

Table 3 Histological changes in the liver tissue of koi carp, *Cyprinus carpio*, fed different levels of açai *Euterpe oleracea* in the diet for 30 days. Data presented as mean  $\pm$  standard deviation. Different letters (a, b, c) in the same line indicate significant difference between the diets using Tukey's post-hoc test ( $p < 0.05$ )

Alterations	DC0.0%	DA0.5%	DA1.0%	DA1.5%	DA2.0%	p value
LCA	62.50 $\pm$ 13.06 <sup>a</sup>	50.00 $\pm$ 10.66 <sup>b</sup>	45.45 $\pm$ 15.08 <sup>c</sup>	56.82 $\pm$ 11.68 <sup>b</sup>	54.55 $\pm$ 15.08 <sup>b</sup>	0.035
LU	31.25 $\pm$ 11.68	31.25 $\pm$ 11.31	31.25 $\pm$ 11.31	35.42 $\pm$ 12.87	35.42 $\pm$ 16.71	0.824
PAG	33.33 $\pm$ 12.61	31.25 $\pm$ 11.31	31.25 $\pm$ 15.54	31.25 $\pm$ 11.31	37.50 $\pm$ 16.85	0.754
BA	39.58 $\pm$ 17.19	47.92 $\pm$ 12.87	50.00 $\pm$ 18.46	58.33 $\pm$ 16.28	50.00 $\pm$ 15.08	0.093
CLV	43.75 $\pm$ 18.77	43.75 $\pm$ 15.54	45.45 $\pm$ 15.08	43.75 $\pm$ 24.13	45.83 $\pm$ 25.75	0.998
PC	56.25 $\pm$ 18.77	70.83 $\pm$ 9.73	62.50 $\pm$ 13.06	60.42 $\pm$ 12.87	50.00 $\pm$ 30.15	0.052
SC	33.33 $\pm$ 11.68 <sup>b</sup>	46.88 $\pm$ 8.84 <sup>ab</sup>	43.75 $\pm$ 15.54 <sup>ab</sup>	35.42 $\pm$ 12.87 <sup>b</sup>	54.17 $\pm$ 20.87 <sup>a</sup>	0.003
PVC	8.33 $\pm$ 7.54	2.08 $\pm$ 7.22	0.00 $\pm$ 0.00	4.17 $\pm$ 9.73	7.50 $\pm$ 12.08	0.515
DHN	56.25 $\pm$ 16.17	52.08 $\pm$ 7.22	52.08 $\pm$ 19.82	58.33 $\pm$ 12.31	56.25 $\pm$ 11.31	0.485
SD	29.17 $\pm$ 7.54	36.11 $\pm$ 13.18	29.17 $\pm$ 9.73	31.25 $\pm$ 15.54	39.58 $\pm$ 16.17	0.067
EI	25.00 $\pm$ 0.00	29.17 $\pm$ 9.73	18.75 $\pm$ 11.31	18.18 $\pm$ 11.68	22.92 $\pm$ 12.87	0.067
MI	72.92 $\pm$ 7.54 <sup>a</sup>	64.58 $\pm$ 12.87 <sup>ab</sup>	54.17 $\pm$ 20.87 <sup>b</sup>	50.00 $\pm$ 21.32 <sup>b</sup>	64.58 $\pm$ 16.17 <sup>ab</sup>	0.011
HH	47.92 $\pm$ 13.48	43.75 $\pm$ 15.54	54.17 $\pm$ 17.94	54.17 $\pm$ 17.94	58.33 $\pm$ 12.31	0.171
HNH	25.00 $\pm$ 0.00	25.00 $\pm$ 0.00	25.00 $\pm$ 0.00	25.00 $\pm$ 0.00	22.92 $\pm$ 7.22	0.416
MA	66.67 $\pm$ 12.61	65.91 $\pm$ 12.61	56.82 $\pm$ 16.17	52.08 $\pm$ 19.82	55.56 $\pm$ 20.83	0.147
CV	72.92 $\pm$ 7.54 <sup>a</sup>	64.58 $\pm$ 12.87 <sup>ab</sup>	47.92 $\pm$ 22.51 <sup>b</sup>	35.42 $\pm$ 16.17 <sup>c</sup>	70.83 $\pm$ 9.73 <sup>a</sup>	<0.001
NE	64.58 $\pm$ 12.87 <sup>a</sup>	62.50 $\pm$ 13.06 <sup>a</sup>	45.83 $\pm$ 20.87 <sup>b</sup>	43.75 $\pm$ 24.13 <sup>b</sup>	56.82 $\pm$ 11.68 <sup>ab</sup>	0.011
PN	41.67 $\pm$ 19.66	43.75 $\pm$ 15.54	37.50 $\pm$ 16.85	33.33 $\pm$ 19.03	52.08 $\pm$ 19.82	0.098
KN	50.00 $\pm$ 19.36	41.67 $\pm$ 12.31	41.67 $\pm$ 19.46	43.75 $\pm$ 15.54	39.58 $\pm$ 12.87	0.56
KCN	35.42 $\pm$ 13.06	39.58 $\pm$ 12.87	35.42 $\pm$ 16.17	35.42 $\pm$ 12.87	33.33 $\pm$ 12.31	0.852
LHN	41.67 $\pm$ 16.17	37.50 $\pm$ 13.06	35.42 $\pm$ 16.17	41.67 $\pm$ 22.19	23.71 $\pm$ 19.82	0.892
LPA	29.17 $\pm$ 10.11	29.17 $\pm$ 9.73	25.00 $\pm$ 0.00	27.08 $\pm$ 7.22	31.82 $\pm$ 11.68	0.408
MCC	6.25 $\pm$ 11.68	11.25 $\pm$ 16.25	6.25 $\pm$ 15.54	9.17 $\pm$ 19.29	0.42 $\pm$ 1.44	0.419

Note: LCA = Loss of cord-like appearance; LU = Loss of uniformity in cell and nucleus size; LAG = Loss of intact acini and visible eosinophilic zymogen granules; BA = Ballooning appearance; CLV = Congestion in large vessels; PC = Pancreatic congestion; SC = Sinusoidal congestion; PVC = Portal vein congestion; DHN = Displacement of hepatocyte nuclei; SD = Sinusoidal dilation; EI = Eosinophilic inflammatory infiltrate; MI = Mononuclear inflammatory infiltrate; HH = Hepatocyte hypertrophy; HNH = Hepatocyte nuclear hypotrophy; MA = Macrosteatosis; CV = Cytoplasmic vacuolization; NE = Necrosis; PN = Pyknotic nucleus; KN = Karyolytic nucleus; KCN = Karyorrhectic nucleus; LHN = Loss of hepatocyte nuclei; LPA = Loss of nuclei in pancreatic acini; MCC = Melanomacrophage centers