

A combination of lower calorie intake and exercise may have additional benefits to reduce diabetes risk

23 July 2015

American researchers from Saint Louis University in St. Louis, Washington University School of Medicine in St. Louis, and Baylor College of Medicine in Houston, have concluded that, in sedentary, women and men who have overweight, the combination of calorie restriction (eating fewer calories than normally consumed) and exercise has additive effects on the regulation of blood sugar levels after a meal. The effect is greater than obtained by either calorie restriction or exercise alone, with the same percentage of weight loss. Moreover, the time required to reach the intended weight loss was significantly shorter when combining the two interventions.

Glucoregulation refers to the body's capacity to keep steady levels of sugar (glucose) in the blood. The hormone insulin supports the uptake of glucose by different tissue cells. Sensitivity of those cells to insulin, i.e. insulin sensitivity, is an important indicator of glucoregulation and diabetes risk.

From previous studies there are indications that both calorie restriction and exercise affect glucoregulation through weight loss, but also through weight loss-independent mechanisms, such as the increase in skeletal muscle through exercise. The objectives of this study were 1) to determine whether a combined intervention of calorie restriction and exercise will have additive benefits in regulating glucose relative to either intervention alone, and 2) to investigate the weight loss-independent mechanisms through which particularly calorie restriction may influence glucoregulation, as these are less well understood compared to exercise.

Sixty-nine sedentary, women and men who have overweight aged 45 to 65 years were assigned to one of three interventions (only a calorie restriction diet [CR], only exercise [EX], or both combined [CREX]), with a common goal to lose approximately 6-8 % bodyweight over a period of 12 to 14 weeks. Fifty-two of them finalised the study and reached the weight loss goal. For the CR intervention the aim was to decrease the energy intake by 20%. In the EX intervention the participants were instructed to increase their Total Energy Expenditure (TEE) by 20%. The CREX intervention was a combined 10% reduction in energy intake and a 10% increase in TEE. Three-day food diaries were used to assess energy intake. Energy expenditure was measured using physical activity recall interviews and electronic measurement equipment (accelerometers). Blood samples were taken at several intervals after a meal to assess insulin sensitivity and glucoregulation. Different substances were analysed, including glucose, insulin, and hormones involved in insulin production and release like glucagon-like peptide 1 (GLP-1) and glucose-dependent insulinotropic polypeptide (GIP).

All three interventions resulted in a BMI reduction of about 7%, as intended. The time required to reach the weight loss goal was significantly shorter in the CREX group (13 weeks) than in the CR (19 weeks) group and EX (20 weeks) groups. Insulin sensitivity in the CREX group improved twice as much in comparison to either the CR or EX group alone. Moreover, the dietary intervention, in contrast to exercise, decreased one

of the hormones involved in insulin action (GLP-1). The authors hypothesised that it may be part of a CR-specific mechanism that improves glucoregulation.

In summary, the authors concluded that calorie restriction and exercise together lead to greater improvements in glucoregulation than either calorie restriction or exercise alone, with equal weight loss. Weight loss showed to be more successful when the two interventions are combined. The findings suggest that both calorie restriction and exercise interventions affect glucoregulation through weight loss but also through other mechanisms. The authors underlined the importance of combining both to reduce the risk for diabetes, but also noted that since data from participants who withdrew (12) and from those who did not adhere to the intervention (5) were excluded, these results may only be relevant to people who can commit to healthy lifestyle interventions.

For further info please see:

[Weiss EP, et al. \(2015\). Calorie restriction and matched weight loss from exercise: Independent and additive effects on glucoregulation and the incretin system in overweight women and men. Diabetes Care 38:7 1253-1262.](#)