STUDY ON THE EFFECT OF VITAMIN C DEFICIENCY ON OREOCHROMIS NILOTICUS UNDER INTENSIVE CULTURE SYSTEM

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ABSTRACT
In this study 2000 Oreochromis niloticus monosex at 28 days, were divided into four groups to study the effect of vitamin C deficiency. The first group was fed on vitamin C deficient diet while the other three groups were fed on diet containing vitamin C in rates 200, 400 and 800 mg/Kg food respectively. Gross abnormalities in vitamin C deficient group were mainly skeletal deformities and emaciation. Haematological parameters showed decrease in blood cell counts, P.C.V. and hemoglobin concentration. The histopathological examination revealed pathological lesions in cartilage and spleen. Necrosis of chondrocytes, oedema and melanophores aggregation were the most common lesions while the spleen showed lymphocytic necrosis and destruction of melanomacrophage centers. The results suggested that, addition of vitamin C in the intensive cultures of Oreochromis niloticus is critical for growth performance, skeleton integrity of the fish and general health status of such species of fish.

Abbreviations: PCV=Packed cell volume
INTRODUCTION

No doubt that the fish culture in the recent years play a major role all over the world as it supply human population with a good quality protein that help in covering the shortage of other animal protein, in addition, the fish culture industry sharing progressively in industrial and commercial activities. EL bana and Abdelhamid (13) reported that the fish culture in Egypt added about 235,000 tons of fish which represented about 35% of the total fish production in Egypt. Culturing of fish associated with many disease problems specially under intensive culture system. Nutritional problems are among the most important group of non infectious problems facing fish culture. Nutritional problems are most commonly associated with a nutritional imbalance (33) in a complete diet for fish being reared under intensive culture conditions. The imbalance may result from an excess of a particular nutrient or it can also occur in response to the complete absence of a nutrient or its presence at a level below that required by the fishes. Vitamins are organic compounds that are required by at least some species in small quantities for normal growth and health (10,28,31) but they aren't the only elements of fish diets that can lead to nutritional diseases, mineral deficiency also leads to many diseases (17). Vitamin requirements vary from species to species (12,18,24) for salmonids and catfishes the requirements of vitamins have been fairly well established but haven't been determined for many other aquaculture species. Nutritional deficiency symptoms associated with dietary vitamin imbalance are among the best documented of all nutritionally related diseases in fish (12) with good data being available on both salmonids and channel catfish.

Vitamin C considered the most important vitamin and the occurrence of typical signs of vitamin C deficiency has been reported in many fish species (19,25) and in some cases, vitamin C deficiency occurs although the fish diets are usually supplemented with ascorbic acid because this vitamin is very heat labile and prone to atmospheric oxidation. Therefore proper storage and utilization of feed within a few months of purchase even formulations heavily fortified with vitamin C is important. Signs of vitamin C deficiency have been observed and recorded in salmonids and catfishes but little information is available about the effects of vitamin C deficiency on Oreochromis niloticus fish under intensive culture system, so the aim of this study was to, Obtain an over view on the effect of vitamin C deficiency on Oreochromis niloticus under intensive culture system, determination of the optimum concentration of vitamin C that should be added on fish diet, determination of the effect of different levels of vitamin C on mortality and growth of Oreochromis niloticus, observation of...
different clinical abnormalities associated with vitamin C deficiency in comparison with a control group, determination of the effect of vitamin C deficiency on some hematological parameters and histopathological study on different body organs of *Oreochromis niloticus* suffered from vitamin C deficiency in comparison with the control group.

**MATERIALS AND METHODS**

**Fish:** Two thousands *Oreochromis niloticus* fry aged 28 days and about 1 gram average body weight obtained from a private hatchery in Misr Alexandria road (Elbohaira governorate). The fish divided into 4 groups 500 fish of each, were hold in a concrete ponds sized 3 X 7 X 1.2m. The ponds of *Oreochromis niloticus* were supplied with artificially aerated underground water.

**Diet:** The fish groups were received prepared diet contained 25% protein. In group A the received diet deprived from vitamin C, while group B received diet containing 200 mg vitamin C/kg food, group C received diet containing 400 mg vit.C/kg food and group D received diet containing 800 vit.C mg/kg food.

**Vitamin C:** Vitamin C was added in formulation as ascorbyl polyphosphate (2) given in PPM equivalent ascorbic acid. The study extend from 2 July 2003 till 5 November 2003, during which the following examinations were done:

**Determination of the effect of different vitamin C levels on the growth of *Oreochromis niloticus***: According to Halver (19)The average specific growth rates were recorded each 4 weeks from the start till the end of the experiment.

**Clinical examination:** According to Roberts (25) Clinical abnormalities and mortality rates or any abnormal behavioral changes were noticed and observed daily, also radiographic examination was done for some deformed fish and the died fish were examined for any specific lesions.

**Determination of the effect of vitamin c levels on some Hematological parameters:** At the end of the experiment hematological examinations were applied according to Houston (20) on random samples (10) fish from each group. Blood samples were taken from the caudal vessels to determine R.BCs count, H.B. concentration, P.C.V, W.B.C count.

**Histopathological examination:** For histopathological examination, according to Gabaudan et.al. (16) specimens of liver, spleen, gills and muscles including parts of the vertebral cartilage were collected from each group at the end of the experiment and fixed in 10% neutral buffered formalin. Tissue specimens were processed routinely for paraffin sections of 4-5 Mm thickness, stained with Hematoxylin and Eosin (H&E).
Statistical analysis:
The obtained results were statistically analyzed according to Shedicor and Cochran (29) using student s,T test.

RESULTS

Effect of vitamin C on the growth of Oreochromis niloticus:-
Results of the monthly growth rate of fish in the 4 groups (A-B-C-D) were recorded in table 1.

Table 1: Average body weight (mean ±SE) of different groups of the experiment:

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Group A</td>
<td>8.6 gm ± 0.37</td>
<td>34 gm ± 1.24</td>
<td>72 gm ± 3.27</td>
<td>111 gm ± 4.61</td>
</tr>
<tr>
<td>Group B</td>
<td>9 gm ± 0.43</td>
<td>39 gm ± 1.06*</td>
<td>80 gm ± 3.64</td>
<td>130 gm ± 5.03*</td>
</tr>
<tr>
<td>Group C</td>
<td>8.5 gm ± 0.46</td>
<td>37 gm ± 1.35</td>
<td>83 gm ± 4.11</td>
<td>155 gm ± 5.82***</td>
</tr>
<tr>
<td>Group D</td>
<td>10 gm ± 0.41*</td>
<td>45 gm ± 1.52***</td>
<td>91 gm ± 4.69*</td>
<td>150 gm ± 5.86***</td>
</tr>
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</table>

*Significant at p≥0.05 .  
** Significant at p≥0.01.  
*** Significant at p≥0.001.

2- Results of clinical abnormalities and mortalities:- Daily observation of different clinical abnormalities and abnormal behavioral changes revealed that there is no apparent clinical abnormalities and abnormal behavioral changes in the first month of culture. Beginning from the second month, anorexia was apparent in the fish of group A where there was a remnant of food remained in the pond. The fish in groups C and D had bitter appetite than group B and A and the fish leaves no residues of food and have the ability to eat more food than the daily meal. Later on many fish in group A showed marked emaciation, also some fish showed various deformities in the head and vertebral column. the deformed head appeared with abnormal mouth opening due to deformity of the jaws (figs 1&2), also shortened operculum was noticed either unilateral or bilateral. X ray of the head region showed abnormality of the bony component of head (short mandible) (fig 3). At the same time some fish in group A showed deformity of the vertebral column (scoliosis and lordosis) as appeared in X ray of some affected fish (fig 4) also some deformed fish showed marked muscular atrophy in the caudal parts of the body (caudal peduncle)
The deformed fish have marked slow growth rate in comparison with other fish. No deformities were observed in fish in groups B, C and D.

The mortality records in the 4 groups (A,B,C and D) revealed that the number of died fish in the 4 groups were 42,40,23 and 16 in the first month of culture. While in the second month the mortality record was 26,12,4 and 9 respectively, in the third month the mortality was 19, 9, 11 and 6 while in the fourth month was 12,0,4 and 2 respectively. The total number of died fish in the four groups reached 99, 61, 42 and 33 respectively in groups A,B,C and D (19.8%,12.2%,8.6% and 6.6 % respectively).

3-Results of hematological parameters. The results of examination of 10 fish randomly taken from each group for determination of some hematological parameters (R.B.Cs,W.B.Cs, H.B and P.C.V) were summerized in table 2.

Table 2. Blood parameters of different groups of *Oreochromis niloticus*:-

<table>
<thead>
<tr>
<th>Group</th>
<th>Vitamin C\kg diet</th>
<th>R.B.CS count ±</th>
<th>W.B.CS ±</th>
<th>H.B gm% ±</th>
<th>P.C.V % ±</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0</td>
<td>1.340.000 ±22672.83</td>
<td>34000 ±149.13</td>
<td>4.8 ± 0.13</td>
<td>15.8 ± 0.57</td>
</tr>
<tr>
<td>B</td>
<td>200mg</td>
<td>1.605.000 ±25310.57***</td>
<td>38000 ±156.27***</td>
<td>6.0 ± 0.15***</td>
<td>17.9 ± 0.63*</td>
</tr>
<tr>
<td>C</td>
<td>400mg</td>
<td>1.620.000 ±26538.29***</td>
<td>37000 ±142.68***</td>
<td>5.9 ± 0.13***</td>
<td>18.5 ± 0.61*</td>
</tr>
<tr>
<td>D</td>
<td>800mg</td>
<td>1.590.000 ±26529.66***</td>
<td>38200 ±159.26***</td>
<td>6.4 ± 1.2***</td>
<td>18.6 ± 0.60**</td>
</tr>
</tbody>
</table>

*Significant at p≥0.05.
** Significant at p≥0.01.
*** Significant at p≥0.001.

Results of histopathological examination:- Results of histopathological examination of samples from 5 fish randomly taken from different groups A,B,C and D revealed that:

Macroscopic examination . The macroscopic examination of fish in the 4 groups revealed that the fish in group A showed marked muscular weakness specially in the caudal peduncle where the head of fish appeared large in comparison to the size of the body. No muscular atrophy was seen in fish in groups B,C and D. Macroscopic examination of internal organs showed that the spleen in some fish in group A was very dark, the same picture was apparent in some fish in group D.

Microscopic examination . The histopathological examination of the musculo-skeletal system of fish in group A (diet deficient in vitamin C’) revealed that in the
axial skeleton, the vertebral cartilage showed irregular aggregates of chondrocytes 
(fig.6). In such cases the melanophores were aggregated around the deformed 
cartilage. In other cases, edematous fluid was aggregated around the deformed 
cartilage with dispersion of the surrounding connective tissue fibers (fig.7). Some fish 
samples in these group showed advanced lesions including, necrosis of the 
chondrocytes as a common feature in lamellar cartilages in which the cells appeared 
vacuolated and without nuclei. The chondrocytes in other cases were completely 
necrosed and replaced by remnants of the cells and infiltrated with melanophores 
(figs.8&9). Also Fig.10 shows deformity of the cartilaginous part of the gill arch 
where dissociation of the chondrocytes and abnormal arrangement of the lacunae was 
clear. The histopathological examination of fish samples in groups B,C and D 
revealed that the cartilage appeared normal (Fig. 10) without any pathological 
changes.

Histopathological examination of internal organs revealed that, the most 
common changes were in the spleen of group A where the melanomacrophage centers 
showed central areas of necrosis with depletion of the melanin pigment (Fig.11). The 
splenic lesion in these group sometimes was advanced and the melanomacrophage 
centers of the spleen completely replaced by necrotic mass. The necrotic tissue 
appeared granular (Fig. 12).

Fig. 1: *Oreochromis niloticus* in group A showed head deformities.
Fig. 2: *Oreochromis niloticus* showed abnormal mouth due to deformity of the jaws.

Fig. 3: X ray on deformed fish showed abnormality of the bony component of the head including short mandible.
Fig. 4: X-ray of O. niloticus in group A showed deformation of the vertebral column.

Fig. 5: Some deformed fish in group A showed marked muscular atrophy in the caudal parts of the body (caudal peduncle).
Fig. 6: Deformed vertebral cartilage of *Oreochromis niloticus* in group A showed irregular aggregates of chondrocytes (small arrow) notice: melanophore aggregation around the deformed cartilage. (H&E stain x 100)

Fig. 7: Deformed vertebral cartilage of *Oreochromis niloticus* in group A showing edematous fluid around the deformed cartilage and melanophores aggregation (arrow). (H&E stain x 400)
Fig. 8: Lamellar cartilage of *Oreochromis niloticus* in group A showing necrosis of the chondrocytes. (H&E stain x 400)

Fig. 9: Lamellar cartilage of *Oreochromis niloticus* in group A showing complete necrosis of the cartilage and melanophores aggregated around the necrotic cells. (H&E stain x 1000)
Fig. 10: Vertebral cartilage of *Oreochromis niloticus* supplemented with Vitamin C showing normal chondrocytes and perichondrium (H&E stain x 400)

Fig. 11: The spleen of *Oreochromis niloticus* in group A showing central area of necrosis in melanomacrophage centers (arrow) with marked depletion of the melanin pigment (H&E stain x 400)
DISCUSSION

The most interesting finding in our study was firstly the characteristic low growth rate in group A (fed diet deficient in vitamin C) in comparing to groups B, C and D which received 200, 400 and 800 mg respectively of vitamin C. The characteristic variation in growth began to appear at the third month and became very clear among fishes in the different groups at the end of the experiment. Also great variation in growth was found between fishes in group C and D in comparing to fishes in group B.

The nutritional deficiency symptoms associated with dietary imbalance are among the best document of all nutritionally related diseases in fish. With good data being available on both salmonids and channel catfish (12), retardation of growth is considered one of the typical signs of vitamin C deficiency and was reported in trout, salmon, yellow tail, carp, guppies, catfish, snake head, tilapia, sea bass and other fish species (19,25).

At the same time Duncan and Lovell (11) stated that with dietary ascorbic acid 200 mg\ kg food, weight gain was improved in channel catfish (*Ictalurus punctatus*) which agree with our finding.

In Egypt Ezzat (14) recorded that the deprivation of vitamin C in ration fed to Nile tilapia leads to reduction of growth rate and decrease in stress resistance. At the same time providing 100 mg vitamin C kg diet increase both specific and absolute growth rate and is enough to resist stresses.
Also our results agree with Chagas and Val (8) who studied the effect of ascorbic acid dietary supplementation on the body weight and find that the juveniles of tambaqui (Clossoma macropomum) fed on higher ascorbate levels showed higher final body weight and better feed conversion rate. These results showed the importance of ascorbic acid in the diet and he stated that 100 mg ascorbic acid/kg in the diet gave bitter body weight gain. Frischknecht et. al. (15) found that the most interesting finding in his study on the effect of vitamin C, E and combination of them in rainbow trout was the high mortality together with marked muscular lesions and anemia in fish fed diet deficient in vitamin C and E in comparing with control fish.

Another study (21) studied the impact of poultry droppings supplemented with ascorbic acid and live yeast on Nile tilapia (Oreochromis niloticus) performance and recorded that the addition of ascorbic acid and live yeast had no effect on body weight gain and body length increment in fish fed on 10, 20, 30 and 40% poultry droppings compared with fish fed on the control diet. The negative results may be due to that the addition of poultry droppings affect some important water parameters which drastically affecting the health condition of cultured tilapia, also the use of poultry droppings add many pathogenic bacteria, some of them are highly pathogenic to fish resulting in mortalities, at the same time the fish act as a carriers to others bacteria that may be transmitted to humans which may constitute a potential health hazards, which make the use of poultry droppings as feed for fish should be prohibited (1).

The enhancement of growth by vitamin C supplementation in feed may be correlated to many factors, vitamin C 2000 mg/kg feed delivered every second day to sea bass and gilthead sea bream brood stock increase collagen synthesis in embryos and starved larvae in comparison with a diet containing vitamin C at the recommended concentration for growth (3,31). Also the enhancement of growth may be due to the possible role of ascorbic acid toward the behavior of rainbow trout. Blom et.al. (7) found that ascorbic acid supplementation enhanced the competitiveness of trout, expressed as bitter ability to maintain preferential tank position near the bottom which means that ascorbic acid supplementation increase competition for space and feed in rainbow trout (Oncorhynchus mykiss).

The results of observation of different clinical abnormalities and abnormal behavioral changes in the 4 groups of fish revealed that there was no apparent clinical abnormalities and abnormal behavioral changes in the first month of culture. Beginning from the second month anorexia became apparent in fish in group A (vitamin C deficient diet) and the fish leave residues of feed. While the fish in groups C and D (fed on 400 mg and 800 mg vitamin C kg feed respectively) have bitter
appetite than groups A and B (fed on zero and 200 mg vitamin C / kg feed respectively).

Beginning from the third month of culture anemia became apparent in fish in group A, some fish showed deformations of head and vertebral column, including abnormal mouth, short opercula, scoliosis and lordosis. Also some deformed fish showed marked muscular atrophy in the caudal parts of the body. No deformations were observed in fish in groups B, C and D.

The typical signs of vitamin C deficiency have been observed in many fishes but little information is available about the effect of vitamin C deficiency on *Oreochromis niloticus* fish under intensive culture system.

Scoliosis and lordosis have been observed in salmonids when vitamin C levels were low (30), also broken back syndrome in channel catfish have been resulted from vitamin C deficiency under intensive culture. The occurrence of deformities may be explained by the finding of Ashley *et al.* (4) they reported that vitamin C deficiency in fish leads to collagen alterations and dysplastic processes in the bone and cartilage tissue leading to skeletal deformations.

Similar findings were observed by Frischnect *et al.* (15) they found that rainbow trout (*Oncorhynchus mykiss*) after 16 weeks of exposure to vitamin C deficiency diet, fish swim slowly and separately from the others, anorexia developed simultaneously with the subsequent occurrence of severe deformations of the head and vertebral column. The characteristic signs of vitamin C deficiency may not been by pond culturists since even in heavily stocked ponds the fish are able to obtain some vitamin C from natural foods.

The determination of the characteristic mortalities among the different groups A, B, C and D revealed that the total number of died fish in the 4 groups was 99, 61, 42 and 33 respectively which represent percentages of 19.8%, 12.2%, 8.6% and 6.6% of the total fish cultured in groups A, B, C and D respectively. These results indicate that the fish in group A was associated with higher mortality in comparing with the other groups. Also the results revealed that the high concentration of vitamin C in diets was associated with lower mortality as the mortality in group B (200mg vitamin C / kg) was higher than group C (400mg vitamin C / kg) and also than group D (800 mg vitamin C / kg) also group C the mortality was higher than group D. The lower mortality rates associated with higher concentration of vitamin C were reported in many studies and may be correlated to many effects of vitamin C, Merchie *et al.* (23) demonstrated high resistance to salinity shock in association with high dietary supplementation with ascorbic acid and astaxanthin. Similar results also agree with our results was reported by Chagas and Val (8) who found that juveniles tambaqui
(Clossoma macropomum) fed on higher ascorbate levels showed higher final body weight, better food conversion rate and survival, which indicate the importance of ascorbic acid in the diet. The inhibitory effects of vitamin C on Haematocrit, Red blood cell count and H.B may play a role in increasing mortality rate in fish fed on vitamin C deficiency diet. Low H.B levels and reduction of haematopiotic tissue in the anterior kidney of fish which no doubt inhibit immune status of fish and render fish vulnerable to diseases (16,22,26). At the same time Bagni et al. (5) their study on ascorbic acid as immunostimulant in combination with glucan and alpha tocopherol on the innate immune response of culture sea bass revealed that alternative pathways of complement activation and lysozyme activity were both significantly enhanced, which also may explain the role of vitamin C on increase survival rate of fish. While Sealy and Gatlin (27) reported that dietary supplementation with megadose levels of vitamin C and or E before or after infection with Strept. iniae is an ineffective treatment for juvenile striped bass. This difference may be due to variation in the environment as the immune status of fish affected greatly by the environmental temperature as well as many other factors such as species variation.

The results of determination of the effects of vitamin C on some hematological parameters revealed that R.B.Cs count, W.B.Cs count, P.C.V and H.B was lower in group A (diet deficient in vitamin C) in comparing to the other groups (group B, C and D which received 200,400 and 800 mg/kg feed respectively). These results indicate that vitamin C have an important role on such hematological parameters. Similar results agree with our findings, also some investigators reported microhaemorrhages and low hemoglobin levels in fish suffered from vitamin C deficiency (16,22,26). At the same time Duncan and Lovell (11) found that when the marginal ascorbic acid 20 mg/kg was given, hematological measurements increases maximally with low or high supplement of folic acid. Also Chagas and Val (8) estimated the effect of ascorbic acid dietary supplement on some hematological parameters of juveniles tambaqui and found that the ascorbic acid free diet resulted in reduction of haematocrit and RBCs and characterizing anemia was found. Meanwhile Frischknecht (15) found that Haematocrit, P.C.V, total Hb and RBCs count were significantly reduced in fish fed diet deficient in vitamin E but high in vitamin C, also they reported reduction in total HB, RBC count and Hematocrit in fish fed diet deficient in vitamin E and C. A possible explanation for the results obtained could be an influence of vitamin C on iron metabolism (9,34) as well as the effects of vitamin C deficiency on haematopiotic tissue.

The results of histopathological examination revealed some characteristic findings. The macroscopical examination of fish in the 4
groups revealed that the fish in group A (diet deficient in vitamin C) showed marked muscular atrophy especially in the caudal peduncle. Also the macroscopical examination of internal organs showed that the spleen in some fish in group A was very dark. The microscopical examination of the musculoskeletal system of fish in group A revealed that the vertebral cartilage showed irregular aggregates of chondrocytes with aggregation of melanophores around the deformed cartilage. This finding explain the various deformations that were observed in head and vertebral column (scoliosis and lordosis). Also the marked muscular atrophy in the caudal peduncle may play a role in exaggerating such deformity. Samples of fish in group A showed advanced cases with necrosis of the chondrocytes as a common feature in lamellar cartilages. The chondrocytes in other cases were completely necrosed and replaced by remnants of the cells infiltrated with melanophores. Some fish showed deformity of the cartilagenous part of the gill arch where dissociation of the chondrocytes is clear. The great histopathological changes occurred in the spleen which is a main haematopiotic tissue may explain the high mortality among fish in group A. Results similar to our findings recorded by Frischknecht et.al. (15) they reported that, when fish fed diet deficient in vitamin C, pathologic lesions were seen in the supporting tissue (collagen, cartilage and bone). Moderate lesions such as hydropic degeneration of supporting cartilage and distortion of secondary gill lamellae. A reduction of collagen was seen in the myosepta, in gill lamellae and in the periostal region of the vertebral column. Also they recorded dysplastic processes of bone tissue were seen in vertebral column and in different regions of the head. The effects of vitamin C on collagen synthesis demonstrated by Terova et.al. (31), who concluded that a vitamin C delivered every second day to sea bass and gilthead seabream at dose 2000 mg kg increase collagen synthesis in embryos and starved larvae in comparison with a diet containing vitamin C at the recommended concentration for growth. The effect of vitamin C on collagen which is a supporting tissue may share in the occurrence of various deformations among fish fed on diet deficient in vitamin C. From this study, it could be concluded that, the use of vitamin C for cultured Oreochromis niloticus under intensive culture is very important because the defeciency of vitamin C interfere with growth affecting immune system of fish and render the fish vulnerable to diseases. At the same time, vitamin C defeciency affect some important hematological parameters. In addition, it leads to many important histopathological changes leading to many deformities among fishes sufferd from vitamin C defeciency. From the result, the best concentration of vitamin C was 400 mg/kg food for Oreochromis niloticus under intensive culture.
REFERENCES

1- Abdelaziz M. A and Ehab I.M (2003): Risk assessment of using of poultry droppings and poultry viscera as feeds for cultured tilapia and catfish (Clarias gariepinus), evaluation of their tremendous effects on water, fish, as well as their human health hazards.

2- The international conference for fisheries resources in Arabian and Islamic countries. Egypt. Azhar university 22-24 October.


12- Duncan P. L., and Lovell R.T. (1994): Growth, Survival and Blood composition of Channel catfish given a semipurified diet with folic acid 0, 0.4 and 4.0 mg \ kg plus ascorbic acid 0, 20 and 200 mg \ kg in a factorial design.


دراسة عن تأثير نقص حمض الأسكوربيك (فيتامين ج) على أسماك البلطي النيلى تحت نظام الأستزراع المكثف.

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في هذا البحث تم أجراء الدراسة على عدد 2000 من أسماك البلطي النيلى وحيد الجنس عمر 28 يوم و متوسط وزن 1 جرام. وقد تم تقسيمهم إلى 4 مجموعات بكل مجموعه 500 سمك. المجموعة الأولى تم تغذيتها على علبه غذائية لا تحتوي على فيتامين ج بينما المجموعة الثانية تم إضافة فيتامين ج اليها بمعدل 200 مجم/كمم من العلبه. والمجموعة الثالثة تم تغذيتها على علبه تحتوي على 400 مجم/كمم من العلبه. والمجموعة الرابعة تم تغذيتها على علبه تحتوي على 800 مجم/كمم. وقد استمرت التجربة لمدة أربعة أشهر بدءا من شهر أغسطس حتى نهاية فبراير 2003. وقد تم دراسة تأثير اضافة فيتامين ج على معدلات النمو.

فوجد أن اضافة فيتامين ج لتأثير واضح لزيادة معدلات النمو في أسماك البلطي، وقد أضح لنا جليا بدءا من الشهر الثالث لأجزاء التجربة. كما تم دراسة تأثير اضافة فيتامين ج على الحالة الصحية للأسماك وذلك على معدلات التنفس، ووجد أن نقص فيتامين ج كان مصحوبا بضعف اتخاذ الأغلبيات أو أعراض في معدلات النمو، وكذلك ظهور العديد من التشوهات في العمود الفقري، وكذلك في منطقة الرأس والقدم ونابك في الأسماك المعززة لنقص فيتامين ج.

وقد لوحظ أن معدلات التنفس زادت عند نقص فيتامين ج بالعبلية، وقلت عند أضافة.أما بالنسبة ل بصورة الدم، فقد وجد أن نقص فيتامين ج كان مصحوبا بأحمراء في عدد كرات الدم الحمراء والبيضاء، وكذلك نسبة الهيموغلوبين، ونجاز الدراسة الباثولوجية على عينات عشوانية مختلفة من المجموعات وجد أن نقص فيتامين ج سوجب بتأثيرات نسيجية على الغضاريف القلبية والخليجية، وكذلك على الطحال حيث تأثيت مركز الخلايا المناعية الموجودة به مما حدد تكوير واضح لهذه الخلايا.