Preventative and Prescriptive Measures for Metabolic Syndrome

Metabolic syndrome (MetS) is defined by the International Diabetes Federation (IDF) as a group of cardiovascular disease (CVD) risk factors that when present, correlate to increased CVD potential and morbimortality (Anderssen, Carroll, Urdal, & Holme, 2007). The MetS risk factors also correlate to increased potential of developing type 2 diabetes if the individual is "borderline" or if type 2 diabetes runs in the family (Anderssen et al., 2007). These factors of MetS include having insulin resistance, problems with glucose regulation, high blood pressure, obesity especially excessive adipose tissue around the waistline, and dyslipidemia (Anderssen et al., 2007).

The National Cholesterol Education Program Adult Treatment Panel III (NCEP ATP III) favors promoting healthy lifestyle choices (and permanent behavioral change) as the best way to prevent and combat these risk factors throughout life (Anderssen et al., 2007). Anderssen et al. (2007) reexamined the data from the Oslo Diet and Exercise Study (ODES) which studied the effects of diet intervention (total energy restriction), exercise intervention (mostly endurance-based), and diet combined with exercise interventions for one year in a group of men who met the International Diabetes Federation criteria for MetS. After one year, the diet-exercise combination group showed the greatest and most significant improvement (over diet alone or exercise alone) in decreasing the MetS risk factors (waist circumference, triglycerides, high-density lipoprotein, diastolic blood pressure, and glucose regulation (Anderssen et al., 2007). The diet and exercise combination seemed to have positive additive effects.

Hansen, Dendale, van Loon, and Meeusen (2010) also stated that modifications in energy intake and exercise were "cornerstone" to the prevention and treatment of obesity, MetS, type 2 diabetes, and heart diseases. For these type of patients, the general clinical recommendations on exercise dosage is at least 150min/week of moderate intensity (40-85% of VO_{2max}) and gradually increasing to at least 200-300min/week (3-5 days of exercise) and incorporate both cardiovascular exercise and resistance exercise (Hansen et al., 2010). Being physically active lowers one's cardiovascular mortality risk by 24% (Hansen et al., 2010).

Specific recommendations by Hansen et al. (2010) for obesity are restriction of energy intake and a combination of endurance plus resistance exercises. For obese patients, the most significant improvement in their overall health condition can be made by reducing the adipose tissue (especially around the waistline) and preserving as much muscle as possible (Hansen et al., 2010). Hansen et al. (2010) noted that individuals on a 16-week program lost 11kg on average, and those individuals who just exercised (without restricting energy intake) lost on average 3kg. Volume of exercise seemed to make a larger impact over exercise intensity (Hansen et al., 2010). For the obese individual, low to moderate intensity may be less daunting than high-intensity exercise and thus, there may be more compliance and more adherence to the volume of work needed to be done (at least initially) (Hansen et al., 2010). Hansen et al. (2010) noted that visceral obesity is a strong predictor for cardiovascular disease and insulin resistance. In many obese patients, heart disease and/or type 2 diabetes are already present (Hansen et al., 2010).

For patients with metabolic syndrome, lifestyle changes (and counseling) and endurance exercise seems to help decrease blood pressure (for those hypertensive cases), improve blood

lipid panels, improve insulin resistance and blood glucose regulation, and bodyfat reduction (Pattyn, Cornelissen, Eshghi, & Vanhees, 2013). Pattyn et al. (2013) noted that even a small reduction of 3mmHG in resting systolic or diastolic blood pressure may reduce heart disease risk by 5%, stroke by 8%, and "all-cause" mortality by 4%.

Lalande, Petrella, and Shoemaker (2013) also noted that MetS patients tend to exhibit left ventricular (LV) diastolic dysfunction which can be described by the peak early flow velocity (E) when the mitral valve opens and peak atrial flow velocity when the atrium contracts (A) in the ratio E/A. When E/A is less than 1, it marks a prolonged LV relaxation which is an indicator of first stage LV diastolic dysfunction (Lalande et al., 2013). Lalande et al. (2013) also noted that E/A correlates to VO_{2max} and aerobic fitness and exercise would be important to improving LV diastolic dysfunction.

For MetS patients, moderately-high to high intensity exercise yielded significantly better results over low intensity exercise in reducing fat mass (Hansen et al., 2010). High intensity interval training also impacted insulin sensitivity in MetS patients (Hansen et al., 2010).

For patients with type 2 diabetes, exercise is a very effective way to improve lipid profiles, reduce blood pressure, regulate blood sugar, and reduce bodyfat (Hansen et al.,2010). For patients diagnosed with heart disease, exercise also creates a positive impact on their condition especially increasing their peak oxygen uptake, and adaptations on cardiac and skeletal muscle (Hansen et al., 2010). For both type 2 diabetes and heart disease patients, building up endurance to 40-60minutes per bout is recommended (Hansen et al., 2010). Also high-intensity interval training seems to impact VO_{2peak} in heart patients (Hansen et al., 2010).

The obesity pandemic is serious and presents multiple risk factors and comorbidities that "stack" up against an individual experiencing these types of medical complications. Exercise and regulating one's diet seems to be the best non-pharmacological, do-it-yourself intervention or prevention.

References

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