SCI: Good Food – literature review of energy requirements in SCI

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Introduction

Obesity is a common secondary complication of spinal cord injury (SCI) and is associated with a range of adverse metabolic and physical conditions. Similar to obesity in the able-bodied population, obesity in the SCI population is associated with glucose intolerance, insulin resistance, hypertension, hyperlipidaemia and coronary artery disease. In addition unique to the SCI population, obesity can result in pulmonary emboli, respiratory problems, pain, pressure ulcers and further compromised mobility.1,2,3,6,7,8,9,15

A positive energy balance is the fundamental cause of obesity in all people i.e. energy (or ‘kJ’) consumed exceeds the energy requirements. It is assumed that persons with SCI have lower energy requirements so a literature review was undertaken to attempt to quantify these reduced requirements.

Resting Metabolic Rate (RMR) and SCI

The most quantitatively important component of total daily expenditure is RMR. The RMR is determined by the amount of fat free mass (FFM) in the body. People with SCI have less FFM than the able-bodied population and therefore a lower RMR. It appears that the metabolic activity in the FFM is the same in controls and SCI persons. A review by Buchholz et al reported that a person with SCI has a RMR of 14-27% lower than that in the able-bodied population. In fact the RMR in this population appears to approach that of the able bodied population only in the presence of inflammatory conditions such as bacteriuria or pressure ulcers.1,11,12,13,14

Activity Expenditure and SCI

There is very little information on energy expenditure from activity in both paraplegia and tetraplegia. After the acute phase, because the resting metabolic rate decreases and, as a result of the relatively sedentary lifestyle post injury, the total energy needs decrease. The studies indicate that activity levels in persons with paraplegia equate to that of very sedentary able bodied persons.15,13,15

Calculated Energy Requirements and SCI (using the Schofield Equation)16

CASE 1 – 20yo 176cm male with paraplegia

‘Normal’ Ideal Weight 70kg requires 7.5MJ(1780calories)/day using RMR reduction of 15% and Activity Factor 1.25 (sedentary)

CASE 2 – 20yo male 176cm, able-bodied

Ideal Weight 70kg requires 9.2MJ(2180calories)/day using Activity Factor 1.25 (very sedentary)

CASE 3 – 20 yo 166cm female with tetraplegia (chin control wheelchair)

‘Normal’ Ideal Weight 62kg requires 5MJ(1200calories)/day using RMR reduction of 25% and Activity Factor 1.1 – it is difficult to achieve an adequate vitamin and mineral intake at this energy level.

CASE 4 – 20yo female 166cm, able bodied

Ideal Weight 62kg requires 7.4MJ(1760 calories)/day using Activity Factor 1.25 (very sedentary)

Discussion and Conclusion

The energy requirements of persons with a spinal cord injury can be calculated and are significantly lower than able bodied persons because of a reduction in Resting Metabolic Rate and reduced activity levels. Consequently planning diets for people with SCI based on the energy requirements identified will require care to ensure adequacy of vitamin and mineral intake.

References