**The heightened cardiovascular risk in young females with athletic amenorrhea: A systematic review.**

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The female athlete triad is commonly known to be composed of three elements; low energy availability, amenorrhea and osteoporosis. It has been suggested these elements, though separate, are interrelated. However, increased research suggests a fourth element; endothelial dysfunction, which increases cardiovascular risk in young female athletes. Those with athletic amenorrhea demonstrate similar hormonal profiles to menopausal women, in which the cardio protection of oestrogen is no longer present. Thus suggesting females with athletic amenorrhea may, in fact, be at risk. To obtain the literature to review, one electronic database, PubMed, was searched by one individual. All searches were performed between February and May 2017. After a screening process, a total of 7 research papers were included in the review, with publication dates ranging from the years 2003 to 2016. A total of 285 female participants were included in the review. Emphasis was placed upon those with athletic amenorrhea, however those who were not classified by this term were included for comparison. The studies reviewed included those directly relating to vascular function and dysfunction, measured using flow-mediated dilation techniques. Indirect factors, such as altered hormone and cholesterol levels, were also discussed in terms of their relation to cardiovascular risk and consequent atherosclerosis. In 5 articles, flow mediated dilation (FMD) measurements of the brachial artery were conducted. In 4 of these articles, FMD was reported to be 6.3% (*P* < 0.05), 5.3% (*P* < 0.05), 5% (*P* = 0.0016) and 3.5% (*P* < 0.05) lower in females with athletic amenorrhea, compared to eumenorrheic athletes. One study measured calf blood flow using venous occlusion strain-gauge plethysmography. Those with athletic amenorrhea had reduced resting and peak blood flow at the calf (*P* < 0.05). In one study, grehlin secretion was 39% higher (*P* < 0.05), leptin secretion was 34% lower (*P* < 0.05), and total pulsatile secretion of luteinizing hormone was 40% lower (*P* < 0.05) in those with amenorrhea. Furthermore, one study demonstrated elevated cholesterol levels (*P* < 0.01) in athletes with amenorrhea. Based upon the findings in the review, it may be suggested that young female athletes with amenorrhea, have an increased risk of atherosclerosis. However further research is essential.

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