Indian Streams Research Journal
ISSN 2230-7850
Impact Factor : 1.7604(UIF)
Volume-3 | Issue-12 | Jan-2014
Available online at www.lbp.world

STUDIES ON CHANGES OF SODIUM, POTASSIUM AND CALCIUM IN GONAD OF TWO SPECIES OF FISHES OFF JODIA COAST IN GULF OF KUTCH

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Abstract:

Minerals like Sodium, potassium and Calcium Content in Ovary and Testis in both Species was studied. Rise and fall in level in minerals Content in Ovary and Testis was observed in relation to Pre-spawning, Spawning and Post-spawning periods. All these observed decreasing and increasing trends in minerals content in respective organs have correlation with the gonadial cycle of both the fish.

Key words: *Sodium,Potassium,Calcium,Ovary, Testis.*

INTRODUCTION:

It is known that the fish gonads under of several histological, anatomical, and physiologicalcytologicaland biochemical changes during pre-spawning, spawning and post-spawning period. Gonad at the main testes of many fish physiologist other literature some except of testes and ovary regarding that position, shape, size, and activities during different stages have metabolites of gonads.

The maturation and restoration of ova are correlated with the mobilization of minerals to and fro from gonads to various organs.

Work regarding sodium in fish ovary is very few (Leonteive and Fskupskui, 1966; Varghese 1976). The rise in sodium content in both the testes and in the ovary during sexual maturity of *Pampusargenteus*and*Parastromuteusniger*was recorded, followed by a fall in the fish after spawning by Varghese (1976).

Up till now very few literatures have been available about potassium content of gonads. (Leonteive and Fskul's 1966; Varghese, 1976).

Calcium is very important in process of maturation of eggs in the fish Bailey (1957). Calcium increases in female along with enhancement of maturity. Especially in female, a notable increased level of calcium in mature ovaries of fish is reported by Woodhead et al. (1965). Varghese recorded high level of calcium in stage IV and V of ovaries of *Pampusargenteus* and *Parstromateusniger* and a significant fall in the spent ovaries. With an aim to study variations in

sodium, potassium and calcium content in the ovary and in the testes of *E. Tetradactylum*and *L. Tade* the present investigation was undertaken.

MATERIALS AND METHODS:

The testes and ovaries from fifteen to twenty live*E. tetradactylum*and *L. tade*(10 to 20 cm in size) were dissected out separately every month. The samples were then brought to the laboratory and were oven dried at 48^0C for 3 to 5 days. The samples were then digested with Conc. $H_2SO_4$and per chloric acid and were made up to certain volume. Sodium and Potassium was determined by flame photometer(Eel make) using sodium filter and Potassium filter and Calcium present in the above solution was determined by E.D.T.A.method using Erichrome Black –T as an indication, the all minerals reading were then converted to mg/gm of dry weight of testes and ovaries respectively.

RESULT AND DISCURSION:

From the Fig. 1, 2and table 1 it can be seen that in both the species, the sodium content in the ovary increases before spawning and decreases during spawning period. It shows higher level immediately after spawning and it gradually decreases during Post spawning period i.e. May to July. It increases gradually before spawning i.e. during the period of gametogenesis and sperm and Ova maturation sodium in the ovary of both the species is depleted after spawning.

Regarding sodium content of testes of *E. tetradactylum it* gradually increases during pre-spawning period i.e. August to November and it shows decrease trend during post spawning period i.e. during March and April. In case of *L. tade sodium* content in the testes increase during just before the spawning time. It shows higher level during spawning period and decrease level during post spawning period i.e. during February to June.

Fall in the sodium immediately after spawning period may be due to depletion in fish sodium content. In testes of *E. tetradactylum*shows higher level than that of ovary during pre-spawning and spawning period. It indicates the accumulation and mobilization of minerals in liver and gonads.

It is important to note that the liver sodium shows higher trend and gradually decreases during post spawning and pre-spawning period. While sodium in ovary and testes in case of *L. tade*shows comparatively less amount during the same period i.e. pre and post spawning period. The sodium content in ovary or testes shows higher level during spawning period.

It indicates active mobilization of during pre-spawning and spawning period in liver and gonads. The rise in sodium in both, the testes and the ovary during sexual maturity of *Pampus, argentenus and Parastromuteusniger* was recorded, followed by a fall in the fish after spawning by Varghese (1976).

The potassium content inovary of *E. Tetradactylum* Fig. 3, 4 table 2shows an increase trend during pre- spawning and spawning period and it shows highest level during just after spawning i.e. during April and it fall significantly in May to July. In case of *L. Tade* the potassium content shows highest level during just the spawning period starts and shows decline level during spawning time, it shows higher level during post spawning period. The potassium content of ovary fall during spawning period can be correlated with the release of gametes and sexual activity. Higher level of Potassium content in ovary of both the species during post spawning period is correlated with the process of reabsorption of unspawned ova. A decline level in Potassium content ovary of both the species during process of gametogenesis and gamete

laying period is significant variation in Potassium of testes and ovary of *Pampusargenteus*and *Parstromateusniger*

Potassium content in the testes of both the species shows same trend as it is in ovary. In case of *E. tetradactylum*it shows higher trend from July to October i.e. during pre-spawning period and shows decline level during spawning period and it rises gradually during post spawning period. In case of *L. tade*Potassium content in testes shows higher level during August to September and same trend is observed during November to January i.e. during spawning period. It falls to significant level during February and March i.e. immediately after spawning. The decline level of Potassium content in testes during immediate after spawning period is due to depletion in Gonads.

Referring to the Fig. 5, 6 and table 3 it can be stated that Calcium level in ovary of *E. tetradactylum*increases during pre-spawning period. I.e. during period of active process of gametogenesis in the month to August and September. The calcium level decreases significantly during spawning period i.e. in December to March. It again increases after spawning period i.e. during post spawning period. In case of *L. tade.*Same trend is observed. The calcium level increases during the period of gametogenesis i.e. during October and November. The Calcium content decreases significantly during spawning period i.e. during December to March. The calcium level in ovary of *L. tade*increases i.e. April and May. It is clear from the above results increases during process of maturation of Ova. There is fall in calcium level of ovary during spawning period and again rise in calcium level in post spawning period. The fall during spawning period may be due to depletion. The calcium level increases in female along with the enhancement of maturity; it is reported by Woodhead, et al (1965). Varghese (1976) has also reported fall in ovarian calcium in Post spawning period and rise in ovarian calcium from stage III of maturity to stage V of maturity in *Pampusargenteus*and *Parstromateusniger.* Similarly higher calcium level was also recorded in ripe ovary of *Gadus morrhua* by Woodhead et al, (965). The calcium content in testes of *E. tetradactylum*shows mostly same trend as it is in ovary. It increases during per spawning, show a peak level in October and November. Generally it remains at normal level during spawning period. In case of *L. tade,*the calcium level in testes gradually increases during pre-spawning, and it reaches to the peak in the beginning of spawning period of spawning and post spawning. An increase level in calcium of testes a both the species during pre-spawning and in the beginning of the spawning can be correlated with active process of gametogenesis during this periods. A decreases level during later period of spawning and post spawning may be attributed to the depletion. It is interesting to note that the calcium level in gonads of both the species remains at higher level than those of white muscles than in red muscles in liver. Again, it is notable from the above results that the calcium amount is observed at higher level in testes than that of ovary of the both the species.

Table -1 Showing the Sodium Content in Gonad in mg/gm

	E.tetradectylum		L.tade	
Month	Ovary	Testis	Ovary	Testis
January	8.60±0.46	18.30±0.17	3.20±0.19	15.37±0.17
February	10.45±0.17	13.25±0.46	7.20±0.35	3.40±0.35
March	10.85±0.35	-	6.25±0.16	-

April	12.25±0.46	12.35±0.34	12.25±0.17	6.30±0.34
May	6.07±0.00	15.25±0.17	9.10±0.00	4.35±0.17
June	5.25±0.76	15.75±0.60	6.30±0.17	3.10±0.37
July	6.70±0.60	12.35±0.35	4.50±0.11	-
August	7.80±0.35	13.35±0.52	7.50±0.18	13.85±0.34
September	7.20±0.17	18.40±0.34	13.45±0.34	12.25±0.16
October	9.50±0.35	22.35±0.46	16.60±0.17	6.30±0.35
November	15.30±0.17	24.50±0.17	6.20±0.18	15.30±0.16
December	13.85±0.18	15.30±.17	4.35±0.17	15.10±0.46

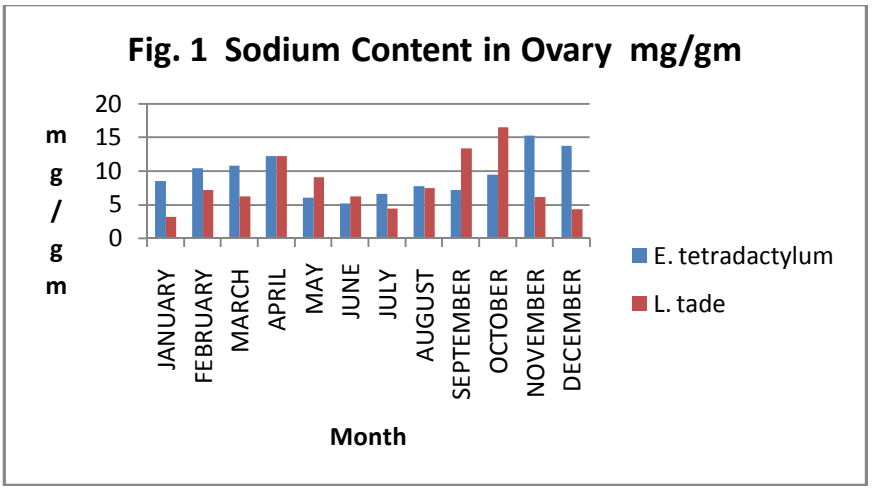
Table -2 Showing the Potassium Content in Gonad inmg/gm

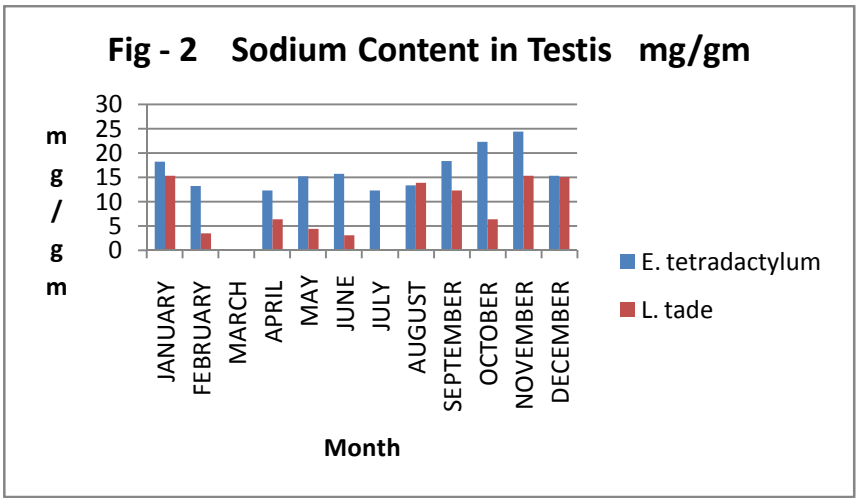
	E.tetradectylum		L.tade	
Month	Ovary	Testis	Ovary	Testis
January	14.00±0.54	18.70±0.20	7.75±0.19	20.40±0.52
February	17.65±0.20	15.60±0.39	17.20±0.20	6.84±0.00
March	18.45±0.35	-	15.05±0.34	-
April	20.40±0.52	20.85±0.59	13.80±0.19	11.40±0.52
May	16.85±0.40	24.35±0.39	13.10±0.20	10.15±0.19
June	15.40±0.34	23.50±0.19	8.45±0.19	8.45±0.20
July	10.70±0.40	21.75±0.20	9.10±0.39	-
August	12.40±0.52	18.45±0.35	10.50±0.19	17.30±0.19
September	8.65±0.39	20.16±0.34	17.20±0.20	21.85±0.35
October	10.00±0.39	21.98±0.71	24.70±0.86	17.45±0.34
November	14.70±0.35	13.67±0.00	20.16±0.34	23.50±0.39
December	12.65±0.35	11.51±0.52	12.20±0.19	17.30±0.39

Table -3 Showing the Calcium Content in Gonad inmg/gm

	E.tetradectylum		L.tade	
Month	Ovary	Testis	Ovary	Testis
January	2.10±0.10	4.00±0.00	0.67±0.12	4.90±0.10
February	5.75±0.46	4.85±0.12	0.85±0.09	4.10±0.23
March	2.15±0.06	-	0.96±0.07	-
April	2.10±0.10	7.95±0.05	3.06±0.11	3.5±0.12
May	4.25±0.23	6.10±0.10	3.50±0.00	3.8±0.00
June	3.10±0.10	8.00±0.00	0.85±0.05	2.0±0.12
July	2.05±0.05	2.10±0.10	0.99±0.06	-
August	7.05±0.11	4.20±0.20	1.45±0.06	4.20±0.20
September	3.10±0.10	6.90±0.10	4.97±0.08	6.00±0.12

October	2.05±0.05	8.00±0.00	6.03±0.05	6.70±0.10
November	1.65±0.12	8.90±0.10	6.90±0.10	8.90±0.10
December	1.30±0.10	6.00±0.80	0.80±0.02	8.00±0.00





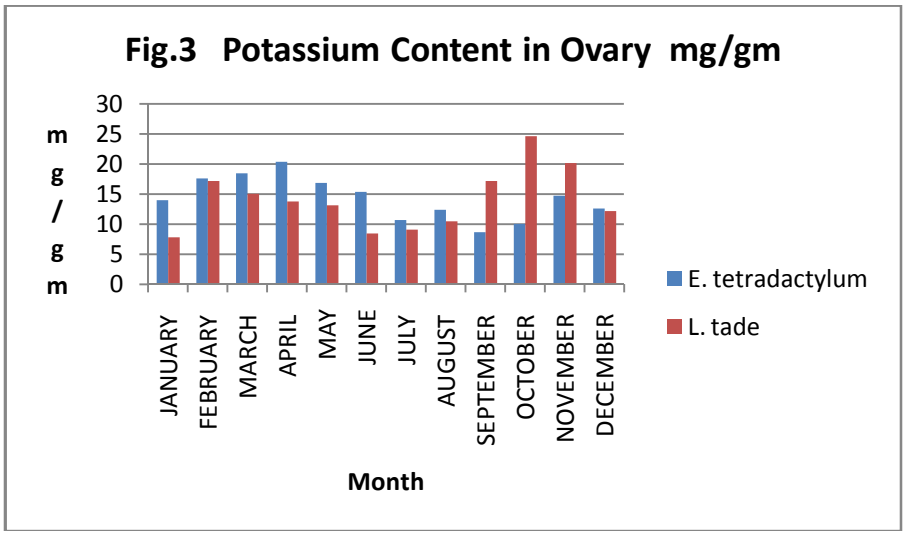


Fig.3 Potassium Content in Ovary mg/gm
mg/gm
30
25
20
15
10
5
0
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
Month
E. tetradactylum
L. tade

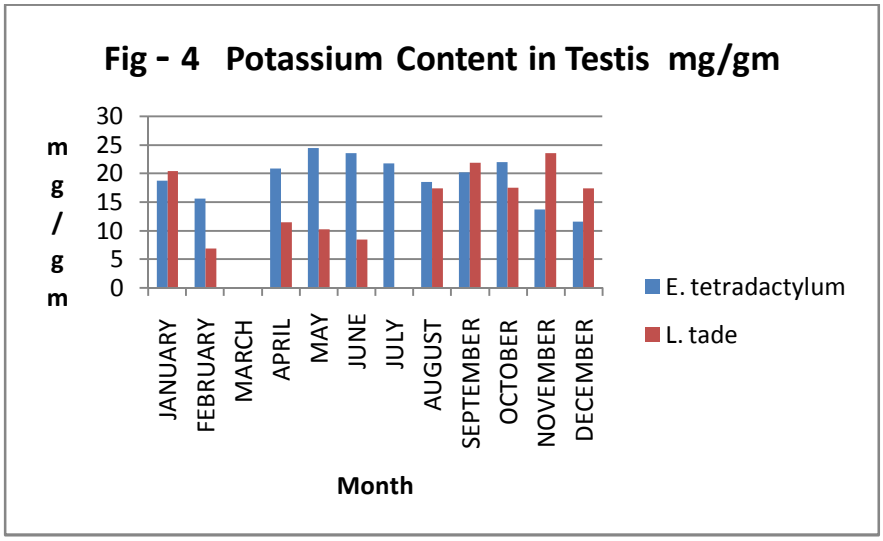


Fig - 4 Potassium Content in Testis mg/gm
mg/gm
30
25
20
15
10
5
0
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
Month
E. tetradactylum
L. tade

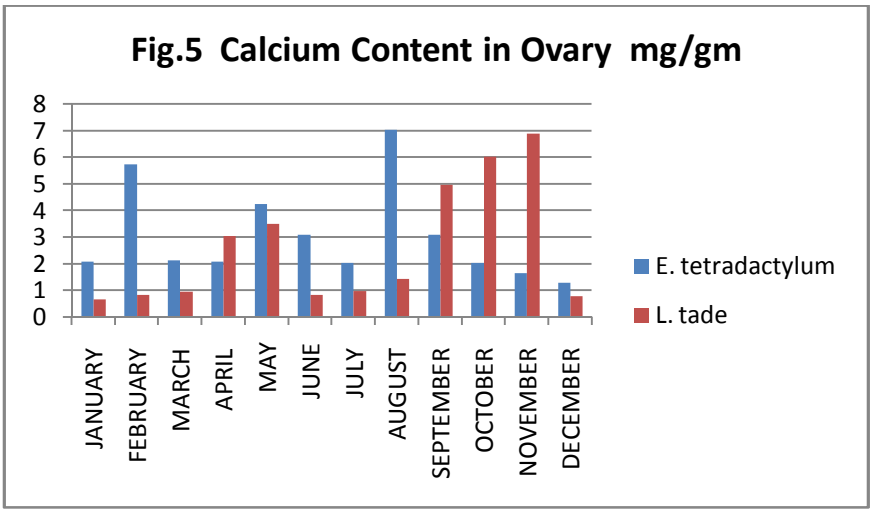
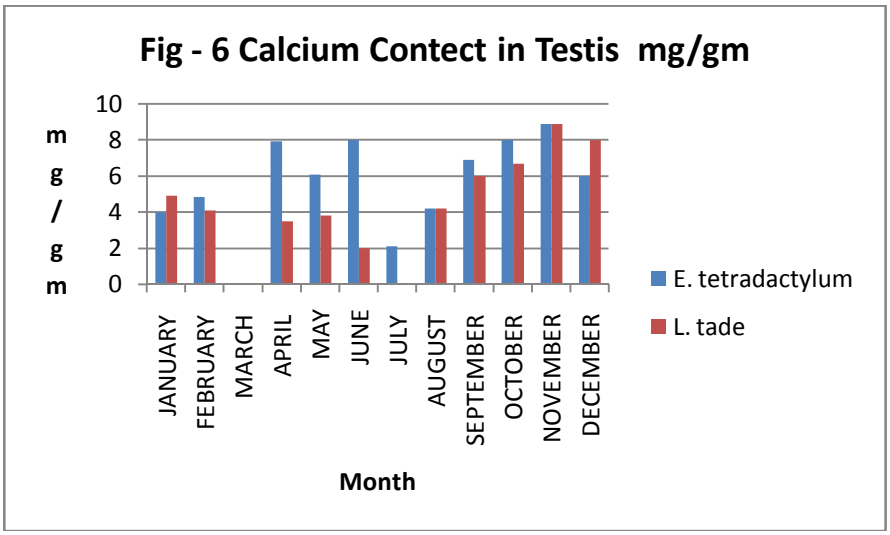


Fig.5 Calcium Content in Ovary mg/gm
8
7
6
5
4
3
2
1
0
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
E. tetradactylum
L. tade



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ISSN 2320-5407 International Journal of Advanced Research (2014), Volume 2, Issue 11, 1028-1034 103

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