Fitness levels of South African youth of Indian descent — 1977 and 1997

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Abstract

Background. South Africa's population of Indian descent is at high risk of premature coronary artery disease, and in particular, diabetes mellitus. Putative risk factors that may be contributing to these chronic diseases include obesity, inactivity, poor lipid profiles, smoking, unbalanced dietary practices and stress. It has been hypothesised that it may be particularly important to document changes or secular trends in these risk factors in schoolgoing children of Indian descent. The fitness level of South African youth of Indian descent has been questioned for many years.

Objectives. The aim of this study was to compare and contrast the fitness levels of Indian high school boys (aged 15,16,17 and 18 years of age) in two cohorts: 1977 and 1997. These cohorts provided a unique opportunity to monitor secular trends in fitness of South African youth from the Indian community. A secondary aim was to identify whether the same trends in the fitness scores between the age groups still exists as well as to compare these trends between 1977 and 1997.

Design. Ten different secondary schools from the metropolitan area participated in this study.

Outcome measures. The test battery was based on the 1978 study by Coopoo. The selected fitness tests included a 50 m dash, sit-ups, pull-ups, medicine ball put, shot put, 250 m shuttle-run and the 12-minute run/walk test.

Results. Data from 400 boys were analysed, categorised into four age groups. Basic descriptive and inferential statistics were used to analyse the data. The results indicate that the 1997 cohort compared favourably in some components, but poorly in most of the tests. There was a consistent and statistically significant ($P < 0.05$) decline in aerobic fitness, anaerobic fitness and speed throughout the age ranges, with muscular endurance and static strength showing erratic percentage differences throughout the age ranges.

Conclusion. Most of the children tested were not sufficiently active to attain optimal fitness and to reduce the risk factors associated with ill health.

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Introduction

The first group of Indian indentured labourers arrived on the eastern shores of South Africa in 1860. These immigrants came from India to work on the sugar cane farms in Natal run by the British. The physical activity level of these settlers was high. Data extrapolated from information gained in a study completed in 1994 on cane-cutters and stackers show that the energy expenditure of these workers was approximately 13 000 kj per day.[14] This indicates high levels of physical activity for these indentured labourers per day. Workers lived in trying conditions where food was cooked on open fires, wood had to be chopped and collected and water had to be carried from dams and rivers.[18] Thus the profile of the Indian settler was one of a physically fit manual worker undertaking a number of agricultural pursuits daily.

In the early 1960s, the lifestyle and work patterns of these agricultural labourers changed as their contracts came to an end. Many of them began selling vegetables, working in shops in order to make a living. Hence physical activity levels were reduced to a minimum due to the change in work habits.[18]

The present Indian population of South Africa is at high risk of premature coronary artery disease due to obesity, lack of exercise, high cholesterol levels, diabetes, smoking, poor dietary habits and stressful lifestyle. Their poor lifestyle habits may have been established in youth.[1, 5, 12, 16, 21]

In 1977 a study was conducted to assess the fitness levels of Indian high school boys in the Durban area between the ages of 15 and 18 years.[4] The results of the study showed that there was a marked decline in overall fitness in the 16-year-old and older groups. The fitness scores showed trends similar to those of the other racial groups in the country at the time. However, the fitness levels of the Indian boys were lower than those of their counterparts in South Africa.[3,7,8]

These cohorts provided a unique opportunity to monitor secular trends in fitness of South African youth from the Indian

community over a 20-year period, using cohorts sampled from the same schools.[4]

Physical activity during childhood can benefit health and reduce risk factors associated with ill health in adulthood.

Methods

Ten different secondary schools in the Durban metropolitan area participated in this study. Permission was granted by the Education Department to test these children. Informed consent was obtained from all parents of the children tested.

The tests employed included the 50 m dash for speed, sit-ups for 2 minutes and pull-ups testing muscular endurance, medicine ball put and shot put for static strength, 250 m shuttle-run for anaerobic capacity, and the Cooper's run/walk test for aerobic fitness.[4] The test battery was based on the Fleishman study which measured motor fitness.[10]

There were 100 boys in each age category (15, 16, 17 and 18 years of age, $N = 400$ children). Testing on both occasions (1977 and 1997) was conducted over a 3-month period, viz. July, August and September. Twenty children were tested per day, after school. Permission was granted by both the Department of Education and the principals of the schools. The children were recruited randomly from a class register. Every third boy was selected to be tested within the age groups. If the boy refused, the next boy on the register was requested to participate. Basic statistical procedures were used to analyse the data using a computer statistical package (SPSS). The means and standard deviations (± SD) and percentage differences of both studies were compared to ascertain the difference in fitness levels between the two cohorts. The level of significance was set at 0.05% using the students *t*-test.

Results

The results of the comparative study are presented in tabular form.

Table I reflects the scores for the two cohorts of 15-year-old boys in 1977 and 1997. There were statistically significant differences at the 5% level for all the tests completed, except for the medicine ball put.

The scores of the 1997 cohort for the 50 m dash, 250 m shuttle run and the Cooper's run/walk test were worse than those of the 1977 cohort. However, medicine ball put, shot put, pull-ups and sit-up scores were better than those of the 1977 cohort. The scores of the 1997 cohort showed an increase in results related to strength and muscular endurance and decreases in anaerobic, aerobic and speed performance compared with the 1977 cohort.

The results in Table II indicate the differences in mean fitness scores for 16-year-old boys in the two cohorts. The 16-year-old boys showed similar results to the 15- year-old boys, namely decreases in speed, aerobic and anaerobic components and increases in strength and muscular endurance compared with the 1977 group. All tests were found to be statistically significant at the 5% level except for the medicine ball put results.

Table III compares the results for the 17-year-old boys in the 1977 and 1997 cohorts. The data indicate poorer performances in speed, upper body endurance, strength, anaerobic and aerobic performances compared with the study by Coopoo.[4] Performances that improved were in the static strength and abdominal endurance components. A steady decline in fitness starts to emerge compared with the 15 and 16-year-old boys (Tables I and II).

Table IV reflects the changes from 1977 to the current study for the 18-year old boys.[19] There is a marked difference in fitness trends, with this age group performing the worst of all four groups tested. The static strength components, reflecting upper body strength, anaerobic speed and aerobic performance all decreased with age. There was a 1% increase in shot put performance from 1977 to 1997. This improvement was not statistically significant. The only statistically significant improvement in fitness from 1977 to 1997 was the abdominal endurance component ($P < 0.05$). This trend in fitness decline was similarly observed in the study by Coopoo in 1978 for the 17 and 18-year old boys.[4]

Table V compares the trends in performance of the two cohorts tested for aerobic fitness, anaerobic fitness and speed through the age ranges. These components were chosen for comparison because there was a consistent decline in all age groups. The comparisons were made by establishing the percentage difference between the means of the scores. There is a consistent decline in aerobic fitness from the 15 to 18-year-old boys. Aerobic performance decreased from 16% in the 15-year-old boys, 14%, 9% and 16% for the 16, 17 and 18-year-old boys respectively. These consistent decreases in aerobic fitness from the 15 to 18- year-old boys were also observed in 1977. The decline in aerobic performance was the greatest in the oldest boys.

TABLE I. Comparison of the means (± SD) of the fitness scores for the 1977 and 1997 cohorts (15-year-old boys)

Test item	Data of Coopoo[4]	Data of Naidoo[19]	Per cent difference	Difference from 1977 study
50 m dash (sec)	8.18 ± 0.70	9.13 ± 1.26*	12	Worse
Medicine ball put (cm)	574 ± 105	590 ± 142*	3	Better
Shot put (cm)	493 ± 100	559 ± 130*	13	Better
Pull-ups (*N*)	6 ± 3	8 ± 6*	33	Better
Sit-ups (*N*)	44 ± 13	55 ± 17*	25	Better
250 m shuttle (sec)	84.6 ± 6.1	91.9 ± 18.5*	9	Worse
Cooper's run/walk test (m)	2 451 ± 326	2 065 ± 465*	16	Worse

*$P < 0.05$

TABLE II. Comparison of the means (±SD) of the fitness scores for the 1977 and the 1997 cohorts (16-year-old boys)

Test item	Data of Coopoo[4]	Data of Naidoo[19]	Per cent difference	Difference from 1977 study
50 m dash (sec)	7.75 ± 0.65	8.96 ± 1.63*	16	Worse
Medicine ball put (cm)	643 ± 118	626 ± 130	3	Worse
Shot put (cm)	569 ± 103	619 ± 136*	9	Better
Pull-ups (*N*)	7 ± 4	9 ± 7*	28	Better
Sit-ups (*N*)	46 ± 13	60 ± 12*	30	Better
250 m shuttle (sec)	81.7 ± 6.4	96.4 ± 27.5*	18	Worse
Cooper's run/walk test (m)	2 517 ± 293	2 178 ± 355	14	Worse

*$P < 0.05$

TABLE III. Comparison of the means (± SD) of the fitness scores for the 1977 and the 1997 cohorts (17-year-old boys)

Test item	Data of Coopoo[4]	Data of Naidoo[19]	Per cent difference	Difference from 1977 study
50 m dash (sec)	7.56 ± 0.88	8.77 ± 1.64 *	16	Worse
Medicine ball put (cm)	673 ± 107	764 ± 115	13	Better
Shot put (cm)	599 ± 102	751 ± 110*	25	Better
Pull-ups (*N*)	7 ± 4	5 ± 5*	29	Worse
Sit-ups (*N*)	49 ± 11	63 ± 9*	29	Better
250 m shuttle (sec)	83.6 ± 7.1	88.6 ± 22.9*	6	Worse
Cooper's run/walk test (m)	2 467 ± 298	2 240 ± 392*	9	Worse

*$P < 0.05$

TABLE IV. Comparison of the means (± SD) of the fitness scores for the 1977 and the 1997 cohorts (18-year-old boys)

Test item	Data of Coopoo[4]	Data of Naidoo[19]	Per cent difference	Difference from 1977 study
50 m dash(sec)	7.50 ± 0.58	9.8 ± 1.7*	30	Worse
Medicine ball put (cm)	703 ± 107	638 ± 105	9	Worse
Shot put (cm)	631 ± 96	636 ± 105	1	Better
Pull-ups (*N*)	8 ± 3	5 ± 5*	38	Worse
Sit-ups (*N*)	46 ± 11	58 ± 8*	26	Better
250 m shuttle (sec)	82 ± 6	103 ± 34*	26	Worse
Cooper's run/walk test (m)	2 480 ± 329	2 086 ± 216*	16	Worse

*$P < 0.05$

There were larger decrements in the anaerobic and speed components, with the largest decreases between the two cohorts being among the 18-year-old boys (anaerobic by 26% and 30% for speed). There were decreases in these components in the 1977 study[4] (Table V) and the 2000 study[19] across all age groups.

The small percentage increases in static strength for the shot put (static strength in the 15, 16 and 17-year-old boys) may be due to the general changes that accompany maturation especially with regard to muscle development.[10]

Discussion

The main purpose of this study was to compare the fitness levels of a cohort of South African youth of Indian descent in 1977 and 1997.[4,19] This was achieved. There was a consistent decline in performances relating to the anaerobic, speed and aerobic components from 1977 to the 1997 study (Table V). The same trend, namely decreasing fitness levels, was noted in the 1977 study[4] across all age groups.

The results obtained by Coopoo[4] in the 1977 study were below the mean scores compared with other population groups in South Africa.[3, 7-9, 13, 26, 27] The further deterioration of the fitness data from 1977 to 1997[4,19] does not augur positively for the

TABLE V. Changes in aerobic, anaerobic and speed scores throughout the age ranges from 1977 to 1997

Component	15-year-old boys	16-year-old boys	17-year-old boys	18-year-old boys
Aerobic (Cooper's run/walk test)	16% decrease	14% decrease	9% decrease	16% decrease
Anaerobic (250 m shuttle)	9% decrease	18% decrease	6% decrease	26% decrease
Speed (50 m dash)	16% decrease	16% decrease	9% decrease	30% decrease

future fitness and possibly the health of the South African population of Indian descent. A study completed by Coopoo in 1995[5] on adult Indian males confirms the poor health status of this population group. This study shows disappointing fitness profiles for Indian men when compared with selected components of the South African population.[2] However, the study indicated that regular exercise supplemented by dietary modifications is effective in reducing the risk of heart disease in a high-risk South African population.[5]

There appears to be a trend of poor health patterns across the South African population of Indian descent. Several studies emphasise the poor state of health of this population in focus.[5, 16, 21-25] The deterioration in health status has already begun, as documented by the studies listed. These studies make the point that poor lifestyle profiles, lack of physical activity, obesity and poor dietary habits are the main potential lifestyle risk factors associated with the deterioration of health in the Indian population.

The poor cardiovascular fitness of the Indian youth may be implicated as a risk factor impacting on premature coronary artery disease, hypertension and diabetes, in adulthood.[1, 12]

These decreases in fitness from 1977 to 1997 could be attributed to a number of factors. These include the reduction and omission of physical education in most government schools, beginning in the early 1980s. The status quo exists today. In January 2000, the US Department of Health and Human Services released Healthy People 2000 objectives for the American nation. The following objectives were registered concerning physical education:[28] (*i*) increase the proportion of the nation's public and private schools that require daily physical education for all students; (*ii*) increase the proportion of adolescents who participate in daily school physical education; and (*iii*) increase the proportion of adolescents who spend at least 50% of school physical education class time being physically active.[28]

South Africa's Department of Education should formulate similar realistic objectives for South African children.

Fifteen-year-old boys are self-motivated to remain active; however older boys diversify their interests, with sport not being on the list of extramural activities. This has impacted greatly on the level of fitness of the older boys. More older boys are undertaking part-time jobs after school than before as they are required to supplement the family income, and desire financial independence.[19]

Other factors are the introduction of television into South Africa, which became a common appliance in every home around the late 1970s. As viewing time increased, so physical activity decreased. The introduction of the personal or home computers in the 1990s, plus computer games, reduced physical activity time to almost zero. Similar trends have been observed in the USA.[11, 20, 29] Many competitive codes of sport favour better athletes, excluding those who are less skilled. This demotivation leads to the less-skilled athlete seeking other forms of recreation in order to satisfy the need for fun and enjoyment. The government does not have a coherent plan for providing extramural sport programmes for youth.

A further important factor is that the health education taught in primary schools does not have a practical carryover value into adulthood. This would imply that most children cannot transfer their knowledge from health education and physical education into healthy lifestyle habits.[17] This is a failure in our educational system.

Historically, cultural philosophies shaped the actions of communities plagued by the oppressive apartheid system. In South African communities of Indian descent, educational achievement was emphasised as a method to achieve social upliftment and combat apartheid, and to gain dignity, respect, better jobs and freedom.[6] Hence the emphasis on educational achievement at the expense of athletic prowess. Due to the political framework at the time athletic achievement did not lead to the possibility of representing South Africa, which may have contributed to the indifferent attitude towards sport and physical activity.

In addition the Indian community, like many other black communities, did not have easy access to available knowledge which proposed that physical inactivity plays a large role in the development of poor health profiles. Further, the lack of sporting facilities, superior coaching and proper nutrition may have been other factors that demotivated our potential sportspeople.[15]

Many of these assumptions are based on the experience of the educational fraternity. While certain assumptions have not been scientifically proven, they are plausible enough to explain factors in the decline of the fitness of the South African boys of Indian descent.

Conclusion

The fitness level of South African youth of Indian descent is disappointing. There must be drastic changes with regard to increased activity levels generally and a more structured extramural sports programme. This programme must be attractive enough to lure children back to activity.

The attitude of principals and education officials towards physical education in schools should be positively altered by the minister of education. The re-launching of physical educa-

tion in schools is imperative for the improvement of future health in South Africa.

It is the opinion of the authors that most of the children tested in 1977 and 1997 were not sufficiently active to maintain aerobic and anaerobic fitness.

Recommendations

The recommendations listed are among many; however, the authors believe them to be important in changing the fitness level of this population. The recommendations are as follows: (*i*) the re-launching of physical education in all schools in South Africa; (*ii*) parents should play a significant role in encouraging their children to take part in sport; (*iii*) school governing bodies and school administrators should be made aware of the state of fitness of school children; (*iv*) well structured extra-curricular sports programmes should be developed for children; and (*v*) health education must be taught differently so that it can influence the health and fitness habits of children positively.

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