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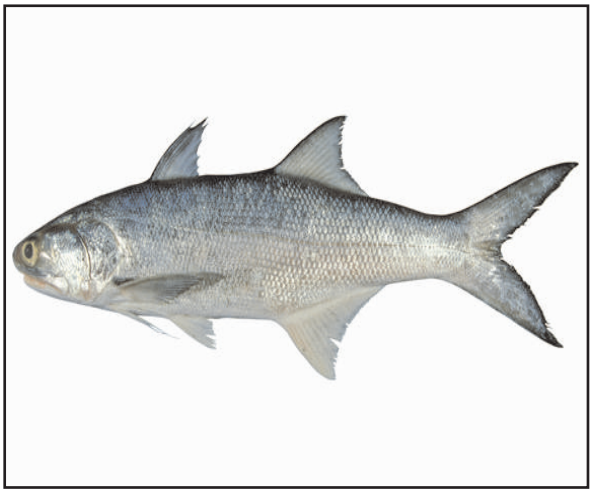
STUDY ON CHANGESH OF LIPID AND CHOLESTEROL CONTENT IN WHITE MUSCLES AND RED MUSCLES OF TWO SPCIES OF FISHES OFF JODIA COAST IN GULF OF KUTCH.

Y. M. Kadiyani
Department of Biology, Bhavan's College , Dakor , Gujarat, India.



ABSTRACT

Regarding total lipid content in white muscles in case of E.tetradactylum, it increases pre-spawning time and remain uniform level during spawning .Again shows higher level during late period of spawning period .In case of L.tade the total lipid content decreases during post spawning period and increases during pre-spawning period .Again it shows higher level in November to February i.e. spawning period .Total lipid might be accumulating during pre-spawning and beginning of spawning period .Indicating requirement of metabolites for exhaustive spawning migration .The total lipid of red muscles level shows a decreases trend during pre-spawning period and beginning of spawning time and it shows higher level during spawning and late period of spawning and uniform trend during post spawning period in E.tetradactylum .In case of L.tade a uniform up and down level in total lipids of red muscles is observed during pre-spawning and post-spawning and higher level in total lipid content in red muscles present during spawning period indicating the resumption of un spawned gametes particularly ova. The Cholesterol level of White muscles in E.tetradactylumshows a rise and fall during pre-spawning period and gradually increase level during beginning of spawning and spawning period .While in case of L.tade Cholesterol level remains uniform in a pre-spawning period increases trend observed during spawning period up, and up and down level during late period of spawning and uniform level in post spawning period .In case ofE.tetradactylumthe cholesterol level in red muscles shows increases during pre-spawning and shows gradually increased level during spawning time. Again the level decreases during late period of spawning and post-spawning.In case of L.tade the cholesterol level in red muscles higher level during spawning and post spawning period (up to April). A decreases level in cholesterol content in red muscles of L.tade is observed during pre-spawning period .It may be attributed that fish might be utilizing cholesterol for the synthesis of sex hormones during pre-spawning period.

KEYWORDS :*E.tetradactylum , total lipid , period of spawning and uniform level .*

INTRODUCTION :

In fishes in addition to adipose tissues the skeletal muscles also serve as lipid reserve site (Bilinski, 1969; Tashima and Cahil, 1965). It is also known that comparatively red muscles of fishes spare more fat (Alexander, 1955; Brackkan, 1959; Geiger and Bergstorm, 1962; George, 1962; Joseph, 1967; Bilinski, 1969; Love, 1970). The narrow muscle fibers have been demonstrated to have more fat by using 'Sudan Black Staining' (Alexander, 1965; George and Naik, 1958; Oseph, 1967). The lipase activities were demonstrated mainly in red muscles; both extra and intra cellularly, where as in the white muscles only extra cellular lipase was demonstrated (George and Bokadawala, 1964; Bokadawala and George, 1964). The red muscles are better to utilise fat compare to white muscles in fishes (Baaretters, 1961; George, 1962; Anderson et al., 1963; Bone, 1930; as cited by Love, 1970).

There are two distinct functions for red and white muscles, as far as locomotion in fishes is concerned. The red muscles may be more active during prolonged swimming in the fishes whereas white muscles are used for quick movement. Consequently fat of the muscles plays a prominant role as an energy source in long periods in swimming in fishes. It is known that muscles oil increase in *Gadus morrhua* (Jangaard et al., 1967) in Raja batis(Fisher, 1964).In *Sardinella longiceps*(Harnel and Nayudu, 1953). Migratory fishes store fat in liver and in skeletal muscles prior to migration and utilise during migration (Thurston and Newman, 1962; Joseph, 1967).

Some fishes show depletion in amount of lipids during spawning (Idler and Bitners, 1958; Joseph, 1967; Varghese, 1967). The fat content of muscles of Sea batrachus was influenced by maturation of gonads (Bano, 1977).

A good deal of work has been presented on cholesterol content of various organs of some fishes, like fish blood, fish dark muscles (Bligah and Scott, 1963; Igarashi et al., 1957a; 1957b; 1957c; 1957d; Katada et al., 1959; 1960; Namiki, 1933- as quoted by Love, 1970; Zama, 1963a); gonads (Siddiki, 1966).Ovary (Idler, 1959;1960; Shewan and Takeuchi, 1964a; 1964b; Addison et al., 1968). It is now made known that the cholesterol present in fish flesh is not related to the lipid content of the fish muscles. Wurtiziger and Hensel (1967) have shown that there is not much significant difference in cholesterol content of muscles of various species of the fish. However, the dark of red muscles of the fish, contain more cholesterol than that of white muscles. The cholesterol in fishes is converted possibly into the sex-hormones, during the peak of the sexual activities that result in to low cholesterol in serum of fish. With a view to study variations occurring in both white and red muscles of *E. tetradactylum* and *L. tade* the present study was under taken.

MATERIAL AND METHODS

White and red muscles from at least ten to fifteen fishes of *E. tetradactylum* and *L. tade* each (Total length from 10 to 20 cm in size) were obtained in the field Jodia coast. The white muscles were dissected out from the samples from the trunk and tail region; whereas the red muscles were concentrated only at the base of pectoral and pelvic fins. After removing their skeletal spines, the muscles were separately stored in polethene bags and brought to the laboratory of the Department of Chemistry, Saurashtra University, and Rajkot. The muscles were then blotted with blotting papers and dried muscles then stored separately in polythene bags. Total lipids from the muscles were extracted by using sox let apparatus using ethanol and petroleum ether mixture (3:1 ratio) as the solvent system. Enough care was taken to collect the sample from the same portion of the fishes every month to keep consistency of the collection of samples. The muscles powder prepared from the thirty specimens were mixed together and analyzed. However, the analyses for white and red muscles were done separately. The results are presented in Fig. 1, 2 and Table 1.The white and red muscles were dissected out very

quickly in the field from live E. tetradactylumand L. tade of length range 10 to 20 cm every month and were dried at 480C in an oven for three to five days. Then the muscles were powdered and were stored in polythene bags.

The cholesterol of the muscles was estimated by method of the stadman (1957) using Leiberman Burchard reaction. Mean values of 10 to 15 samples collected every month for the analysis of cholesterol is presented in the Fig.3, 4 and Table 2.

RESULTS AND DISCUSSION

It is observed in Graph 36 and Table 36 that total lipid content in white and red muscles of both the species show high level throughout the year, in comparison to other metabolites. A rise in total lipid contents is observe during pre-spawning period and uniform level is observed during spawning period. It can be explained the possible conversion of glycogen to during maturation of eggs in case of female, and accumulation of extra energy in the form of total lipids, in case of male fish.

It is also clear from graph and table that red muscles show higher value in total lipid than that of white muscles in case of *E. tetradactylum*. It is possible that pectoral and pelvic fins required high energy content metabolites for migration and locomotion purpose.

In case of *L. tade* total lipid content shows higher level in white muscles during spawning period, and a gradual rise in total lipid content in white muscles observed during pre-spawning period. During this time fish might be accumulating fat for future spawning purpose.

A uniform up and down level in total lipid in red muscles is observed during post-spawning and pre-spawning period. Indicating recovering during this period, and nearly higher level in fat content in red muscles present during spawning period, for steady and long movement in red muscles require high energy metabolites. It is reported by several workers that red muscles contain more fat compared to white muscles (Alexandar, 1955; George, 1962; Bone, 1966; Anderson, et al., 1963; Rayner andKeenan, 1967; Joseh, 1967, Varghese, 1976).

It is evident from the graph 37 and Table 37 that the cholesterol content of white muscles of E. tetradactylum increases prior to spawning during October and during middle of the spawning period. I.e.during November and December. Cholesterol content is higher during June that is during pre-spawning period and fall in cholesterol level is observed in pre-spawning period indicating utilization of cholesterol by gonads in both the species. White and Red muscles depletion in cholesterol content is observed during post-spawning and pre-spawning period. The rise in cholesterol during spawning period recorded is suggestive of relationship between spawning and cholesterol content of fish muscles.

The cholesterol content in white muscles in *L. tade* shows a rise and fall during December to April. A uniform level is observed from May to November. A rise in cholesterol content is observed during spawning period, fish might be accumulating high energy content metabolites during spawning period.

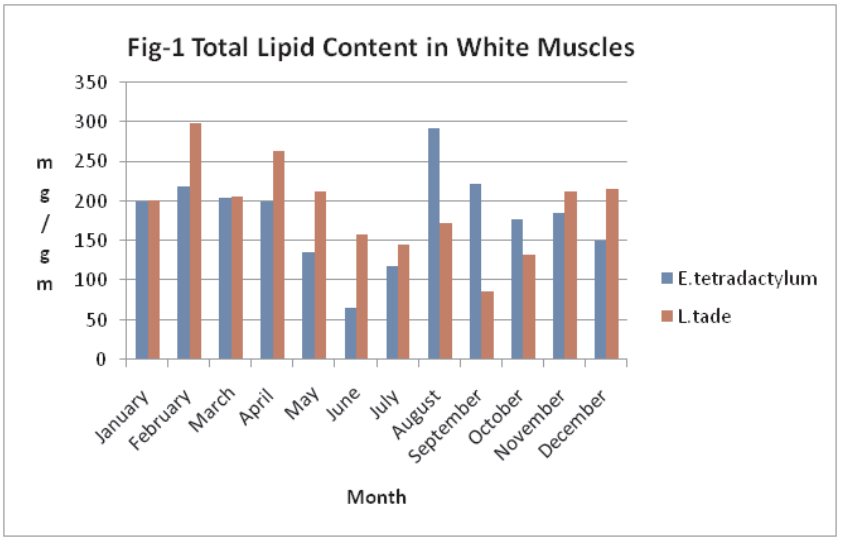
The cholesterol level in red muscles shows higher level during spawning and post spawning period (Up to April). Sudden fall in cholesterol level is observed in May. A decrease level in cholesterol content in Red muscles of L. tade is observed during pre-spawning period indicating utilization of cholesterol for gonadial activity. Cholesterol is precursor of sex-hormones in fishes also. Preparation of sex hormones from cholesterol during pre-spawning period, probably due to decrease in cholesterol content in both the muscles is observed during pre-spawning period.

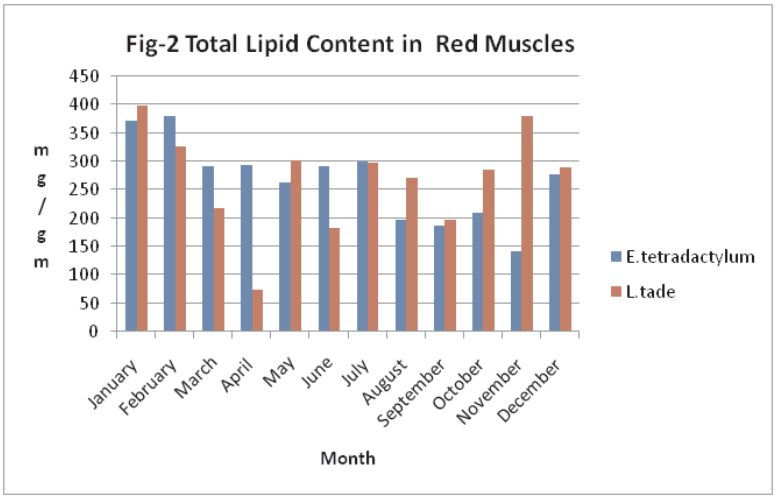
Table-1Showing the Total Lipid Content in White Muscles and Red Muscles in mg/gm.

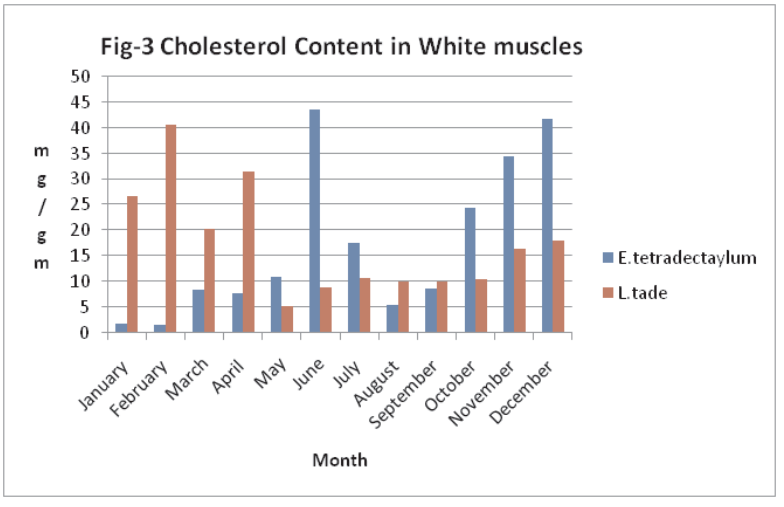
Month	*E. tetradactylum*		*L. tade*	
	White muscles	Red muscles	White muscles	Red muscles
January	200 ±3.00	372 ± 1.25	202 ± 1.52	398±2.00
February	219±2.00	380±1.53	299±1.15	326±1.50
March	204±1.00	292±1.52	206±0.00	218±1.00
April	200±2.89	294±1.52	264±1.52	74±1.52
May	136±2.5	264±2.00	212±2.00	302±0.00
June	65±0.58	292±2.52	158±2.00	182±2.00
July	118±2.52	300±0.00	146±2.00	298±1.50
August	293±2.65	198±2.00	172±2.50	272±1.52
September	222±3.00	186±2.51	86±1.53	197±1.53
October	178±2.00	210±2.00	133±1.73	286±1.52
November	186±1.52	142±2.00	212±2.10	381±1.00
December	151±1.52	278±2.00	216±2.10	289±1.50

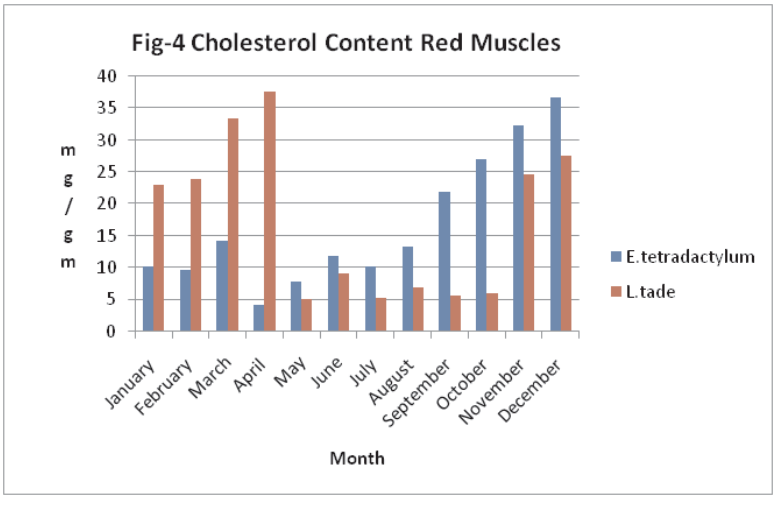
Table-2 Showing the Cholesterol Content in White muscles and Red muscles mg/gm.

Month	*E. tetradactylum*		*L. tade*	
	White muscles	Red muscles	White muscles	Red muscles
January	1.75±0.05	10.30±0.10	26.70±0.05	23.10±0.05
February	1.65±0.10	9.60±0.04	40.55±0.05	24.00±0.00
March	8.55±0.00	14.30±0.10	20.25±0.15	33.50±0.05
April	7.75±0.05	4.20±0.05	31.60±0.10	37.60±0.05
May	10.85±0.05	7.90±0.10	5.15±0.10	5.20±0.05
June	43.50±0.05	11.85±0.15	8.80±0.15	9.10±0.00
July	17.60±0.08	10.20±0.05	10.70±0.10	5.25±0.00
August	5.40±0.13	13.35±0.05	10.10±0.00	6.85±0.05
September	8.60±0.15	21.95±0.05	10.10±0.05	5.75±0.05
October	24.45±0.15	27.10±0.05	10.50±0.15	6.10±0.05
November	34.55±0.05	32.30±0.05	16.40±0.10	24.65±0.10
December	41.75±0.05	36.75±0.07	18.15±0.05	27.65±0.05









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Y. M. Kadiyani
Department of Biology, Bhavan's College,Dakor , Gujarat, India.