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Higher glutathione peroxidase (GPx) activity in physically-active adolescent females in comparison with healthy sedentary controls

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Reactive oxygen species (ROS) have been associated with several degenerative conditions including: CVD, cancer, diabetes and cataracts^(1,2,3). There is a growing body of evidence that antioxidants also play a role in bone health, including osteoporosis⁽⁴⁾. Antioxidants may reduce the damaging effects of ROS by converting them into less-harmful species. Production of ROS from osteoclasts is a normal physiological function, which may alter the rate of bone remodelling when associated with other risk factors⁽⁵⁾. Recent studies have suggested that GPx activity may be significantly increased through exercise⁽⁶⁾.

The aim of the present study was to assess the levels of serum GPx activity in active and inactive adolescent girls and to determine the effects of age, BMI and dietary intake on GPx. A further aim was to investigate whether there is an association between GPx and bone health. The subjects were participants in a 3-year longitudinal investigation of exercise and peak bone mass (PBM) development. Seventy-eight healthy subjects comprising thirty-eight competitive gymnasts and forty healthy sedentary adolescent females (age 8–17 years) were recruited as described previously⁽⁷⁾. GPx was measured using GPx assay kit (Cayman Chemical; Immunodiagnostic Systems Limited Ltd, Boldon, Tyne & Wear, UK).

The results showed that serum GPx activity was significantly higher in healthy competitive gymnasts (*n* 38) compared with the healthy sedentary adolescent females (*n* 40). Data for bone mineral density (BMD), dietary intakes and anthropometric measurements in female gymnasts are shown in the Table. The relationship between serum GPx and BMD, broadband ultrasound attenuation (BUA) of the right and left feet, lumbar spine L2–L4 BMD, lumbar spine L2–L4 bone mineral content (BMC), total body BMC, weight, height and BMI, in female gymnasts indicated no significant correlation.

	Serum GPx (nmol)	Total body BMD	Weight (kg)	Height (m)	BMI (kg/m ²)	Protein (g/d)	Fat (g/d)	CHO (g/d)	Fibre (g/d)
Gymnasts (<i>n</i> 38):									
Mean	157*	0.946	31.7*	1.36*	16.8*	55.6	67.8*	230	10.1
SE	11.1	0.014	1.3	0.016	0.29	1.95	2.89	8.66	0.51
Controls (<i>n</i> 40):									
Mean	126	0.947	41.0	1.47	18.5	58.0	74.3	245	10.7
SE	8.8	0.014	1.5	0.018	0.41	1.39	1.71	6.63	0.35

CHO, carbohydrate. Values were significantly different from those for the controls (independent *t* test): **P*<0.05.

These findings indicate that serum GPx is higher in gymnasts, and would suggest that regular intense exercise may enhance antioxidant status. This outcome in turn may help to protect against degenerative diseases and preserve bone health by preventing free radical-induced bone resorption. Further analysis of the effect of GPx activity and trace elements status on bone turnover in this population group is currently underway.

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