INCIDENCE AND PREVENTION OF OBESITY AND POSSIBILITIES OF ITS REDUCTION IN THE SLOVAK POPULATION

Nora Halmová
Constantine the Philosopher University in Nitra, Slovakia

Abstract
The article presents the results of a survey of incidence of obesity in children and adults during a 5-year-long research period. The objects of the research were 1118 children and adults aged 6-23 years. Questionnaires contained basic information on their health state, amount of performed activity, methods of nutrition, and interest in performing physical activity. Basic somatic data on each person involved were obtained: body weight and height, waist circumference, hips circumference. By means of Body analyser device the amount of fat, muscle mass and water was analysed. The measurement results obtained at the beginning of our research mostly complied with the ones publicized by the Public Health Bureau in SR, where up to 12.5 % of the Slovak population suffers from overweight and 6.7% from obesity. However, an increasing number of overweight population (up to 19%), but a lower incidence of people suffering from obesity (5%) were recorded. After the application of the programme of exercises in the selected experimental groups the percentage of population suffering from overweight decreased to 17% and overweight people to 4.5%. In all observed individuals, in spite of the non-significant reduction of weight (increasing muscle mass) all circumferential measures decreased. We can assume that our programmes of exercises positively impacted obesity consequences.

Key words: obesity, prevention, physical activity, reduction programmes

Introduction
Obesity is a serious threat for the current population in the world, which is stressed also by the fact that experts from WHO started to prepare the so-called Global Strategy for Nutrition, Physical Activity and Health already in 2002. Its final wording was approved by all member states of WHO at the World Health Meeting in May 2004. („WHO expressions concerning obesity,” 2006). The lack of physical activity and inadequate nutrition are the prerequisites of overweight and obesity incidence. People eat much and move less. The consequences (obesity and occurrence of chronic diseases) are very costly, but also mortal. Overweight and obesity have grown also in Europe.

Obesity one of the most serious problems of public health in Europe, since it considerably increases the risk of chronic diseases, such as cardiovascular diseases, diabetes and certain kinds of cancer (Kaplan, Sallis, Patterson, 1996). The increasing incidence of obesity is alarming particularly in children. According to EC six out of seven most weighty risk factors mostly causing early death, is connected with inadequate nutrition and physical activity. The increase in the number of obese people worldwide is so huge that we can speak about pandemy. Obesity rates are high also in the USA and richest Arabian countries, such as Kuwait, Saudi Arabia and UAE. Approximately 10% of children in younger age categories are overweight and 5 to 8% obese, while about one half of them suffer from at least one accompanying disease (Hlaváta, 2007). According to Goldberg (2003) in the Czecho-Slovak population already 6% boys and 5.6% girls are obese. 13% boys and 12% girls are overweight.

More and more attention is paid to child´s obesity, which has recorded an increasing tendency. As to the last worldwide estimates - 22 mln children up to 5 years suffer from overweight. Based on the data obtained from the project of the Slovak Ministry of Education “Nutrition and Health in Education” in 2004, where more than 1000 children and adolescents of both sexes aged 9-18 were measured, we can state that the average incidence of overweight and obesity in the sample from 2004 in children aged 9-11 years was already 16.5 %, in adolescents aged 14-18 years - 12 % (UVZ SR, 2007). In the population of children we sometimes meet also with the kind of obesity caused by disadvantageous composition of genes and increased food consumption, without an appropriate physical activity. One part of the child´s population replaces the increased psychic demands by increasing the amount of food consumed, mainly late in the evening or at night. Overeating seems to be a modern trend. This results in positive energy balance, when energy reception exceeds energy consumption.

The risk factor of child´s obesity is a serious social problem – children are frequently exposed to a disproportionate social stress (Vítek, 2008). In the countries of the northern Europe the prevalence of obesity is 10 - 20 %, while in the southern Europe it reaches up to 20 - 35 %. In the Czech Republic, similarly as in the USA, the incidence of obesity rates approaches 30%, while the number of obese and overweight people represents about one third of adult population. These countries along with Slovakia rank at top places in the world in the incidence of overweight and obesity.
In Slovakia in the age category of 40-65 years up to 40-65% people suffer from overweight and 20-25% by obesity. In 1998 46.7% men and 37.9% women aged 25-64 years were overweight, while obesity reached 19.5% and 20.8% respectively. The report on the health state of inhabitants from 2004 says about the increase since 1998 in overweight and obesity in men by 3.3%, while in women a decrease by 4.9% has been recorded since 1993 (Jurkovičová, 2005). Ben-Sefer, Ben-Natan M. & Ehrenfeld, (2009) in their contribution underline the differences in the incidence of overweight and obesity in different countries of Europe and the world.

Table 1. Percentage of overweight/obese children

<table>
<thead>
<tr>
<th>Nation</th>
<th>Age</th>
<th>% obese</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hungary</td>
<td>11-14</td>
<td>6</td>
</tr>
<tr>
<td>Poland</td>
<td>11-14</td>
<td>18</td>
</tr>
<tr>
<td>Australia</td>
<td>6-13</td>
<td>30</td>
</tr>
<tr>
<td>New Zealand</td>
<td>6-13</td>
<td>30</td>
</tr>
<tr>
<td>USA</td>
<td>6-13</td>
<td>25.5</td>
</tr>
<tr>
<td>Israel</td>
<td>6-13</td>
<td>13.9</td>
</tr>
<tr>
<td>Ireland</td>
<td>6-13</td>
<td>24.7</td>
</tr>
<tr>
<td>France</td>
<td>6-13</td>
<td>11.4</td>
</tr>
<tr>
<td>Greece</td>
<td>6-13</td>
<td>28.7</td>
</tr>
</tbody>
</table>

Lobstein & Frelut 2003; McCarthy 2004; WHO 2005 (in Ben-Sefer, Ben-Natan & Ehrenfeld, 2009)

The change of living conditions, for which reduction of physical effort, sedentary behaviour at work and at home (working with PC, watching TV and video programmes) are characteristic, reduces the share of physical activity in the daily regime of children. Deficit of physical activity in children has negative impact on the growth and development of young generation and incidence of obesity (Krahulec, 2005). The most significant causes of obesity are well-known factors such as: lack of physical activity, nutrition and also genetics.

Children and youth spend a lot of time by computers, television and do not go in for sports. Higher incidence of obesity was recorded in the population groups with lower social and economic situation – these people eat cheaper food, which is energy high (Vítek, 2008). In the USA Sallis and Glantz (2006) during their 40 years of research found that besides nutrition, the distance of home from school is a very significant factor of overweight and obesity. However, they assign to increased obesity rates also social conditions, of which depend nutrition and health behaviours as well as forming the life-long relation to one’s health through physical activity (Ebbeling, Pawlak & Ludwig, 2002).

Aim

The aim of our years-long research was to monitor overweight and obesity in children and adults and followingly, designing and verification of programmes of exercises serving as the prevention of overweight and obesity and the means of their remedy in the Slovak population.

Problem

Obesity characterized as a human epidemic has become a serious problem, which has become also a part of the National Programme Declaration of the Slovak government from 2010. However, it is insufficient just to declare prevalence, but it is inevitable to propose programmes of exercises for these children and implement them in the practice. Based on the above stated we formulated the following basic research problem: Are we able to monitor the state of overweight and obesity in Slovakia and followingly create programmes of exercises to positively influence this status?

Methods

Totally 1118 people aged 6-26 years participated in our research and followingly 136 of them aged 11-15 years attended our programmes of exercises for the prevention and remedy of obesity. The experiment was carried out between September and December 2012, which forms 15 weeks.

Table 2. Number of respondents

<table>
<thead>
<tr>
<th>Age</th>
<th>n-boys</th>
<th>n-girls</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>7-8</td>
<td>75</td>
<td>72</td>
<td>147</td>
</tr>
<tr>
<td>9-10</td>
<td>141</td>
<td>140</td>
<td>281</td>
</tr>
<tr>
<td>11-15</td>
<td>116</td>
<td>120</td>
<td>236</td>
</tr>
<tr>
<td>16-18</td>
<td>101</td>
<td>130</td>
<td>231</td>
</tr>
<tr>
<td>23.5</td>
<td>106</td>
<td>115</td>
<td>227</td>
</tr>
<tr>
<td>Total</td>
<td>1118</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Research groups were recruited from various parts of Slovakia. The research was carried out between 2005 and 2012 and consists of partial results of individual measurements. Out of the total number of research probands (1118), ninety-three were secondary schoolers from the districts of Žilina and Nitra, at which we took anthropometric data (body height and weight, BMI). In other groups we measured basic somatic indicators and in 136 people we verified the effectivity of programmes of exercises for the reduction of weight and remedy of overweight and obesity.

At the beginning of each survey family personal history and health state of children were investigated by means of questionnaires distributed among the parents. Two questionnaires distributed among the parents and their children formed a part of the survey. In the experimental group, in which the programme of exercises was executed, the first questionnaire was administered. It contained questions focusing on the area of the way of life, nutrition habits and physical activities of children and parents. The second questionnaire observed satisfaction of children and parents with the course of performing exercises. Results of the second questionnaire were obtained after the termination of the research. In the other groups, questionnaires containing basic questions concerning nutrition habits and physical activities of children, were distributed. The method of exploration was used along with the method of measurement.
This method helped us to obtain the data on body weight and height, waist circumference, hips circumference of individual pupils, as well as the variables necessary for the calculation of BMI index and WHR index. The percentage of fat in the body was measured using the device BODY FAT ANALYSER MODEL: BT – 905. The majority of parents cooperated during the research either by passive or active participation in practical exercises. The feedback from both parents and children, as well as various sport apparatuses, helped us improve our programme of exercises. The research was focused on the remedy of overweight and obesity in children. All children in the selected group were healthy and were able to perform all kinds of activities included in the programme of exercises. It was proved that the selected children went in sport also in the time after school. They preferred the following activities: cycling, swimming, roller-skating, walking in the nature and tourism. Experimental factor was the programme of exercises, which was attended by our experimental groups during 6 months 3-times a week, for 50-60 minutes. With regard to the risk of damaging the bearing joints of lower limbs by overloading, activities with unloading of the centre of gravity were mostly used. The best results were obtained with aerobic activities, especially those which increased breathing and pulse frequency, thus supplying the body with oxygen and consuming energy from fats. Most frequently recommended activities are generally walking, swimming and exercises in water, cycling, dance, modified aerobic (without jumping), cross-country skiing, skating, ball games, badminton, table tennis, squash, zumba, exercises on fit-balls and bosu, and in the last years also nortic walking. From among the activities performed indoors, we used various kinds of dance, simple elements of zumba, exercise on fit-balls and bosu, and in the last years also nortic walking. From among the activities performed indoors, we used various kinds of dance, simple elements of zumba, exercise on fit-balls, where there is an advantage that ball effectively relieves the load from the load-bearing joints. We consider physical activities with frequent jumps and spring to be inappropriate. The body is exposed to rapid changes of movement and various impacts. Among them are step-aerobic, running on hard surfaces, speed exercises, strength exercises, and others. The body of a fat individual is overloaded by his/her own weight, so we should not load the joint and ligaments with an inappropriate physical activity. In the course of the whole research we used a lot of available tools, such as: overballs, skipping ropes (for marking the exercise area), short rods, rubber balls, bosu, shell-boards, Swedish boxes, colour cones, benches.

Results

Based on the research carried out between the years 2005 through 2010 we found out that 19% suffered from overweight and 5% from obesity, 7% showed underweight and 69% had normal weight (figure 1.). After the application of the programmes of exercises positive changes in the incidence of obesity and overweight were found in 136 probands (figure 2.). The incidence of subcutaneous fat in the body can be divided into two categories. In table 3 you can see that boys aged 11-15 years at input measurements reached above-the-normal values of fat in the body and the maximum value reached 37.3%, which is a serious risk. As far as waist circumference is concerned, all children are outside the risk range. Surprisingly, in girls (Tab 4) the average values are below 18% - only 15.6%, but it is possible to find also one alarming maximum value – 37.1 %. As to the waist circumference in boys, all children are outside the critical range, but the maximum value 100 cm in boys and 89 cm in girls shows weighty health problems. In boys there are 8% of children above this level and in girls 9%. After the application of the aimed programmes of exercises we can see that in both groups in all indicators there are small but positive changes, which were reached only by means of changing their movement regime, since we modified neither their nutritional nor eating habits.
Discussion

After the evaluation of questionnaires we found that the results of UVZ SR (2007) that with the onset of puberty and finding orientation in the „adults´ world” girls start to take care of their outfit and appearance, has not been proved. Girls change their child´s and pubertal nutrition habits, observe their weight and control their eating habits. We can thus agree with Nováková that girls partly reverse their habits to the opposite trend – towards disproportional slenderness, slim posture and appearance, has not been proved. Girls change their child´s and pubertal nutrition habits, observe their weight and control their eating habits. We can thus agree with Nováková that girls partly reverse their habits to the opposite trend – towards disproportional slenderness, slim posture and appearance, has not been proved. Girls change their child´s and pubertal nutrition habits, observe their weight and control their eating habits. We can thus agree with Nováková that girls partly reverse their habits to the opposite trend – towards disproportional slenderness, slim posture and appearance, has not been proved. Girls change their child´s and pubertal nutrition habits, observe their weight and control their eating habits. We can thus agree with Nováková that girls partly reverse their habits to the opposite trend – towards disproportional slenderness, slim posture and appearance, has not been proved. Girls change their child´s and pubertal nutrition habits, observe their weight and control their eating habits. We can thus agree with Nováková that girls partly reverse their habits to the opposite trend – towards disproportional slenderness, slim posture and appearance, has not been proved. Girls change their child´s and pubertal nutrition habits, observe their weight and control their eating habits. We can thus agree with Nováková that girls partly reverse their habits to the opposite trend – towards disproportional slenderness, slim posture and appearance, has not been proved. Girls change their child´s and pubertal nutrition habits, observe their weight and control their eating habits. We can thus agree with Nováková that girls partly reverse their habits to the opposite trend – towards disproportional slenderness, slim posture and appearance, has not been proved. Girls change their child´s and pubertal nutrition habits, observe their weight and control their eating habits. We can thus agree with Nováková that girls partly reverse their habits to the opposite trend – towards disproportional slenderness, slim posture and appearance, has not been proved. Girls change their child´s and pubertal nutrition habits, observe their weight and control their eating habits. We can thus agree with Nováková that girls partly reverse their habits to the opposite trend – towards disproportional slenderness, slim posture and appearance, has not been proved. Girls change their child´s and pubertal nutrition habits, observe their weight and control their eating habits. We can thus agree with Nováková that girls partly reverse their habits to the opposite trend – towards disproportional slenderness, slim posture and appearance, has not been proved. Girls change their child´s and pubertal nutrition habits, observe their weight and control their eating habits. We can thus agree with Nováková that girls partly reverse their habits to the opposite trend – towards disproportional slenderness, slim posture and appearance, has not been proved. Girls change their child´s and pubertal nutrition habits, observe their weight and control their eating habits. We can thus agree with Nováková that girls partly reverse their habits to the opposite trend – towards disproportional slenderness, slim posture and appearance, has not been proved. Girls change their child´s and pubertal nutrition habits, observe their weight and control their eating habits. We can thus agree with Nováková that girls partly reverse their habits to the opposite trend – towards disproportional slenderness, slim posture and appearance, has not been proved. Girls change their child´s and pubertal nutrition habits, observe their weight and control their eating habits. We can thus agree with Nováková that girls partly reverse their habits to the opposite trend – towards disproportional slenderness, slim posture and appearance, has not been proved. Girls change their child´s and pubertal nutrition habits, observe their weight and control their eating habits. We can thus agree with Nováková that girls partly reverse their habits to the opposite trend – towards disproportional slenderness, slim posture and appearance, has not been proved. Girls change their child´s and pubertal nutrition habits, observe their weight and control their eating habits. We can thus agree with Nováková that girls partly reverse their habits to the opposite trend – towards disproportional slenderness, slim posture and appearance, has not been proved. Girls change their child´s and pubertal nutrition habits, observe their weight and control their eating habits. We can thus agree with Nováková that girls partly reverse their habits to the opposite trend – towards disproportional slenderness, slim posture and appearance, has not been proved. Girls change their child´s and pubertal nutrition habits, observe their weight and control their eating habits. We can thus agree with Nováková that girls partly reverse their habits to the opposite trend – towards disproportional slenderness, slim posture and appearance, has not been proved. Girls change their child´s and pubertal nutrition habits, observe their weight and control their eating habits. We can thus agree with Nováková that girls partly reverse their habits to the opposite trend – towards disproportional slenderness, slim posture and appearance, has not been proved. Girls change their child´s and pubertal nutrition habits, observe their weight and control their eating habits. We can thus agree with Nováková that girls partly reverse their habits to the opposite trend – towards disproportional slenderness, slim posture and appearance, has not been proved. Girls change their child´s and pubertal nutrition habits, observe their weight and control their eating habits. We can thus agree with Nováková that girls partly reverse their habits to the opposite trend – towards disproportional slenderness, slim posture and appearance, has not been proved. Girls change their child´s and pubertal nutrition habits, observe their weight and control their eating habits. We can thus agree with Nováková that girls partly reverse their habits to the opposite trend – towards disproportional slenderness, slim posture and appearance, has not been proved. Girls change their child´s and pubertal nutrition habits, observe their weight and control their eating habits. We can thus agree with Nováková that girls partly reverse their habits to the opposite trend – towards disproportional slenderness, slim posture and appearance, has not been proved. Girls change their child´s and pubertal nutrition habits, observe their weight and control their eating habits. We can thus agree with Nováková that girls partly reverse their habits to the opposite trend – towards disproportional slenderness, slim posture and appearance, has not been proved. Girls change their child´s and pubertal nutrition habits, observe their weight and control their eating habits. We can thus agree with Nováková that girls partly reverse their habits to the opposite trend – towards disproportional slenderness, slim posture and appearance, has not been proved. Girls change their child´s and pubertal nutrition habits, observe their weight and control their eating habits. We can thus agree with Nováková that girls partly reverse their habits to the opposite trend – towards disproportional slenderness, slim posture and appearance, has not been proved. Girls change their child´s and pubertal nutrition habits, observe their weight and control their eating habits. We can thus agree with Nováková that girls partly reverse their habits to the opposite trend – towards disproportional slenderness, slim posture and appearance, has not been proved. Girls change their child´s and pubertal nutrition habits, observe their weight and control their eating habits. We can thus agree with Nováková that girls partly reverse their habits to the opposite trend – towards disproportion...
References


Goldberg, G. (2003). *Obezita: Výskum európskej komisie o stave ľudí v Európe v smere nezdravej a nesprávnej stravy a následnej obesity* [In Slovak].


UČESTALOST I PREVENCIJA PRETILOSTI I MOGUĆNOST NJEGOVA SMANJENJA U STANOVNIŠTVU SLOVAČKE

Sažetak
Članak donosi rezultate istraživanja o učestalosti pretilosti u djece i odraslih tijekom 5-godišnjeg razdoblja istraživanja. Objekti istraživanja su 1118 djece i odraslih osoba u dobi od 6-23 godina. Upitnici sadrže osnovne podatke o svom zdravstvenom stanju, iznos izvršene aktivnosti, metode prehrane i interes za obavljanje fizičke aktivnosti. Dobiveni su osnovni podaci o somatskim značajkama pojedinca koji uključuju: tjelesnu težinu i visinu, opseg struka i bokova. Pomoću analizatora sastava tijela analizirana je količina masti, mišićne mase i vode. Iz dobivenih rezultata mjerenja na početku našeg istraživanja vidi se sličnost podataka objavljenih od strane Zavoda za javno zdravstvo u SR, gdje do 12,5% od slovačke populacije pati od prekomjerne težine i 6,7% od pretilosti. Međutim, sve je veći broj pretilih populacije (do 19%), ali niža incidencija ljudi koji pate od pretilosti (5%) zabilježena je nakon primjene programa vježbi u odabranim pokusnim skupinama i postotak populacije koja pate od prekomjerne tjelesne težine smanjen je na 17% a pretih osoba za 4,5%. U svih promatranih osoba, bez obzira na ne-značajno smanjenje tježine (povećanje mišićne mase) sve mjere obujma su smanjene. Možemo pretpostaviti da su naši programi vježbe pozitivno utjecali na smanjenje pretilosti i posljedice.

Ključne riječi: pretilost, prevencija, tjelesna aktivnost, programi redukcije

Received: November 23, 2013
Accepted: May 30, 2014
Correspondence to:
Assist.prof. Nora Halmová, PhD.
Constantine the Philosopher University in Nitra,
Tr. A.Hlinku 1, 949 74 Nitra, Slovakia
Tel: +421376408322, +421905581264
E-mail: nhalmova@ukf.sk

Acknowledgements: The contribution is a part of the grant project: VEGA 1/0478/11 „Prevention of obesity and functional disorders of the motor system and possibilities of their remedy in children and youth“