Background

- The prevalence of childhood obesity (assessed by BMI) has been increasing dramatically worldwide, particularly in the last two decades.
- Estimates in several studies indicate that one in three to four children between 6 to 10 years is presently overweight.

Table 1: Reference guidelines for detection of overweight and obesity according to BMI-for-age weight status categories in children

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentile Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>Less than the 5th percentile</td>
</tr>
<tr>
<td>Healthy weight</td>
<td>5th percentile to less than the 85th percentile</td>
</tr>
<tr>
<td>Overweight</td>
<td>85th percentile to less than the 95th percentile</td>
</tr>
<tr>
<td>Obese</td>
<td>Equal to or greater than the 95th percentile</td>
</tr>
</tbody>
</table>

www.chees.edu.rs
Background

It seems that body mass index (BMI) alone has limitations for assessing overweight and that relatively simple measures such as waist circumference or body fat percentage may give a clearer picture of overweight and/or obesity risk in children.

Several authors have shown that individual trunk skinfold measures are associated with intra-abdominal adipose tissue in preadolescent children and could be used as indicator of metabolic complications of obesity.

Central adiposity is associated with multiple risk factors for cardiovascular disease in both adults and children.

Low level of physical activity and/or health-related physical fitness, represented by cardiorespiratory (aerobic) endurance, seems to contribute to the development of obesity, type 2 diabetes, hypercholesterolemia, hypertension, metabolic syndrome, cardiovascular disease and all-cause mortality.

Majority of studies have shown that physical activity and fitness may protect from the adverse effects of obesity on health, particularly in children.

It would appear plausible to assume that higher level of physical fitness in children result in a more favorable body composition.
Nassis et al. [2005] reported lower total fatness and trunk skinfold thickness in overweight and obese children aged 6-13 years with high cardiorespiratory fitness.

Background

However, data that permit examination of relationship between aerobic fitness and other indicators of total and regional body adiposity in preadolescent children are limited.

**THE PURPOSE OF THE OUR STUDY WAS TO DETERMINE RELATIONSHIP BETWEEN AEROBIC FITNESS AND TOTAL AND REGIONAL BODY ADIPOSITY IN BOTH NONOVERWEIGHT AND OVERWEIGHT 8-YEAR-OLD SCHOOL CHILDREN.**

Methods

- 245 healthy second-grade elementary school children
- Aged 8 years (125 boys, 120 girls)
- Part of OLIMP study
  - **OBESITY AND PHYSICAL ACTIVITY AMONG SERBIAN SCHOOL CHILDREN**
  - Stratified (geographically) random sampling
  - Cross-sectional study with ten schools

Each child underwent a one-day testing session

- Height was measured using a stadiometer
- Body mass was obtained by a calibrated balance scale
- Body mass index (BMI) was calculated
- Waist circumference was measured using an antro-tape
- Skinfold thicknesses were obtained using a caliper
  - biceps, triceps, subscapular, suprailliac, abdominal
- Fat % fat was determined according to Slaughter et al.

### Methods

- Participants were classified into two groups
  - Nonoverweight and overweight/obese according to BMI
  - **Aerobic fitness - maximal multistage 20-m shuttle-run test**
  - Quantiles based on age- and sex-specific distribution
  - Participants were classified as unfit (first and second quintile) or fit (fourth and fifth quintile). The middle quintile was not used in the analysis.
Results

- Mean values for anthropometric and physiological data are shown in Table 2.
- The mean age of the sample was 8.9 ± 0.4 yrs for the nonoverweight group and 8.8 ± 0.4 yrs for the overweight/obese group.
- Age and height did not differ between fit and unfit children in both groups.
- In all, 41.6% of children were overweight or obese.

| Physical and physiological characteristics of the children participating in the study |
|----------------------------------|------------------|------------------|
| Non-overweight | Overweight/obese |
| Age (years) | 8.8 ± 0.4 | 8.9 ± 0.4 |
| Height (cm) | 132.2 ± 6.3 | 133.7 ± 6.2 |
| Body mass (kg) | 28.3 ± 3.1 | 41.3 ± 7.6 |
| BMI (kg/m²) | 16.2 ± 1.4 | 21.9 ± 2.9 |
| Waist circumference (cm) | 56.0 ± 6.4 | 67.9 ± 7.6 |
| Abdominal SKF (mm) | 11.1 ± 6.6 | 24.0 ± 9.0 |
| Subscapular SKF (mm) | 6.7 ± 4.5 | 14.3 ± 6.7 |
| Body fat (%) | 16.9 ± 7.1 | 26.9 ± 9.7 |

Correlation coefficients between VO2max and total and central body composition variables in both overweight and nonoverweight group are shown in Table 3.

Table

| Correlation between aerobic fitness and total and truncal body composition variables |
|----------------------------------|------------------|------------------|
| VO2max | Overweight | Nonoverweight | TOTAL |
| BM | -0.15 | -0.43* | -0.44* |
| Waist circumference | -0.12 | -0.37* | -0.40* |
| Abdominal SKF | -0.38* | -0.43* | -0.50* |
| Subscapular SKF | -0.29* | -0.41* | -0.45* |
| Suprailiac SKF | -0.43* | -0.47* | -0.53* |
| Body fat | -0.38* | -0.38* | -0.48* |

AEROBIC FITNESS WAS MODERATELY CORRELATED WITH TOTAL BODY FAT IN THE WHOLE GROUP OF SUBJECTS (R = -0.48, P < 0.05).

Discussion

- The present data demonstrates that BMI, waist circumference, five skinfold thicknesses and body fat percentage were lower in overweight children with high aerobic fitness as compared to children at the same BMI category with low VO2max.
- Moderate negative correlation exist between aerobic fitness and regional and total body fatness in both nonoverweight and overweight/obese 8-year-old school children.

The present study show the favorable effect of high aerobic fitness on body fat distribution in overweight and obese children.
Discussion

- Study of aerobic fitness and body fat seems to be a more valid approach than measurement of self-reported physical activity and body weight, particularly in children.
- It has been reported that overweight and obese children showed a lower physical fitness (cardiorespiratory endurance) than normal children.

It has been reported that overweight and obese children showed a lower physical fitness (cardiorespiratory endurance) than normal children.

Studies analyzing an association between cardiorespiratory fitness and different measures of body composition in this population are scarce.

Several authors showed that indicators of total and central adiposity were lower at a given BMI in individuals with superior aerobic fitness.

Nassis et al. underlined lower truncal skinfolds and total body fat in 85 overweight children with high cardiorespiratory (CRF) fitness in comparison with 283 children at the same BMI category with low CRF. The beneficial influence remained even after the values of body fatness were corrected for different BMIs.

The results of the present study are in agreement with those previously reported for both children and adolescents. The diminished central obesity in the group of overweight children with high VO2max in the present study is also consistent with previous intervention studies showing a reduction in waist circumference and intra-abdominal fat after exercise training, independently of BMI changes.

It seems that abdominal and suprailiac skinfold thicknesses, along with total body fat, are closely inversely correlated with aerobic fitness in both overweight and nonoverweight children.

Central and abdominal adiposity has been shown to increase at a faster rate than total body obesity in European children. Truncal fat accumulation in children, assessed by waist circumference and central skinfold thickness, could be associated with abnormal levels of lipids/lipoproteins, elevated triglycerides and insulin, and increased systolic and diastolic pressure.
Discussion

However, Lee et al. followed 21,925 men and shown that fit men with elevated central adiposity had 2.5 times lower mortality rate than did the unfit men in the same central adiposity category. Moreover, unfit lean men also had a higher risk of all-cause and cardiovascular disease mortality than did men who were fit and obese.

Klasson-Heggebo et al. found a curvilinear graded relation between cardiorespiratory fitness and waist circumference, sum of skinfolds, and systolic blood pressure in 4072 children and adolescents (aged 9 and 15) from Denmark, Portugal, Estonia, and Norway with abundant data show a strong connection between physical activity/fitness and body fat percentage in both overweight and normalweight children.

Given that the present study was cross-sectional in design, cause-and-effect conclusions are not warranted. However, if a causal relation is assumed, it appears that the goal of favorably altering central adiposity in children should begin with increasing physical activity and fitness, which in turn will lead to reductions in total and central body fat. Knowledge about the degree of the relation between cardiorespiratory fitness and health outcome is important, because such information adds essential aspects to the aggregated data that serve as the basis for physical activity guidelines.

Moreover, overweight children who improve their cardiorespiratory fitness during childhood have less overall adiposity and less abdominal adiposity than their counterparts during adolescence and adulthood. Participation in vigorous physical activities has been shown to relate inversely to fat deposition in both children and adults.

Due to fact that BMI poorly correlate with aerobic fitness, other indicators of adiposity (body fat, waist circumference) rather than weight has been shown to be associated with cardiorespiratory fitness.

Several investigators provided evidence that a combination of simple measures such as waist circumference, trunkal skinfolds and perhaps aerobic fitness, should be used in clinical settings to evaluate the presence of elevated health risk among children and adolescents. As aerobic fitness is related to body composition in both nonoverweight and overweight children, regular assessment of cardiorespiratory endurance should be encouraged in school children.
Discussion

The data from present study also demonstrate significant prevalence of overweight 8-yr-old children (42%), and higher values of overweight and obese children found were superior as compared to other national studies. Other indices of adiposity including skinfolds, waist circumference and percentage body fat provided similar concern.

Discussion

About 33% of Baltimore school children were overweight and obese based on age-specific BMI reference values. The prevalence of overweight including obesity was moderately high (> 25%) in the representative sample of Spanish children (n = 2859). The results of UK study indicate that over 37% of boys and girls fall into the overweight and obese classifications, with one in five children (22%) had more than 30% body fat. It seems that obesity has become a global epidemic and is threatening to have reached epidemic proportions in Serbia.

Discussion

Although prevalence of overweight and obesity varies quite substantially across ethnic groups and gender, numerous studies have shown alarming high childhood levels of being fat. Obese children are at increased risk of acute medical illnesses and chronic diseases-in particular, osteoarthritis, diabetes mellitus, and cardiovascular disease, which can lead to poor quality of life; increased personal and financial burden to individuals, families, and society; and shortened lifespan. Familiarity with definitions of weight status in children with high-quality evaluation protocols and health outcomes are crucial in understanding the epidemic character of childhood obesity.

Discussion

Indirect measurement of VO2max
Lack of physical activity monitoring and measurement
Indirect assessment of regional and total fatness
Development factors were not included
Parents role in recruitment
Limitations of BMI for initial assessing

Conclusion

The present study shows that 8-yr-old overweight and obese children with high aerobic fitness presented lower BMI, waist circumference, truncal skinfolds and body fat percentage compared with counterparts at the same BMI category with low VO2max. It seems that being fat may reduce the hazards of central and total obesity in paediatric population. Moreover, combination of BMI and other body fatness indicators needs to be used in examining health complications of obesity.

Action plan

The Activity Menu for Adults and Children

- Aerobic and muscle strengthening exercises
- Healthy eating
- Leisure time activities
- Social and community activities
- Relaxation and stress management
- Physical activity programs
- Education and training programs
- Professional and community services
- Transportation and mobility solutions
- Environmental and social support initiatives
- Community-based programs
- Health and wellness initiatives
- Prevention and early intervention programs
- Support to family and caregivers
IT IS BETTER TO BE FAT AND FIT THAN FAT AND SEDENTARY !!!
IT IS BETTER TO BE FAT AND FIT THAN SLIM AND SEDENTARY !!!

www.chess.edu.rs