

The impact of dietary intake and exercise on metabolic health in Saudi Arabian women

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Like much of the Middle East, Saudi Arabia is seeing a dramatic increase in obesity, particularly amongst women⁽¹⁾. Obesity is frequently associated with the development of metabolic syndrome (MS) and associated risk of developing type 2 diabetes and cardiovascular disease. For females, MS is defined by the International Diabetes Federation (IDF) as including the following factors: Waist Circumference (WC) \geq 80 cm, Systolic Blood Pressure \geq 130 mmHg, fasting plasma triacylglycerol (TAG) \geq 1.7 mmol/l, High Density Lipoprotein (HDL) cholesterol $<$ 1.29 mmol/l, fasting plasma glucose \geq 5.6 mmol/l⁽²⁾. Sedentary behaviours, persistent low levels of physical exercise and poor cardiorespiratory fitness (CRF) may be further risk factors for MS⁽³⁾. In Saudi Arabian females cultural factors may specifically limit the amount of physical activity undertaken. This study examined the effect of dietary intervention, without (D) or with (D + E) changes in physical activity, in 40 obese (BMI (Mean \pm SD) = 36.5 \pm 5.1 kg/m²) Saudi Arabian women aged 18–60y.

The study was approved by the ethics committee of King Faisal University, Saudi Arabia. All subjects were provided with dietary advice, including follow-up using regular ‘WhatsApp’ messages, focusing on dietary goals for reducing energy intake and adopting a ‘healthy diet’. The D + E group also attended a fitness centre six times per week where they undertook approximately 20 min vigorous and 40 min moderate exercise.

Total dietary energy intake was reduced by 41 % and 35 % for D and D + E groups respectively. MS associated risk factors were measured prior to and after intervention and are shown in the table. Data was analysed by repeated measures ANOVA.

	Diet Only		Diet + Exercise		ANOVA (p-value)	
	Before	After	Before	After	Time	Time \times intervention
WC (cm)	98.9 \pm 1.9	92.6 \pm 11.9	99.9 \pm 12.7	95.2 \pm 2.0	<0.001	0.235
SBP (mmHg)	117 \pm 13	112 \pm 13	119 \pm 10	114 \pm 10	0.008	0.894
Glucose	4.9 \pm 0.7	4.6 \pm 0.7	4.8 \pm 0.7	4.9 \pm 0.7	0.622	0.169
TAG	0.9 \pm 0.3	0.7 \pm 0.3	0.9 \pm 0.5	0.8 \pm 0.4	0.017	0.541
HDL chol	1.27 \pm 0.29	1.24 \pm 0.30	1.24 \pm 0.32	1.47 \pm 0.39	0.119	0.040

Glucose, TAG & HDL chol all in mmol/l

Both groups of women clearly displayed WC levels that would place them at risk of developing MS. However, of the other risk factors, only HDL chol fell into the range specified within the IDF MS definition. Following dietary intervention WC, SBP and plasma TAG were all significantly reduced independently of exercise inclusion. HDL chol showed a specific response to exercise, increasing in the D + E group but not the D group.

This study shows that, despite having a WC within the range that increases risk of MS, these Saudi Arabian women displayed few other symptoms of MS. However, reduced energy intake, and weight loss, considerably improved their metabolic profile independently of whether this was accompanied by increased physical activity.

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