

EDITORIAL COMMENTARY

Obesity and Metabolic Syndrome in Football Players

An expert panel recently reported that obesity is “the single greatest threat to public health in this century” and urged Americans to reduce their caloric intake and increase their physical activity (1). We are in worse physical shape than any previous generation. We are more sedentary and heavier. The terms *crisis*, *epidemic* and *war on obesity* are routinely used to describe our society’s health problems. Extensive scientific research during the past century has highlighted the short- and long-term benefits of physical activity and the dangers of a sedentary lifestyle. However, the likelihood of a positive change in behaviour in the general population with regard to diet and exercise appears bleak (2).

Recent studies in the United States (US) have shown that obesity concerns are not only restricted to the general population, but surprisingly, include athletes as well. These studies have primarily looked at the incidence of cardiometabolic syndrome in football players at the collegiate and professional levels. Cardiometabolic syndrome is defined by the presence of 3 or more of the following 5 markers: blood pressure $\geq 130/85$ mm Hg, fasting glucose ≥ 100 mg/dL, triglycerides ≥ 150 mg/dL, waist circumference ≥ 100 cm, and high-density lipoprotein cholesterol (HDL-C) ≥ 40 mg/dL (3). Of particular concern among football players is the heavier lineman position. Young athletes are encouraged to gain weight with the intent of becoming offensive or defensive linemen. Unfortunately, the usual time course of their athletic careers is limited, but the long-term effect of weight and obesity on future health may be long-standing. Prior studies in US college football players have demonstrated that 28% to 49% of linemen meet the criteria for cardiometabolic syndrome (4-6).

The percentage of National Football League (NFL) players with a traditional definition of obesity (body mass index [BMI] ≥ 30 kg/m²), is more than twice that of 20- to 39-year-old men in the US National Health and Nutrition Examination Survey (NHANES) (7). The average weight of NFL players increased 10% to an average of 112 kg from 1985 to 2006. Moreover, the number of players who weighed 135 kg or more increased from 39 in 1992 to 552 in 2005. A retrospective analysis of 3683 Iowa high school football linemen in 2004 found 45% to be overweight (BMI ≥ 95 th percentile), compared with a prevalence of 18.3% in a similar age group from the US NHANES (8). In addition, 9% of Iowa high school football linemen were found to have severe obesity, defined as a BMI ≥ 35 kg/m².

In a non-scientific media report in 2006, it was reported

that professional football players were more than twice as likely as professional baseball players to die before the age of 50 (9). The National Institute for Occupational Safety and Health evaluated the health status of 6848 retired NFL players who played from 1972 to 1988 (10). The study demonstrated that linemen had a 52% higher risk of dying from heart disease than the general population. A possible explanation for these findings is a higher prevalence of metabolic syndrome in retired NFL linemen compared with non-linemen (59.8% vs. 30.1%) (11). Similarly, a previous study of active NFL players demonstrated a higher prevalence of cardiometabolic syndrome in linemen compared with non-linemen (22% vs. 0%) (3).

In this issue of the *Canadian Journal of Diabetes*, Mansell et al report the results of the first Canadian study evaluating the prevalence of metabolic syndrome among collegiate football players attending a major university in Canada (12). Their aim was to determine whether Canadian college football linemen exhibit characteristics of metabolic syndrome despite their young age, presumed athleticism and high level of exercise. Thirty-nine collegiate football players from the University of Saskatchewan’s 2009 training camp consented to participate. Clinical and laboratory data were obtained for all study subjects, including blood pressure, cholesterol and glucose levels, waist circumference and body composition. Study participants were also asked to record a 3-day dietary history to assess total caloric intake. Fourteen percent of linemen were found to have metabolic syndrome compared with none of the non-linemen. An additional 38% of linemen met two of the three criteria that define metabolic syndrome. Linemen also exhibited a higher resting heart rate and lower HDL-C levels compared with their non-linemen counterparts.

These results add to the increasing data that contradict the longstanding—and presumed erroneous—concept of being “fit and fat.” Exercise is beneficial and should be encouraged. However, the benefits of exercise in this population may be overmatched by the long-term consequences of weight gain and obesity.

We have obvious concerns about the long-term health status of athletes being encouraged to “fatten up for football,” as described in a popular US magazine article (13). A rigorous scientific study evaluating the health status of high school and younger organized football participants may garner more information regarding the future risk of these young athletes. Moreover, there is an obvious need

for investigational studies that address the longitudinal risk of current and former football players. These long-term outcome studies should be well planned and would necessitate the cooperation of enrolled athletes. They would hopefully answer the question of cardiovascular and other long-term health risks of heavier football linemen, including diabetes and non-alcoholic fatty liver disease with possible additional hepatic sequelae (14). Certainly, past and current data, including the outstanding work of Mansell et al, send a clear warning about the health consequences of those who “fatten up for football.”

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REFERENCES

1. Report of the Dietary Guidelines Advisory Committee on the Dietary Guidelines for Americans, 2010. <http://www.cnpp.usda.gov/DGAs2010-DGACReport.htm>. Accessed November 8, 2011.
2. Groppel JL. Cardiometabolic health in the United States: what’s the story? And how can you, the sports medicine practitioner, help rewrite the story? *Phys Sportsmed*. 2010;38:12-17.
3. Selden MA, Helzberg JH, Waeckerle JF, et al. Cardiometabolic abnormalities in current National Football League players. *Am J Cardiol*. 2009;103:969-971.
4. Buell JL, Calland D, Hanks F, et al. Presence of metabolic syndrome in football linemen. *J Athl Train*. 2008;43:608-616.
5. Borchers JR, Clem KL, Habash DL, et al. Metabolic syndrome and insulin resistance in division 1 collegiate football players. *Med Sci Sports Exerc*. 2009;41:2105-2110.
6. Wilkerson GB, Bullard JT, Bartal DW. Identification of cardiometabolic risk among collegiate football players. *J Athl Train*. 2010;45:67-74.
7. Harp JB, Hecht L. Obesity in the National Football League. *JAMA*. 2005;293:1061-1062.
8. Laurson KR, Eisenmann JC. Prevalence of overweight among high school football linemen. *JAMA*. 2007;297:363-364.
9. Hargrove T. Supersized in the NFL: many ex-players dying young. Scripps Howard News Service Online; January 31, 2006.
10. Baron S, Rinsky R. NIOSH Mortality Study of NFL Football Players: 1959-1988. Atlanta, GA: National Institute for Occupational Safety and Health; 1994. <http://www.cdc.gov/niosh/pdfs/nflfactsheet.pdf>. Accessed November 8, 2011.
11. Miller MA, Croft LB, Belanger AR, et al. Prevalence of metabolic syndrome in retired National Football League players. *Am J Cardiol*. 2008; 101:1281-1284.
12. Mansell K, Blackburn D, Arnold B, et al. Pre-CFL: prevalence of metabolic syndrome among college football linemen. *Can J Diabetes*. 2011; 35:497-502.
13. Keith, AE. Fattened up for football. People. November 10, 2008. <http://www.people.com/people/archive/article/0,,20238302,00.html>. Accessed November 8, 2011.
14. Selden MA, Helzberg JH, Waeckerle JF, et al. Elevated alanine aminotransferase in current national football league players: correlation with cardiometabolic syndrome markers, obesity, and insulin resistance. *South Med J*. 2009;102:1003-1006.