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NUTRITIONAL PROFILE OF TWO CYPRINID SPECIES COMMONLY CONSUMED BY THE KHYNRIAM SUB-TRIBE OF THE KHASI COMMUNITY

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Abstract: An investigation analyzed the proximate composition of two Cyprinid species commonly consumed by the Khynriam sub-tribe of the Khasi community: *Neolissocheilus hexagonolepis* (Khasaw) and *Pethia shalynius* (Shalynnai). Measurements included protein, total free amino acid, carbohydrate, lipid, pH, and trace elements. The results showed significant differences ($P<0.05$) between the two species. Protein content was 0.9144 (±0.0508) in *Neolissocheilus hexagonolepis* and 1.944 (±0.181) in *Pethia shalynius*. Amino acid content was 12.82 (±1.84) in *Neolissocheilus hexagonolepis* and 49.03 (±5.44) in *Pethia shalynius*. Carbohydrate content was 0.1406 (±0.423) in *Neolissocheilus hexagonolepis* and 0.0870 (±0.0223) in *Pethia shalynius*. Lipid content was 4.333 (±0.577) in *Neolissocheilus hexagonolepis* and 7.333 (±0.577) in *Pethia shalynius*. Both species had slightly acidic pH values: 6.667 (±0.115) for *Neolissocheilus hexagonolepis* and 6.967 (±0.153) for *Pethia shalynius*. Essential minerals Fe, Zn, and Cu were higher in *Pethia shalynius*, while Mn was slightly higher in *Neolissocheilus hexagonolepis*. Zn content was highest in *Neolissocheilus hexagonolepis*, followed by Mn, Fe, and Cu. In *Pethia shalynius*, Fe content was highest, followed by Mn, Zn, and Cu. These findings provide valuable insights into the nutritional value of the two fish species, both of which are recommended for daily consumption to ensure a balanced diet. Encouraging the consumption of both species could enhance the nutritional diet of the Khynriam sub-tribe of the Khasi community.

***Keywords**:* Nutritional Value, *N. hexagonolepis*, *P. shalynius*, Khasi, Khynriam

1. INTRODUCTION

Nutrition is the most important requirement for human health in relation with growth, health, maintenance and disease. Good food should be chosen wisely for providing proper nutrition to all age groups in order to obtained optimal health. Food derived from both plants and animals are the best sources that meet the need of human nutrition in concern with health. Proper nutrition is an important part of leading a healthy lifestyle and it focuses on how disease condition and problems can be prevented or reduces with a healthy diet. Nutrition also helps in identifying certain disease which may affect the overall health status of an individual. Apart from plants and animals' meat sources that serve the best nutrition, fish is also one of the major sources of food that provides the best nutrients for human health in many ways. Fish as a food is consumed by both animal species and humans. Three quarters of the Earth are covered by water, so fish has been a common and important diet of humans in almost all countries in the world since time immemorial. Fish is one of the cheapest sources of animal proteins and it is commonly available and affordable. Fish serves as a main health-food for the world owing to the fish oils which are rich in polyunsaturated fatty acids (PUFAs), specifically n-3 PUFAs and it is a health-food for the people in extreme of the nutrition scale owing to its proteins, oils, vitamins and minerals and the benefits associated with the consumption of small indigenous fishes. (Mohanty, 2015). Fish is a very well-known source of protein in human diet and it is rich in essential amino acid. It contains a low calorific value and low-fat content but protein content is high. Further n-3 fatty acid found in fish is very essential and it helps in preventing coronary heart disease (Kinsella J.E, 1988). Fish meat also provides a good balance of protein, lipid, vitamins, and minerals (Eridisinghe *et al*., 2000). Fish consists minerals such as iron, calcium, zinc, iodine, phosphorus, selenium and fluorine. These minerals are easily absorbed by the body. Iron being very important in the synthesis of haemoglobin in red blood cells for transporting oxygen to all parts of the body. Calcium plays an important role for strong bones and for the normal functioning of muscles and the nervous system. It also has an important aspect in the blood clotting process. Fluorine is also important for strong bones and teeth. Zinc has an important role in growth and development as well in the proper functioning of the immune system and for a healthy skin. It also has an important role in cell division, cell growth, wound healing and the breakdown of carbohydrates and is required for the senses of taste and smell. Fish is also a rich source of vitamins, especially vitamins A, D and E, as well as thiamine, riboflavin and niacin (vitamins B_1, B_2 and B_3) (Mohanty, 2015). Fish is one of the main sources of food that play an important role in solving food problem, approximately 16% of animal protein consumed by the world's population are derived from fish meat and over a billion depend on fish as their main sources of animal protein (FAO, 2000). Nutrient profiling of fishes determined that fishes are superior nutrients of health benefits.

Worldwide fish has been an important component of human diet. More than 50% of Indian population is fish eating and in some states like Assam and other North-Eastern states, West Bengal, Odisha, Goa and Kerala, more than 90% of the population consume fish (Mohanty, 2015). Fish is also a major source of food to the Khasi Community of Meghalaya. The Khasi Community consists of seven sub-tribes *i.e.* Khynriam, Pnar, Bhoi, War, Maram, Lyngngam and Diko, hence title "Children of Seven Huts" of which the Khynriam sub-tribe is the main focus of the study. They inhabit the central upland of East Khasi Hills, a tribal community maintaining a tradition of forest conservation inhabits the area. People of this community have a habit of gathering a variety of edibles including fish, frogs, crustacean, molluscs, wild vegetables etc. Their staple diet is rice, meat and fish. The area where the Khynriam sub-tribe inhabit is impregnated with a network of rivers and streams which include: Wah Umiew, Wah Umngot. Wah Umkhen, Wah Tharia besides small streams and their tributaries which habour

certain local varieties of fishes locally known as Khasaw, Khalad, Khakhla, Khaiong, Dohthli, Shersyngkai, Shalynnai, Dohmaiñ, Dohbah which are more popular. Out of these Khasaw–*Chocolate mahseer* (*Neolissocheilus hexagonolepis*) and Shalynnai (*Pethia shalynius*) were chosen based on their availabity and commonly consumed. The khasaw (*mahseer)* is a type of fish which inhabit mainly in the hill stream with clean and clear water which is believe to ascend into rapid streams with rocky bottoms, strong current where the water is well oxygenated. They are omnivores feeding not only on algae, crustaceans, and insects but also fruits and shalynnai (*shalynius*) is a small fish a barb, it is a highly endemic freshwater fish and it has an economic importance as ornamental fish. This fish is also a hill stream fish inhabiting high altitude water bodies, they are omnivores and feeds on small invertebrates and plant matter.

Although these fishes are found to be endangered or placed in an endangered list but they are still dominating in the Khynriam Rivers as compared to the other fishes mentioned above and this is may be due to various factors in the environment that may affect the habitat, the feeding habit of the fishes as a whole. The two fish Khasaw (mahseer) and Shalynnai (*shalynius*) serves the best nutrition as per the population view of the community, yet most of the people of the Khasi community scientifically do not understand the importance of fish nutrients. None are serious about fish meat nutrient and its benefits, except only when are prescribed by health practitioner which are bound to follow, instead people are more concerning to the ancestor's tales and stories about the importance and nourishment obtained from fish meat such as strong memory, body build up, smooth skin etc and besides this they are much more well aware of the taste and satisfaction. These are living in their minds and thoughts. Most people of the Khynriam community enjoyed fishing for their own local consumption. The quantity of local varieties of fishes is affordable for rural consumption and not well fit for supply of demands. So, the knowledge of unawareness of the people strikes a mind to focus on the study of fishes which mainly inhabit the area of the Khynriam community.

This study aims to determine the nutritional value of two cyprinid species commonly consumed among the Khynriam sub-tribe of the Khasi community, which will be an utmost importance for the knowledge of the people of the Khasi community considering that less scientific work has been done in this field.

2. MATERIALS AND METHODS

2.1. Study Site

Fig. 1: East Khasi Hills Map of Meghalaya

2.2. Equipment and Reagents

Oven, weighing balance, Centrifuge, spectrophotometer, homogenizer, hydrolysis tube, incubator, digital pH meter, atomic absorption spectrophotometer, magnetic stirrer, hot plate, water bath, test-tubes, pipettes.

Anthrone reagent, standard glucose, working standard, Lowry's Reagent, Folin-Ciocalteau reagent, Ninhydrin reagent, standard protein solution, working standard, leucine, trichloroacetic acid, hydrochloric acid, sodium carbonate, chloroform, methanol, ethanol, propanol, sulphuric acid, nitric acid, potassium hydroxide.

2.3. Questionnaire Survey

The information was collected through extensive field survey, by interacting with the local people.

2.4. Sample Collection

Two species of fish samples were collected from the rivers and weekly local market.

2.5. Identification of Samples

The fishes were identified using the book "Fish and Fisheries of Nagaland" by Fishbase.org; S. C. Dey and S. K. Sarmah. The species were identified as *Neolissocheilus hexagonolepis* (Fig. 2) and *Pethia shalynius* (Fig. 3).

Fig. 2: Photo of *Neolissocheilus hexagonolepis* (Khasaw)

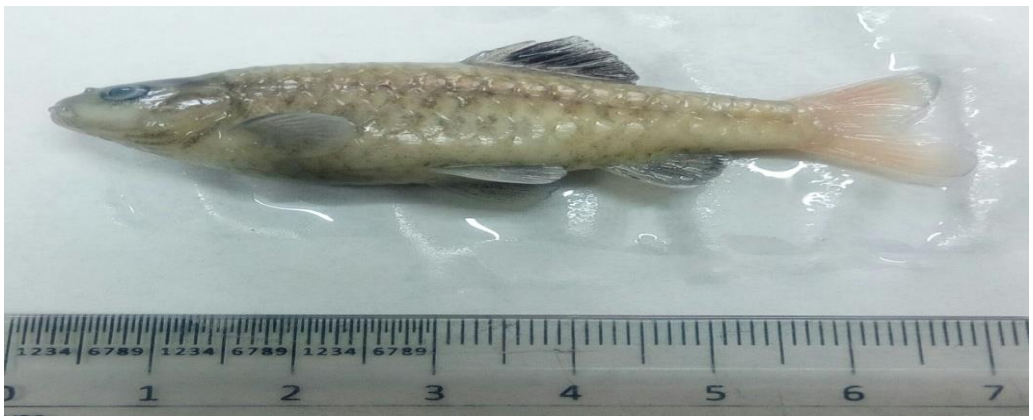

Fig. 3: Photo of *Pethia shalynius* (Shalynnai)

2.6. Analytical Methods

The analytical methods for protein, total free amino acid, carbohydrate, lipid content and pH were done following the methods given in the book by J. Jayaraman "Laboratory Manual in Biochemistry" (2011) with certain modifications for the feasibility of the study. Protein content

was estimated following the method described by O. Lowry (1951), amino acid content was estimated following the method described by S. Ruhemann (1910) and Carbohydrate was estimated by Anthrone reagent method. All the analyses were carried out in triplicate to ensure replicability of the results.

2.7. Protein content Determination

One gram of fresh muscle was extracted and weighed. The sample was homogenized with 5ml of methanol (90 ml): chloroform (30 ml) (3:1). The homogenate was centrifuged at 3000 rpm for 15 minutes. The supernatant was discarded and the remaining tissue pellets were homogenized with 5 ml of methanol: chloroform. The homogenate was centrifuged and the tissue pellet was again homogenized with 5 ml of methanol: chloroform. After centrifugation, the supernatant was discarded and the tissue pellets were homogenized with 5 ml of 1N NaOH and was incubated at 37˚C for 30 minutes. After incubation, the homogenate was centrifuged. The supernatant was collected in another centrifuged tube and the tissue pellet was homogenized in 1ml of 1N NaOH and was centrifuged. This step was repeated three times. To the collected pool supernatant, 2 ml of 10% TCA was added and centrifuged. The supernatant was removed and the precipitate was dissolved in 1ml of 1N NaOH diluted with 10ml distilled water.

One ml of the sample was taken in different test tubes. The blank was prepared by adding 1 ml of 1N NaOH (diluted with 10 ml distilled water). 5 ml of solution E was added in all the test tubes including the blank. The test tubes were allowed to stand for 10 minutes at room temperature. After 10 minutes, 0.5 ml of Folin's reagent was added to all the test tubes and allowed to stand for 30 minutes. The optical density was recorded at 755 nm with the help of colorimeter. The protein content was calculated using the formula:

$$Strength\ of\ Unknown\ = \frac{Strength\ of\ Known - O.D.of\ Unknown}{O.D.of\ Known}\ X\ Dilution\ Factor$$

2.8. Total Free Amino acid Content Determination

One gm of fresh muscle was extracted and weighed. The sample was homogenized with 10 ml of 80% ice cooled methanol and transferred to a centrifuge tube. The homogenizer tube was then washed with 5 ml of 80% methanol and was emptied to the same centrifuge tube. The homogenate was then centrifuged at 3000 rpm for 15 minutes. The supernatant was transferred into a clean beaker; and to the tissue pellet, 5 ml of 80% methanol was added and centrifuged. This step was repeated twice. Finally, the collected pool supernatant was allowed to evaporate to 10 ml with the help of a hot plate.

0.1 ml of the sample was taken in each test tube, and 1 ml of 4% Ninhydrin was added. The volume was made 2 ml by adding 0.9 ml of distilled water. The blank was prepared by adding 0.1 ml of methanol, 1 ml of Ninhydrin, and 0.9 ml of distilled water. The test tubes were then heated in a water bath for 20 minutes. After 20 minutes, the test tubes were allowed to cool down, and 5 ml of distilled water (50): propanol (50) (1:1) was added in all the test tubes. The optical density was taken at 570 nm within 10 minutes. The amino acid content was calculated using the formula:

$$Strength\ of\ Unknown\ = \frac{Strength\ of\ Known - O.D.of\ Unknown}{O.D.of\ Known}\ X\ Dilution\ Factor$$

2.9. Carbohydrate Content Determination

0.2 g of fresh muscle was extracted and weighed. The sample was homogenized with 4 ml of 30% KOH solution and transferred to a test tube. The test tube was heated in a boiling water

bath for 15 minutes and the glycogen was precipitated by adding 4.8 ml of 95% ethanol. The test tube was allowed to stand overnight at room temperature. The precipitated glycogen was centrifuged and the supernatant was discarded. The precipitate was then washed with 65% ethanol and centrifuged. This step was repeated twice. The precipitate was then dissolved and diluted with 10 ml distilled water.

1ml of the sample was taken into different test tubes (excluding blank). 1ml of distilled water was added to all the test tubes including blank. 4ml of Anthrone was then added to the test tubes. The test tubes were then heated in a boiling water bath for 10 minutes and cooled. The optical density was taken at 630nm. The amino acid content was calculated using the formula

$$Strength\ of\ Unknown\ = \frac{Strength\ of\ Known - O.D.of\ Unknown}{O.D.of\ Known}\ X\ Dilution\ Factor$$

2.10. Lipid Content Determination

2 g of fresh muscle was extracted and weighed. The sample was homogenized with 5 ml of methanol (80 ml): chloroform (20 ml) (2:1). After centrifugation of the homogenate at 3000 rpm for 15 minutes, the supernatant was transferred into a beaker (the weight of the beaker must be noted). The beaker containing the supernatant was then allowed to evaporate at 35˚C using a hot plate. The lipid content was calculated using the formula:

$$Amount\ of\ Lipid\ Present\ in\ 100\ gm\ of\ Tissue = \frac{Final\ Weight}{Weight\ of\ Fresh\ Muscle}\ X\ 100$$

2.11. pH Determination

The pH was determined with a glass electrode of a calibrated digital pH meter at room temperature. 2 g of sample was blended with 30ml distilled water and stirred with a magnetic stirrer. The homogenate was transferred to a beaker and was allowed to stand until the tissue pellets settle at the bottom. The supernatant was then taken for pH measurement.

2.12. Mineral Content Determination

2.12.1. Sample Preparation by Conventional Digestion Method (CDM)

Triplicate of 1 g fresh muscle was weighed and mineralized in 5 ml of a freshly prepared mixture of concentrated HNO_3-H_2SO_4 (2:2, v/v). These mixtures were then heated on a hot plate at 80°C for 1hour until clear, transparent digest were obtained. Final solutions were made by diluting 100-fold with deionized water and stored at 4°C until analysis.

2.12.2. Instrument Configuration

A Shimadzu model AA-7000 FAAS equipped with a deuterium lamp for background correction was used with hollow cathode lamps (Shimadzu). Argon was used as purging gas. The FAAS parameters are shown in the Table 1. Cu, Fe, Mn, and Zn were measured under optimized operating conditions by FAAS with air-acetylene flame. Composition of working standards and reagent blanks were run in parallel and corrections were made as needed.

Table 1: Measurement conditions for electro thermal atomization FAAS-7000

Sl. No	Parameters	Cu	Fe	Mn	Zn
01	Lamp current (mA)	06	12	10	08
02	Wave length (nm)	324.8	248.3	279.5	213.9
03	Slit width (nm)	0.7	0.2	0.2	0.7
04	Atomization temp (°C)	2100-2400	2100-2400	2000-2400	1200-1600
05	Ashing temp (°C)	Up to 900	Up to 1000	Up to 1000	300-400
06	Burner height (mm)	7	9	7	7

3. RESULTS

3.1. Taxonomic Status of *Neolissocheilus hexagonolepis* and *Pethia shalynius*.

3.1.1. *Neolissocheilus hexagonalepis*

Kingdom	Animalia
Phylum	Chordata
Class	Actinopterygii
Order	Cypriniformes
Family	Cyprinidae
Genus	*Neolissocheilus*
Species	*N. hexagonolepis*

D iv 9; P i 16; V i 8; A iii 5; C 19

N. hexagonolepis is a hill stream fish belonging to the *Neolissocheilus* genus in the family Cyprinidae and order Cypriniformes. It has a moderately elongated and rounded abdomen. The body is coppery colour with greyish shot with large hexagonal scales, large eyes, and a complete lateral line. (Mcclelland, 1839). It is an omnivorous fish and feeds not only on algae, crustaceans, insects but also fruits. *N. hexagonolepis* is locally known as Khasaw.

3.1.2. *Pethia shalynius*

Kingdom	Animalia
Phylum	Chordata
Class	Actinopterygii
Order	Cypriniformes
Family	Cyprinidae
Genus	*Pethia*
Species	*P. shalynius*

D iii 7; P ii 12-13; V i 7; A ii 5; C 19

The pool barb (*Pethia shalynius*) is a small hill stream freshwater fish belonging to the *Pethia* genus in the family Cyprinidae and order Cypriniformes. It has two black blotches present in the body place on the side of the caudle peduncle, mouth without barbels and small (Yazdani and Talukdar 1975). It feeds on small insects, algae, plankton and small invertebrates. *Pethia shalynius* is locally known as Shalynnai.

3.2. Proximate Composition Analysis

The result of the proximate composition analysis conducted for the samples under study are represented in Table 1, Table 2, Table 3, Table 4 and Table 5.

Table 1: Protein composition of *N. hexagonolepis* and *P. shalynius.*

	Neolissocheilus hexagonolepis	*Pethia shalynius*
Protein (mg/g)	0.9144 (±0.0508)	1.944 (±0.181)

Value: Mean (±SD)
Difference = mu (N.hexagonolepis) - mu (P.shalynius)
Estimate for difference: -1.03000
95% CI for difference: (-1.17179, -0.88821)
T-Test of difference = 0 (vs not =): T-Value = -16.43 P-Value = 0.000 DF = 9

Table 2: Total Free Amino Acid composition of *N. hexagonolepis* and *P. shalynius*.

	Neolissocheilus hexagonolepis	*Pethia shalynius*
Total Free Amino Acid (mg/g)	12.82 (± 1.84)	49.03 (± 5.44)

Value: Mean (±SD)
Difference = mu (*N. hexagonolepis*) - mu (*P.shalynius*)
Estimate for difference: -36.2111
95% CI for difference: (-40.5439, -31.8783)
T-Test of difference = 0 (vs not =): T-Value = -18.91 P-Value = 0.000 DF = 9

Table 3: Carbohydrate Composition of *N. hexagonolepis* and *P. shalynius*.

	Neolissocheilus hexagonolepis	*Pethia shalynius*
Carbohydrate (mg/g)	0.1406 (±0.423)	0.0870 (±0.0223)

Value: Mean (± SD)
Difference = mu (*N. hexagonolepis*) - mu (*P. shalynius*)
Estimate for difference: 0.053556
95% CI for difference: (0.018831, 0.088280)
T-Test of difference = 0 (vs not =): T-Value = 3.36 P-Value = 0.006 DF = 12

Table 4: Lipid composition of *N. hexagonolepis* and *P. shalynius*.

	Neolissocheilus hexagonolepis	*Pethia shalynius*
Lipid (g%)	4.333 (± 0.577)	7.333 (± 0.577)

Value: Mean (± SD)
Difference = mu (*N. hexagonolepis*) - mu (*P. shalynius*)
Estimate for difference: -3.00000
95% CI for difference: (-4.30883, -1.69117)
T-Test of difference = 0 (vs not =): T-Value = -6.36 P-Value = 0.003 DF = 4

Table 5: pH composition of *N. hexagonolepis* and *P. shalynius.*

	Neolissocheilus hexagonolepis	*Pethia shalynius*
pH	6.667 (± 0.115)	7.333 (± 0.153)

Value: Mean (± SD)

3.3. Graphical illustration

Fig. 4 to 9 are graphical illustrations among the fish under study with respect to the selected parameters.

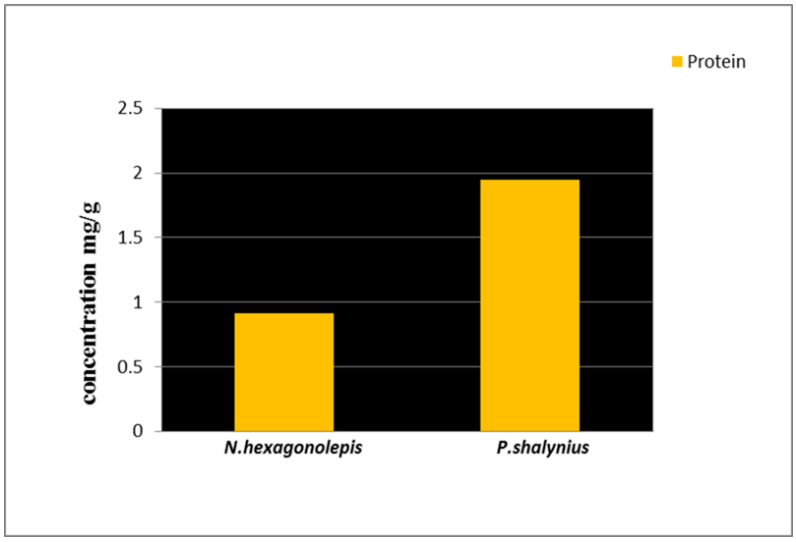

Fig 4: Protein composition of *Neolissocheilus hexagonolepis* and *Pethia shalynius*

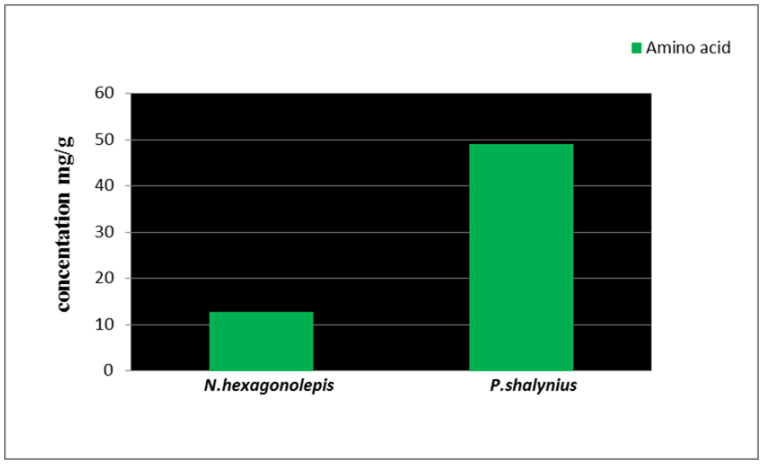

Fig. 5: Amino acid composition of *Neolissocheilus hexagonolepis* and *Pethia shalynius*.

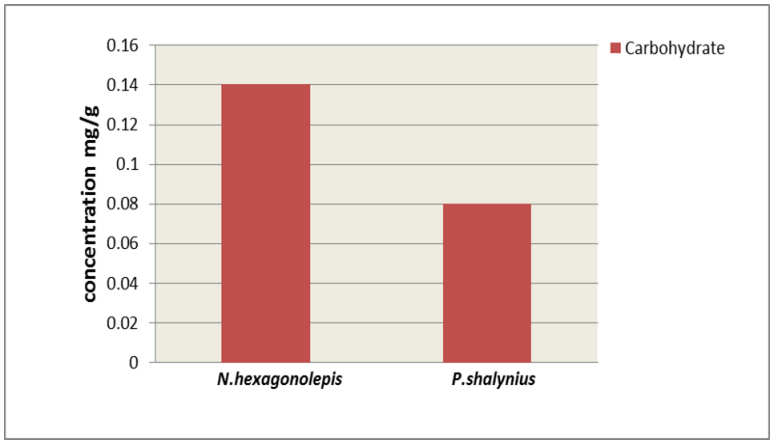

Fig. 6: Carbohydrate composition of *Neolissocheilus hexagonolepis* and *Pethia shalynius*.

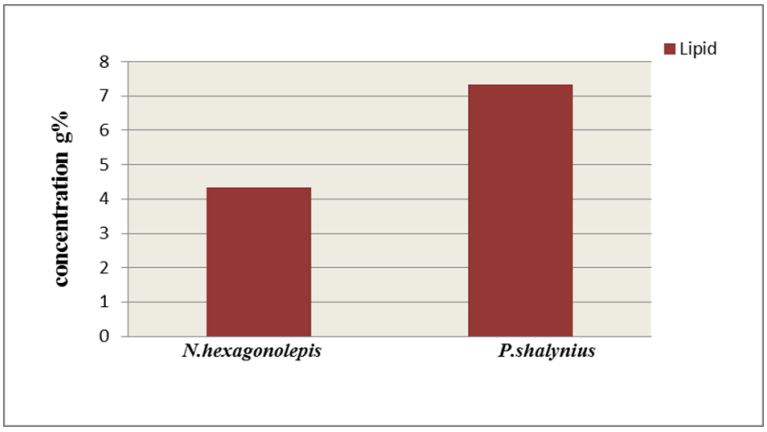

Fig. 7: Lipid composition of *Neolissocheilus hexagonolepis* and *Pethia shalynius*.

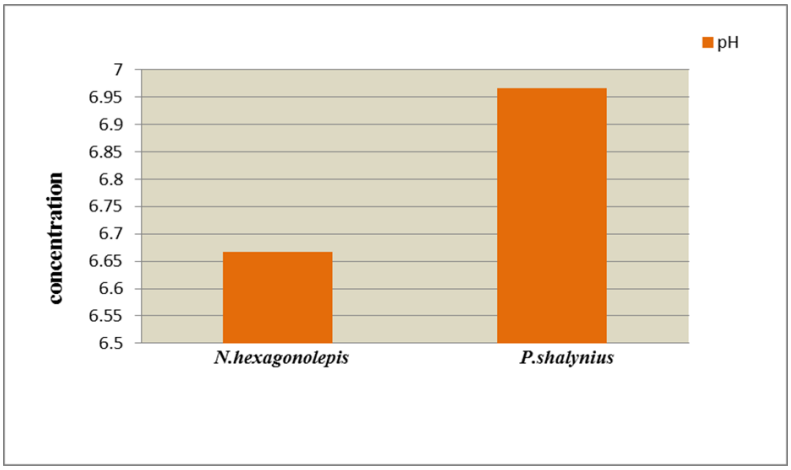

Fig. 8: pH composition of *Neolissocheilus hexagonolepis* and *Pethia shalynius*.

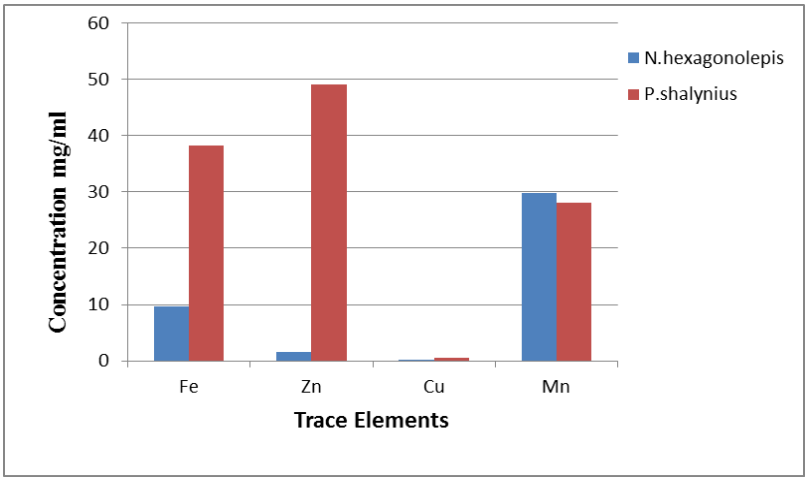

Fig. 9: Trace Elements composition of *Neolissocheilus hexagonolepis* and *Pethia shalynius*.

4. DISCUSSION

The result analysis on the estimation of proximate composition of the two fresh water fishes: *Neolissocheilus hexagonolepis* (Khasaw) and *Pethia shalynius* (Shalynnai) is shown in Table 1, Table 2, Table 3, Table 4 and Table 5 and the graphical illustration is shown in Fig. 4-9 above. Based on the results of the two fish species a distinct picture of nutrients of commonly consumed fishes are evident.

The proximate composition namely protein, total free amino acid, carbohydrate, lipid, pH and trace elements of the two fish species under study are:
Protein Content: The protein content of the two fish species was found to be 0.9144 (± 0.0508) in *Neolissocheilus hexagonolepis* and 1.944 (± 0.181) in *Pethia shalynius* and these fishes are highly significantly indifferent (P<0.05)**.

Total free amino acid content: Total free amino acid of the two fish species was found to be 12.82 (±1.84) in *Neolissocheilus hexagonolepis* and 49.03 (±5.44) in *Pethia shalynius* and these fishes are highly significantly indifferent (P<0.05) **.

Carbohydrate Content: The carbohydrate content of the two fish species was found to be 0.1406 (± 0.423) in *Neolissocheilus hexagonolepis* and 0.0870 (± 0.0223) in *Pethia shalynius* and these fishes are highly significantly indifferent (P<0.05) **.

Lipid content: Lipid content was found to be 4.333 (± 1.84) in *Neolissocheilus hexagonolepis* and 7.333 (± 0.577) in *Pethia shalynius* and these fishes are highly significantly indifferent (P<0.05) **.

pH: pH content was found to be 6.667 (±0.115) in *Neolissocheilus hexagonolepis* and 6.967 (± 0.153) in *Pethia shalynius.*

Trace elements: Trace elements content of the two fish species is recorded as Fe 9.68 ppm, Zn 1.64 ppm, Cu 0.22 ppm and Mn 29.84 ppm in *Neolissocheilus hexagonolepis* and Fe 38.32 ppm, Zn 49.05 ppm, Cu 0.51ppm and Mn 28.01ppm in *Pethia shalynius*.

The results of the study indicate that the proximate compositions of these two cyprinid fish species are highly significantly indifferent (P< 0.05) **. The pH content of both the fishes *Neolissocheilus hexagonolepis* and *Pethia shalynius* was found to be slightly acidic and the essential mineral contents Fe, Zn, Cu and Mn present in both the fishes where Fe, Zn and Cu was found to be higher in *Pethia shalynius* whereas Mn is slightly higher in *Neolissocheilus hexagonolepis.* Zn content was found to be higher followed by Mn, Fe and Cu in *Neolissocheilus hexagonolepis* and Fe content was found to be higher followed by Mn, Zn and Cu in *Pethia shalynius.*

Various species of fish do not provide the same nutritional value to their consumers (Takama *et al.,* 1999) and the nutritive value of certain fish species varies with season (Varjlen *et al.,* 2003). Fishes varies in their proximate composition due to spawning cycle and food supply (Love 1980). The proximate composition content of the fishes also differs in every season as mentioned by Varjlen *et al.,* 2003 and there are also certain several factors such as age, sex, nutrients and many other wide variations occurring that affect the proximate composition of the fishes (Love et al., 1980, Nair and Mathew, 2000). Proximate composition variation may also seem to be governed by sexual development, time of spawning; feeding condition (Bruce 1924; Venkataraman and Chari, 1951). The above results depicts that nutritional value of fishes varies according to season and also other several factors in the environment and the value of the composition may varies. The present study shows that the proximate compositions of the two fish are highly significantly indifferent (P< 0.05) and both these fishes are nutritionally competitive.

5. CONCLUSION

The proximate composition data provides valuable information regarding the nutritional value of the two fish species. The proximate composition of the fishes was reported for understanding more about the well-being of the fish. And the proximate composition may vary in different seasons as mentioned by Varjlen *et al.,* 2003. This present study demonstrated that the proximate composition of the two fishes is highly significantly indifferent ($P<0.05$) and both the fishes can be recommended for the daily diet and people should not rely only on one of the both fish. Encouragement of the consumption of these varieties of fish could be helpful for developing the nutritional diet of the Khynriam sub-tribe of the Khasi community.

There is limited information on the nutritive value difference of fish species in the Khasi Community. It is necessary to develop a guideline for common people to aid them to plan sophisticated nutritional diet for an excellent health status. The outcomes of this study will help in achieving the knowledge on nutritional value of fishes among the Khasi community.

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