

EFFECTS OF DIETS CONTAINING DRY EXTRACTS OF *Achillea millefolium*, *Mentha piperita* AND *Echinacea purpurea* ON GROWTH, HEMATOLOGICAL AND IMMUNOLOGICAL INDICES OF JUVENILE COMMON CARP (*Cyprinus carpio*)



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In this study, the effects of three herbal dry extracts (*Achillea millefolium*, *Mentha piperita* and *Echinacea purpurea*) were investigated on growth, hematological and immunological indices in juvenile common carp (*Cyprinus carpio*). Four hundred juvenile fish with initial weight of 14.30 ± 0.777 g were studied in 10 treatment groups (9 treatment groups & a control) with four replicates for 60 days. Three levels (0.1, 0.5 and 1%) of dry extracts of each herb were prepared according to standard method and added to the commercial common carp feed. At the end of period twelve fish collected out of each group and the parameters were measured.

In order to the results, weight gain, specific growth rate (SGR) and complement C4 were not affected by dietary treatments ($P > 0.05$). Red blood cell (RBC) counts in 0.5 and 1%-diet groups as well as Hemoglobin in three levels of all herbs was increased ($P \leq 0.05$). Hematocrit in 0.5%, 1%-diet *M. piperita* and *E. purpurea* groups was shown significant increases ($P \leq 0.05$).

Mean corpuscular volume (MCV) and mean corpuscular hemoglobin (MCH) in all groups except 0.1% *M. piperita* group and 0.5% *E. purpurea* were increased compare with control group ($P \leq 0.05$). MCHC in 0.5% *E. purpurea* and 0.1 and 1% *M. piperita* groups showed the highest values. Levels of 0.5% *M. piperita* and 1% *E. purpurea* and *A. millefolium* make significantly increases in total leukocytes and neutrophils ($P \leq 0.05$).

Significantly increases of lymphocytes and decrease of monocytes were observed in levels of 0.5% *E. purpurea* and 1% level of all herbs groups ($P \leq 0.05$). Increased levels of immunoglobulin compared to control were significant only in 1% level of all herbs ($P \leq 0.05$). Complement C3 was also increased 1% of *A. millefolium* and *M. piperita* groups compared to the control ($P \leq 0.05$). All levels of *A. millefolium* and *M. piperita* and 1% *E. purpurea* groups caused a significant increase in lysozyme concentration compare with the control ($P \leq 0.05$). The results indicated all three herb extracts in diet can improve immune responses and hematological parameters in common carp. Comparing these extracts, the *M. piperita* extract with a lower concentration is more efficient.

Keywords: Medicinal Herb, Immunology, Hematology, Growth indices, Common carp