



**Suez Canal University  
Faculty of Veterinary Medicine  
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# **Some Biochemical Studies on the Effect of Water Pollution by Heavy Metals and Trace Elements on Sheep**

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## Abstract

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English abstract	<p>The present study was carried out in different localities of Matrouh Governorate to assess concentrations of metals (Pb, Cd, Cu, Zn, Fe, Se) in different water sources and serum of Barki sheep, furthermore, study its impact on biochemical metabolites. Eighty apparently healthy Barki sheep (2-4 years of age) of both sexes were randomly selected. In addition to twenty healthy Barki sheep aged 2-4 years, obtained from governorate farm at Borg El Arab, represented as control. Animals classified into 5 groups according to locality and water source: Control (Tap water); El-Hammam I (surface water); El Hammam II (groundwater); M. Matrouh (rainfall water); El Negaila (rainfall water). Water and serum samples were prepared for the detection and estimation of selected minerals by using FAAS. Serum Biochemical analysis was also done TP, ALB, ALT, AST, urea, CREAT, TC, TG, oxidative stress and antioxidant biomarkers, and thyroid hormone profile. The metal analysis results revealed that metals concentration in water samples altered from site to another, Pb levels in different water samples were recorded above the EWQS of 0.01 ppm. the maximum Pb level was recorded in the following: El Negaila (RW)&gt;El Hammam II (GW)&gt;M. Matrouh (RW)&gt;El Hammam I (SW)&gt;control. Cd was recorded only in El Negaila (RW) and M. Matrouh (RW) above the recommended</p>

	<p>limit of 0.003 and the other areas not detected. Se levels were recorded above maximum limit EWQS of 0.01 ppm in El Hammam II (GW) followed by El Hammam I (SW), control (TW), El Negaila (RW) and M. Matrouh (RW). On the other hand, levels of Cu, Zn, and Fe from surveyed areas were below EWQS limits. Serum metal analysis, Pb level was significantly increased in examined sheep of El Negaila (RW). Cd levels were significantly higher in examined sheep of El Negaila (RW) and M. Matrouh (RW). Cu levels were significantly decreased in examined sheep of all surveyed areas. Zn levels were significantly decreased in examined sheep of El Hammam II (GW), M. Matrouh (RW), and El-Negaila (RW) when compared with the control group. Fe levels of El Hammam I (SW) group were significantly higher than the control one but no differences among the other groups have been observed. Se levels were significantly higher in examined sheep of El Negaila (RW) and M. Matrouh (RW) followed by El Hammam I (SW) in comparison with the control group. However, no significant differences among the mean Se concentration of control and El Hammam II (GW) groups have been observed. Serum biochemical results revealed a significant decrease in TP, ALB, and GLO in all examined sheep from different areas as compared to control group. In contrast, significantly increased levels of ALT, AST, urea, total cholesterol, and triglycerides in all examined sheep but no significant changes in serum creatinine levels were found between groups. Oxidant/antioxidant assessment showed a significant increase in serum MDA levels along with a significant decrease in antioxidant enzyme activities (CAT, SOD, GPx) and GSH levels in all examined sheep from different areas as compared to control group. The serum concentrations of both T<sub>3</sub> and T<sub>4</sub> were significantly higher than that of controls along with a significant decline in serum TSH. Conclusion: - Survey findings revealed that water sources in Matrouh governorate need constant monitoring as the present results showed a degree of pollution especially in rainfall water and groundwater source. The result of serum analysis showed high levels of Pb and/ or Cd in serum of sheep from El Negaila and M. Matrouh, besides, deficient to marginal levels of Cu and Zn in examine sheep from El Hammam II, M. Matrouh and El Negaila. Moreover, sublethal level of Se detected in examined sheep from surveyed localities. Biochemical results suggested that overexposure to dietary Se could induce marked hepatotoxicity as well as oxidative damage in addition to disturbing in thyroid activity. Furthermore, chronic exposure to Pb and/or Cd in El Negaila and Matrouh may reflect an early warning signal for negative impacts of metal exposure on trace elements (Cu and Zn) status, liver function, antioxidant defense system and thyroid activity.</p>
Keywords	Barki sheep, heavy metals, trace elements, serum, Matrouh

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