

Summary of the DVSc thesis No 25573, Faculty Veterinary Medicine, Urmia University.

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Title of thesis: Therapeutic effects of ascorbic acid and thiamine on oxidative stress indices in Sheep with pneumonia.

Summary:

In this study, we investigated the effects of thiamine and vitamin C on oxidative stress in lambs with pneumonia. Twenty lambs with pneumonia received antibiotics (oxytetracycline and tylosin) alone (OT) or with thiamine (OTT), vitamin C (OTC), or both (OTTC), and the levels of oxidative stress markers as well as copper and zinc concentrations in the blood were measured before (day 1) and after treatment (days 3, 6, and 14). Five healthy lambs served as a control group, receiving distilled water. The control, OTC, and OTTC groups exhibited consistent Malondialdehyde (MDA) levels throughout the experimental period, but the OT group demonstrated increased MDA levels on the third day ($P=0.005$), followed by a subsequent decrease ($P=1.000$). Furthermore, the OTT group displayed a significant reduction in MDA levels on the 14th day ($P=0.04$). No statistically significant differences in MDA concentrations were observed between the treatment groups on days 6 and 14 ($P>0.05$). In healthy lambs, superoxide dismutase (SOD) activity remained constant throughout the study ($P>0.05$), while all pneumonia groups, regardless of treatment regimen, showed significantly decreased SOD activity compared to the control group ($P<0.001$). In the OT group, the level of SOD activity on the first and third days was significantly higher than that on the sixth and fourteenth days ($P<0.01$), and on the 14th day, SOD activity levels in the OTT and OTC groups were significantly lower than those on the other days ($P<0.05$), but no significant difference was observed in the OTTC group. Throughout the study, the level of glutathione peroxidase (GPx) activity in the control group remained constant ($P>0.05$). In all treatment groups, the level of GPx gradually decreased and reached its nadir on the 14th day; this decrease was significant on the sixth and fourteenth days compared to the first day ($P<0.01$). In contrast to the control group, which showed a constant level of glutathione reductase (GR) activity throughout the study, the effect of treatment and time on GR activity was significant in lambs with pneumonia ($P<0.001$). OT and OTT groups demonstrated a significant increase in GR activity on days 6 and 14 compared with day 1 ($P<0.05$), whereas the OTC group exhibited a significant increase only on day 14 compared with the other days ($P<0.001$). The OTTC group demonstrated a significant decrease in GR level only on days 1 and 3 ($P=0.014$). Catalase activity (CAT) and total antioxidant capacity (TAC) did not show significant changes in any group ($P>0.05$). Throughout the study, the copper and zinc concentrations remained constant in the control group ($P>0.05$). Throughout the study, the copper and zinc concentrations remained constant in the control group ($P>0.05$). All the affected groups showed a decrease in serum copper levels on the third day; however, this decrease was not significant ($P>0.05$). During the study, plasma copper concentrations were higher in all patient groups than in the control group ($P<0.05$);

however, no statistically significant difference was observed between the affected groups ($P>0.05$). Zinc concentration in the OTC group, similar to that in the control group, did not show significant changes over time ($P>0.05$), whereas the OTTC group exhibited a significant increase from day 1 to day 14 ($P=0.016$). Zinc concentrations followed a two-step pattern of decreasing and increasing in the OT and OTT groups during the study period. The results of this study demonstrate the beneficial effects of combination therapy, particularly the addition of vitamins to conventional treatment regimens, in reducing oxidative stress caused by pneumonia; however, the effects of such treatments on copper and zinc levels are complex and time-dependent.

Keywords: Oxidative stress, Sheep pneumonia, Ascorbic acid, Thiamine, Sheep