With the increasing incidence of obesity and type II diabetes amongst youth in the past three decades, it is unclear how physical fitness and endurance has correlated with these trends. Our goal was to understand how mean endurance time on a standardized endurance test, a proxy for physical fitness, has changed in healthy individuals in the past 3 decades and whether these trends can be identified independently of trends in BMI.

Materials & Methods

We conducted a retrospective cross sectional study reviewing the health records of 436 children (mean age 12.6 ± 3.2 yrs, 57% male) who underwent an exercise Bruce Protocol treadmill test from 1983 – 2010. Patients with known cardiovascular conditions were excluded. There was a significant difference in the mean endurance time between groups of 5-year intervals (ANOVA P<0.001) with endurance time being shorter at later testing years [figure 1].

Bruce Protocol Treadmill Test: The subject begins walking slowly for 3 minutes at 1.7 mph on a calibrated treadmill. Speed and grade are increased every 3 minutes without any intervening rest periods at a pace established by the protocol. The individual then indicates when they are too fatigued to continue. The end point determines the subject’s “endurance time.” The subject may not touch the railing except with a finger or two for balance.

Results

There was a significant difference in the mean endurance time between groups of 5-year intervals (ANOVA P<0.001) with endurance time being shorter at later testing years [figure 1]. The endurance time was significantly inversely correlated with the year of testing (Spearman’s r = -0.274; P < 0.001). In contrast, there was no significant difference in the distribution of BMI between testing date 5-year intervals (P=0.205) [figure 2]. There was a significant difference in the mean endurance time between groups of 5-year intervals (ANOVA P<0.001) with endurance time being shorter at later testing years.

Bruce Protocol Treadmill Test

Conclusions

There is a downward trend in endurance time over the 27 years period among inner city kids. Temporal decline in endurance time was independent of factors known to be associated with physical endurance such as BMI, age, gender, and race. BMI alone cannot fully explain the downward trend in exercise time. Thus, factors such as deconditioning due to sedentary lifestyle and lack of motivation to endure on the treadmill among later generations may play a role in such decline.

References


Acknowledgements

Much appreciation to the John H. Stroger, Jr. Hospital of Cook County for their assistance in completing the study, and to Dr. Rami Doukky and Dr. Maria Serratto for their assistance in the data analysis.