

Brazil



Photography by Maysa Vieira de Sousa

Football and diet for women and men with type 2 diabetes in Brazil

The cost of treating type 2 diabetes and its micro- and macrovascular complications/diabetes-related complications are high. Among Brazilian 20–79-year-olds, approximately 15.7 million people have diabetes.¹ The prevalence of type 2 diabetes is especially high and, along with important risk factors such as obesity, is gradually increasing. The high prevalence of diabetes and other non-communicable diseases in the Brazilian population highlights an urgent need to optimise preventive strategies that are both effective and sustainable.



Football as a hedge against diabetes in Brazil

While it is well-understood that increased physical activity and healthy diets are cornerstones in the prevention and treatment of type 2 diabetes,² adherence to exercise recommendations in people with type 2 diabetes is generally poor.³ However, given Brazilians' love of football, the introduction of this popular national pastime as a form of physical exercise to hedge against the risks of type 2 diabetes was identified by researchers as a viable health intervention. By using this popular activity in combination with dietary advice and proper diabetes management, researchers hypothesised that the risk of comorbidities could be reduced in people with type 2 diabetes.

The intervention

In 2012, researchers in Brazil developed an intervention of recreational football combined with a calorie-restricted diet targeted at Brazilian men and women with type 2 diabetes. The project was initiated by Maysa Vieira De Sousa, a Brazilian Sports Nutrition Researcher from School of Medicine, University of São Paulo. She was inspired by the remarkable effects football demonstrated in normotensive individuals^{4,5} and hypertensive patients.^{6,7} Encouraged by the medical benefits of regular football practice, De Sousa sought to implement football practice into the prevention and treatment programmes of middle-aged and elderly Brazilian individuals suffering from metabolic diseases. The study was a collaboration between researchers from the University of São Paulo School of Medicine and Professor Peter Krustrup from the University of

Southern Denmark. The study aimed to examine the effectiveness of recreational football training combined with a calorie-restricted diet on lipid profile and insulin resistance indicators in type 2 diabetes patients. The study was supported by a grant from the State of São Paulo Research Foundation (FAPESP).

Methods

Middle-aged men and women with type 2 diabetes were recruited from Basic Public Health Units and the Hospital das Clínicas in São Paulo. They were 48–68 years old, living with obesity (BMI ~33 kg/m²), and with glycosylated haemoglobin (HbA1c) of 7.3%. All had been living with diagnosed type 2 diabetes for approximately seven years and were free from complications such as diabetic nephropathy, diabetic retinopathy, and cerebrovascular and cardiovascular disease. Generally, the participants were highly motivated to engage in football training and arrived with various football playing skills and experience. To carry out the intervention, training sessions were led by fitness instructors specialised in football coaching and further educated in the Football as Medicine approach. Training sessions were provided three times per week for 12 weeks and consisted of friendly small-sided games (3 versus 3 up to 7 versus 7). Games took place either outdoors on an approximately 35x50m natural grass pitch or on a natural wooden court on rainy days. Each training session lasted 40 minutes, starting with a 10-minute low-intensity warm-up. This was followed by a football game lasting 24 minutes (12 minutes a half), with 3 minutes of passive rest in between. For the purposes of these training games, there were no goalkeepers.



Calorie-restricted diet

In addition to regular football training, each participant was given an individually calculated dietary plan that provided them with 500–1,000 fewer kcal of energy per day compared to what they were accustomed to. The prescribed diet was balanced and rich in fibre (minimum of 20g/ day), per current Brazilian guidelines. The diet also consisted of 45–60% carbohydrate, 15–20% protein, and 20–30% fat, distributed over five to six meals per day. Every two weeks, all participants were enrolled in the Nutritional Education Program, which included lectures on nutritional care and glucose management for people with type 2 diabetes.

Participant perspectives

All the participants started this intervention as overweight and sedentary individuals who could not imagine themselves playing football again. However, as they became familiar with the training regime, they reported positively on the feeling of playing football and exercising. At the end of the study, all participants asked about the possibility of continuing the training and shared how they had formed great friendships during the intervention.

Researcher perspectives

The enthusiasm for football among Brazilian participants greatly assisted in the success of this intervention. However, it should be remembered that people with type 2 diabetes may have unknown disease complications that contraindicate participation in football.¹¹ Therefore, it is highly advised that a physician is always involved before prescribing exercise to type 2 diabetes patients.

Results

The combination of regular football practice with a calorie-restricted diet induced the following results in the study group:

- Improved blood glucose control;
- A 10% increase in aerobic fitness;
- A markedly improved lipid profile;
- Identical fat mass reduction to that achieved by a calorie-restricted diet alone (3.4 kg vs 3.7 kg) with no change in muscle mass during the intervention period

Moreover, it was shown that the combination of football and dietary changes markedly decreased muscle catabolism biomarkers and improved blood glucose regulation to an even greater extent than making dietary changes alone.⁸ This important finding may help to preserve lean body mass and prevent sarcopenic obesity—two common problems in older people with diabetes.⁹ Further, the Brazilian findings suggest that football practice in combination with dietary changes may downregulate the expression of muscle atrophy related genes and preserve the anabolic and anti-inflammatory gene IL-15. These findings could explain the observed improvements in glucose regulations and lipid profile among participants, both of which help to mitigate the occurrence of comorbidities in type 2 diabetes patients.¹⁰



By providing a physician, the patients felt safe when they started to exercise. They were supported in their glucose management and taught how to respect their limits to exercise. This support is beyond what people with type 2 diabetes typically receive in basic public health treatment in Brazil.

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Maysa Vieira de Sousa
Laboratory of Medical Investigation
– LIM-18, FMUSP, São Paulo
University
Grant: FAPESP

Next steps

Brazilian football clubs are mainly private and not available to the public. However, the researchers in this intervention see great potential in implementing Football as Medicine across the country. Such a broad-scale intervention would most likely require collaboration between public schools (to provide training facilities), football trainers (to provide coaching), and local ambulatories (to provide nurses, physicians and nutritionists with knowledge of type 2 diabetes management).

The researchers from this study also hope to contribute to an international multicentre study for diabetic patients in collaboration with peers worldwide.

As football is a motivating activity that involves a high-intensity intermittent exercise in combination with many strength-demanding activities such as jumps, sprints, shots and sudden changes of directions,^{12,13} its suitability for encouraging broad-spectrum health effects was deemed ideal.¹⁴⁻¹⁶

High-intensity intermittent exercise such as small-sided recreational football sessions is safe for sedentary middle-aged and older men and women with type 2 diabetes. Football combined with restricted diet was efficient in enhancing physical capacity, dyslipidaemic status, and insulin sensitivity, suggesting that this is an effective way to reduce insulin resistance, beta cell dysfunction, and risk factors for cardiovascular disease in type 2 diabetes patients. This potentially makes football combined with diet a stronger tool for preventing and treating type 2 diabetes complications than diet alone.¹⁷



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