

Book Reviews

Diabetes and physical activity, J.H. Goedecke, E.O. Ojuka, editors (Karger, Basel, Switzerland) 2014. 158 pages. Price: USD 222.00 / CHF 189.00 / EUR 177.00 ISBN 978-3-318-02576-7

The role of physical inactivity in the pathogenesis of type 2 diabetes mellitus (T2DM) has been intensively studied. Lack of physical activity predisposes to T2DM and makes its management more difficult. Conversely, engaging in regular physical activity can not only prevent the development of T2DM, but can also potentiate the effects of anti-diabetic drug therapy, thereby improving glycaemic control. It is, therefore, essential that all healthcare professionals engaged in the prevention and treatment of T2DM have a thorough knowledge of the role of physical activity in this condition. This book is a step in the right direction, considering the increasing prevalence of physical inactivity, which has become an epidemic in its own right.

The book counts among its contributors, recognized authorities in the field of physical activity across the world, thereby providing a global perspective to what has indeed become a global problem. The contents are arranged in a logical and lucid fashion, easy navigation through the book.

The book is divided into 14 chapters, each detailing an important aspect of physical activity in relation to diabetes. The preface succinctly introduces the subject matter and provides a brief overview of each chapter.

Chapter 1 introduces the concept of metabolic syndrome and thereafter deals with the effects of exercise on glycaemic control as well as the role of dietary modification in T2DM. Evidence on the role of exercise in improving and reversing some of the features of T2DM is also presented. Chapter 2 explores the role of sedentary behaviour in the pathogenesis of T2DM. As sedentary behaviour has been shown to be associated with adverse cardiovascular risk tackling

this factor is of paramount importance. The authors also raise an interesting point that being sedentary is not the same as exercising too little. Muscle tissue appears to respond to the balance of total time spent in sedentary pursuits or in active contraction, rather than to a session of formal exercise.

In Chapter 3, the authors attempt to explore the relationship between physical inactivity and T2DM in Sub-Saharan Africa, a region where physical activity levels have traditionally been high. Interestingly, the authors conclude that physical inactivity does not independently predict T2DM in this region, rather ageing, urbanization and genetic factors account for most of the risk of T2DM. It is not clear as to what extent these postulations apply to other nations like India, where the levels of physical activity have been shown to be abysmally low.

Chapters 4 to 8 deal with the physiological effects of exercise on glucose metabolism. Perusal of these chapters would enable the reader to clearly understand how exercise reduces the risk of T2DM. Chapter 4 elucidates the effects of physical training on insulin resistance and secretion. The differential effects of exercise on insulin secretion in normal individuals and those with T2DM are described. Chapter 5 focuses on the role of the mitochondria in the dysregulation of glucose metabolism found in T2DM, and provides evidence on the role of exercise in reversing their mitochondrial dysfunction. Chapter 6 details the role of lipids in the development of insulin resistance and attempts to explain how acute exercise might protect against this by the process of “fatty acid partitioning”. The take-home message from this chapter is that as little as one session of acute exercise can improve insulin resistance in obese individuals. Chapter 7 describes the role of exercise in improving glucose disposal in skeletal muscle, a process mediated through translocation of the GLUT-4 transporters to the plasma membrane of the myocyte. In chapter 8, the effect of exercise on body fat

distribution is described. It is well known that visceral adiposity, rather than overall adiposity, is the major risk factor for metabolic syndrome and T2DM. The authors reiterate that while physical inactivity is a risk factor for T2DM, the magnitude of risk conferred by high levels of body fat is more than that of low levels of physical activity. In other words, an obese physically active individual is at a higher risk of T2DM than normal-weight, physically inactive individual. The authors recommend physical activity of sufficient intensity and volume, to prevent “centralization” of body fat and therefore, reduce the risk of T2DM.

In chapter 9, the authors attempt to unravel the genetic basis behind the variable physiological responses to an equal bout of physical activity. The existence of such a gene-physical activity interaction, may be mediated through epigenetic mechanisms. These interactions may explain why sedentary behaviour appears to increase the risk of T2DM in certain individuals, but less so in others. Identifying these variants would help us tailor preventive and therapeutic exercise interventions to those most likely to benefit from it.

Chapters 10 to 12 discuss the role of physical activity in diabetes occurring in special groups, *i.e.*, pregnant women, children and the elderly. While physical activity has been shown to be effective in improving glycaemic control in women with gestational diabetes, its efficacy in preventing the same has not yet been proven. In children, physical activity has been described as the best preventive measure not only for T2DM, but for obesity as well. The authors have also shared their experience of a real-world intervention study on children from New Zealand, in which a through-school nutritional and physical activity programme significantly reduced the prevalence of obesity and overweight and improved physical fitness. The ongoing Obesity Reduction and Awareness and Screening of Non-communicable Diseases through Group Education in Children and Adolescents (ORANGE) project in Chennai, India will probably tell us whether such an approach is feasible and effective in developing nations such as India. In chapter 12, the authors present evidence for the benefits of exercise in the elderly and provide recommendations for physical activity, taking into consideration the common comorbidities in this population.

Chapter 13 presents recommendations for physical activity for prevention of T2DM from a public health perspective. Current recommendations state that all individuals perform at least 150 minutes of moderate intensity activity per week. The authors show that these

recommendations are valid and effective in preventing T2DM and need to be implemented further, taking cultural and socio-economic factors into consideration.

In chapter 14, the effects of physical activity in type 1 diabetes mellitus (T1DM) are presented. The effects of exercise in T1DM are significantly different from those in T2DM. In addition to hypoglycaemia, these individuals with T1DM are prone to hyperglycaemia and even ketoacidosis; should exercise be initiated when blood glucose levels are high. Nevertheless, the authors reiterate that all individuals with T1DM be encouraged to perform regular exercise. They stress the importance of patient education, focusing on regular self-monitoring of glucose levels and frequent snacking during long bouts of exercise, as the main tool against glucose fluctuations in this situation.

Overall, this book provides a concise update on exercise physiology in diabetes. The pathophysiological and therapeutic aspects of this important topic are presented in detail with clearly labelled illustrations and Tables. Overall, this book is a welcome addition to the library of any student or researcher interested in exercise physiology and diabetes.

R.M. Anjana & V. Mohan*
Madras Diabetes Research Foundation &
Dr Mohan's Diabetes Specialities Centre
Chennai 600 086, Tamil Nadu, India
**For correspondence:*
dr mohans@diabetes.ind.in

