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TO STUDY THE EFFECT OF DIETARY BLACK SEED (*NIGELLA SATIVA*) SUPPLEMENTATION ON THE MEAT QUALITY OF *LABEO ROHITA*

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Abstract:

Purpose In this study, we looked at the benefits of a *Nigella sativa* supplementation diet and how non-essential fatty acids were controlled in *Labeo rohit.* **Methods** For a total of 28 days, *Labeo rohita* were fed various supplemental diets including 0.00 percent, 1%, and 2.5 percent black cumin seed. The effect of black cumin seed on *Labeo rohita's* fatty acid profile was investigated. Saturated fatty acids were high at the start of the trial, but they reduced after supplementation, and the difference in fatty acids between groups was statistically significant (≤0.05). When black cumin seed was added to fish diet, it reduced saturated fatty acids (methyl heptadedecanoate and methyl stearate) while increasing unsaturated fatty acids (gamma-linolenic acid and methyl cis-5,8,11,14 eicosatetraenoic) **Conclusion**In conclusion , adding 2.5 percent black cumin seed bin feed enhanced un-saturated fatty acids, which improved the quality of the fish flesh.

Key words: *Labeo rohita*, black cumin seed, fish meat, un saturated fatty acids.

I. INTRODUCTION

Aquaculture is crucial in reducing the burden on the world's aquatic resources. Aquaculture-based fish production has a substantial influence on global food security requirements for the human population (1). Herbs and herbal products used to fish feed aid growth, decrease stress, boost immunity, and protect against infectious agents (2). Nigella sativa (black cumin seed) is a spice and food preservative with antioxidant, antibacterial, antifungal, analgesic, anti-inflammatory, anticancer, antidiabetic, immunomodulator, spasmolytic, bronchodilator, and hepatoprotective effects (3).

Essential fatty acids (EFAs) assist to prevent skin and hair dryness, acne, eczema, allergies, brittle nails, rashes, and small lumps, and omega-3 fatty acids have been proven to enhance learning, memory, age-related cognitive decline, depression, and mood problems in those in good health (4).

Eicosatetraenoic acid and docosahexaenoic acid usage in shampoo repaired damaged hair, particularly with eicosatetraenoicacid/docosahexaenoic acid 12 percent shampoo, and might prevent damaged hair with increasing eicosatetraenoic acid concentration.(5) During pregnancy, there is an improvement in neurodevelopment. (6), As a result, monthly cramps, menopausal symptoms, and depressive symptoms in middle-aged women are reduced, as are the chances of miscarriage and pregnancy problems (7), Increased lipid accumulation in hair shaft impacts haircoat shine, glossiness, and softness during fur development, which has a positive effect on hair and skin quality. Polyunsaturated fatty acids are essential in the treatment of cardiovascular disease, type 2 diabetes, inflammatory diseases, and autoimmune disorders. Docosahexaenoic acid is required for the development of the embryonic brain and eye retina (8). The effects of omega-3 fatty acids on rheumatoid arthritis, mental health problems such as schizophrenia, and bipolar disorder (9). In the human population, and cognition reduce the risk of heart failure and stroke (10).As well as its beneficial effects on dry eye, neurological diseases, growth, development, depression, and eyesight (11) .Reduce the weight loss cachexia during cancer therapy (12).

II. STUDY DESIGN AND METHODOLOGY

Labeo rohita fingerlings were acquired from a commercial fish farm and hatchery in Manawan,

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Lahore, for this study. The fingerlings were acclimated in glass aquaria at the Fisheries Research and Training Institute in Lahore's Nutrition Laboratory. During the trial, the fish were fed commercial food twice a day. Fish were divided into three groups, each with 20 fish representing three replicates, and fed for a total of 28 days. *Nigella sativa* seed was added to the diet in three different amounts: 0.00%, 1%, and 2.5%.

III. QUANTITY OF DOSES

Commercial carp feed obtained from private firm Oryza organics pvtltd was utilized in the research. Using a spraying technique, cold compressed black cumin seed was introduced to fish feed, which was then mixed until homogenized. In the research, the amount of black cumin seed added to the basal diet was 0.00%, 1%, and 2.5 percent.

IV. FATTY ACID PROFILE

The fatty acid profile was analyzed by gas chromatography clarus 500 with auto sampler (Perkin Elmer, USA) equipped with a flame ionization detector and fused silica capillary sue column (ID× 0.25µm BP20 0.25µm, USA). The oven temperature was held at 140 ^{0}C for 5 min^{-1}, raised to 200 ^{0}C at the rate of 4 ^{0}Cmin^{-1} and held at 240^{0}C at rate 1 ^{0}Cmin^{-1}, while the injector and the detector temperature were set at 240 ^{0}C and 280^{0}C, respectively. Fatty acids were identified by comparing the retention times of FAME with the standard 37 component FAME mixture. Two replicate GC analyses were performed and the results expressed in GC area % as a mean value and ±standarderror of mean.

Statistical analysis: GraphPad prism 8 was used to examine the data collected. The results were determined using a one-way ANOVA followed by a post-hoc test (Tukey's test) to determine the difference between the experimental groups.

V. RESULTS

Acid monoesters linolelaidic acid significantly decreased while, gamma-linolenic Saturated fatty acid monoesters, methyl heptadedecanoate and methyl stearate significantly decreased in 1%, 2.5% *N.S.* supplemented diet groups as compared to control group. Mono-unsaturated fatty acid monoesters cis-10-pentadecanoic acid significantly decreased while, cis-9-oleic acid and trans-9-elaidic acid significantly increased in 1% and 2.5% *N.S.* supplemented diet groups as compared to control group. Poly-unsaturated fatty acid and methyl cis-5,8,11,14 eicosatetraenoic acid significantly increased in 1% and 2.5% *N.S.* supplemented diet groups as compared to control group.

Table: 4.1: The muscles fatty acid profile (% total fatty acids) of *Labeo rohita* fingerlings fed on varying levels of *Nigella sativa* seeds supplemented diets for 28 days.

Fatty acid monoesters (FAMEs)		**Experimental Groups**		
		Group-I (Basal diet + 0.0 % *Nigella sativa*)	**Group-II (Basal diet + 1.0 % *Nigella sativa*)**	**Group-III (Basal diet + 2.5 % *Nigella sativa*)**
C12:0	Methyl undecanoate	ND	ND	7.164±0.234
C14:0	Methyl tridecanoate	14.614	ND	ND
C18:0	Methyl heptadedecanoate	480.147±0.456	267.167±0.932*	177.006±0.123*
C19:0	Methyl stearate	363.056±0.267	246.373±0.781*	91.403±0.743*
C21:0	Methyl arachidate	ND	ND	1428.39±0321
C22:0	Methyl heneicosanoate	1285.001±0.236	ND	ND
C23:0	Methyl behenate	ND	561.456±0.561	904.964±1.656
C24:0	Methyl tricosanoate	ND	ND	1800.215±0.878
∑SFA		50.16±0.134	32.19±0.161*	37.16±0.983*

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C15:1n10c	Cis-10 pentadecanoic acid	151.082±0.136	13.115±0.178*	49.934±0.563*
C17:1n9	Methyl palmitoleate	693.006±0.333	431.151±0.456	ND
C171n10c	Cis-10 heptadedecanoic acid	587.445±0.376	ND	ND
C171n10c	Cis-10 heptadedecanoic acid	587.445±0.376	ND	ND
C18 1n9c	Cis-9-oleic acid	729.289±0.198	223.12±0.239*	483.617±0.568*
C18 1n9t	Trans-9-elaidic acid	536.59±0.201	5.774±0.132*	5338.418±0.411*
∑MUFAs		29.87±0.678	42.32±0.110*	34.12±0.667*
C18:2n9t	Linolelaidic acid	4429.297±0.139	501.011±0.100*	998.231±0.268*
C18:3n6	Gamma-linolenic acid	410.868±0.021	887.456±0.067*	1184.637±0.139*
C19:2n9	Methyl linoleate	275.576±0.161	ND	ND
C21:2n11c	Cis-11, 14-eicosadieniic acid	ND	636.138±0.123	1728.346±0.156
C21:4n5c	Methyl Cis-5, 8, 11, 14-eicosatetraenoic acid	890.252±0.108	998.146±0.992*	1280.777±0.455*
∑PUFAs		19.95±0.563	25.49±0.642*	28.72±0.130*

Values are given as mean± S.E.M. Means in the same row with asterisks are significantly different (*$P<$ 0.05). SFA= saturated fatty acids; MUFAs= mono-unsaturated fatty acids; PUFAs= polyunsaturated fatty acids; ND= not detected

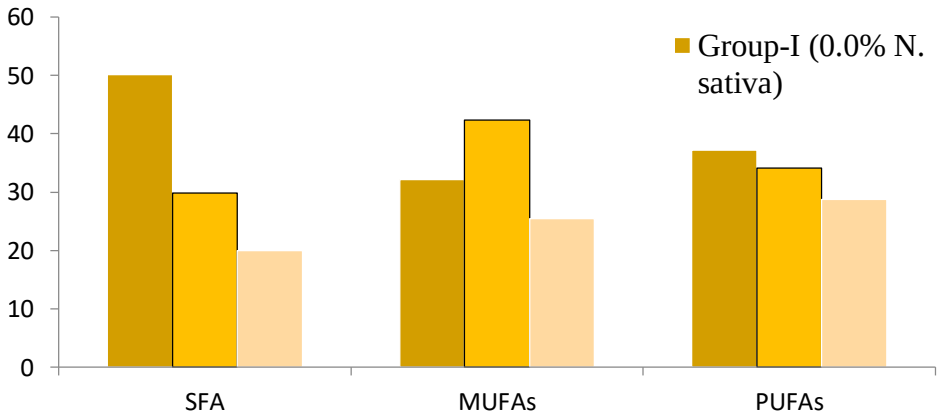

Figure 4.1: Percentage fatty acid groups in the dorsal muscles of rohu fingerlings fed on diets containing varying levels of *Nigella sativa* seeds for 28 days. Where; SFA= saturated fatty acids; MUFAs= mono-unsaturated fatty acids; PUFAs= polyunsaturated fatty acids.

VI. DISCUSSION

Nigella sativa seeds were added to the diet and had a positive influence on the lipid profile. When compared to controls, it reduced TG, TC, and LDL cholesterol while increasing HDL cholesterol.

Abd El-Hack *et al* (13) reported that *Nigella sativa* has high-quality nutritive values as evident from the studies performed to know about nutrients, protein content and omega 3 fatty acids. The extracts of the *Nigella sativa* seed have significant therapeutic effects against variety of ailments. The seeds/oil has various health benefits as it lessen blood pressure, raise respiration and provide valuable nutraceuticals and pharmaceutical products to boost growth.

Oz *et al* (14) who reported the effects of black cumin oil (*Nigella sativa*) in liver fatty acids of rainbow trout (*Oncorhynchus mykiss*). This decreased the saturated fatty acids and increased poly-unsaturated fatty acids (eicosapentaenoic acid and docosahexaenoic acid) in rainbow liver tissues supplemented with black seed. This is because black cumin seed have higher raw protein, raw cinder, lipid and dry matter.

Omolo *et al* (15) agreed with our results who reported the reduction in level of saturated fatty acids in meat of rohu was observed when fed with supplemented diet *Spirulina platensis* when compared to control group while, poly-unsaturated fatty acids eicosapentaenoic acid and docosahexaenoic acid increased because tilapia has capability of converting dietary alpha- linolenic acid to poly-unsaturated fatty acids.

Ayisi *et al* (16) reported the effects of palm oil on meat quality of fish muscle and liver tissues. A significant decreased in saturated fatty acids because dietary fatty acid profiles and increase poly-unsaturated fatty acids especially eicosapentaenoic acid, docosahexaenoic acid fed omega 6 decreased with increase the quantity of dietary palm oil in *Nile tilapia*. Low value of palm oil improved the meat quality of fish and increase market value.

VII. CONCLUSION

In *Labeo rohita* fingerlings, eating Nigella sativa seeds improves their lipid profile by lowering triglycerides, total cholesterol, and LDL cholesterol while boosting HDL cholesterol. Actually unsaturated fatty acid play important role to improve the meat quality in fishes.

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