Significance, causes and effects of obesity in childhood and adolescence

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Abstract

Body weight is influenced by the motor and eating habits of every human being and by a biological or genetic predisposition, the effect of which cannot be quantified with accuracy. Obesity occurs as an expression of a positive energy balance or as a consequence of the absence of a balanced diet. Obesity is an acknowledged and important risk factor for a range of conditions, especially diabetes, hypertension and cardiovascular diseases. The purpose of this study was to approach, analyse and ultimately examine the significance, causes and effects of obesity on children and adolescents. The method adopted for the study was a review of the relevant literature. Based on this study, we discover that, due to people's changing living conditions, the spread of overweight and obesity in industrialized countries has greatly increased, therefore rapid action is needed. Overweight and obesity have always existed. However, the voluptuous body, that formerly was considered a sign of wealth or a survival strategy, is now stigmatized. Overweight people not only have a higher risk for their health in the form of cardiovascular diseases, diabetes mellitus or premature bone and joint damage, but they do not correspond to today's ideal beauty. The causes of obesity are due to many interdependent factors. It is therefore difficult to formulate therapeutic proposals that have general validity. In summary, we can say that for the increasing number of overweight and obese children and adolescents the medical factors are less important. The causes should be sought in the social conditions and behaviours of certain social groups. It is important that children and young people are permanently involved in the subject of nutrition and movement, and that this engagement accompanies them throughout their development. Even if the politics supports, doctors encourage, health funds, kindergartens and schools raise awareness, sport clubs motivate, the media inform, parents recognize and offer incentives, the hardest part of the job should be done by the target group in order to achieve personal success; that is to remain or become "healthy".

Key words: Obesity, Overweight, Childhood and Adolescence

1. Introduction

Obesity is considered a chronic condition, resulting in limited quality of life and high risk of morbidity and mortality. Especially in children and young people this condition has negative effects on almost all organ systems. Thus, overweight is considered an important risk factor for the occurrence of sugar disease and high blood pressure. There are also signs of blood vessel inflammation in overweight children, which may result in blockage of the vessels and therefore in heart attack or myocardial infarction. Also, the tendons, joints, muscles, the entire spine and the motor system are over-stressed, resulting in low back pains and

other orthopaedic conditions. The list of negative health effects is still very long. Western industrialized countries are currently spending large sums on health to treat obesity and its consequences. In America, obesity, and consequent diseases, is the second cause of death among adults. Today, obesity is considered a chronic disease with widespread consequences for the sufferer, due to consequent diseases and social contempt, as well as for society, due to the increasing cost of treatment. Thus, obese children have a higher risk of developing cancer than lean adults. With the increase in body mass index, children have elevated blood pressure values and early lesions of the internal organs appear prematurely, as well as increased muscle mass of heart's left ventricular. In both girls and boys, systolic blood pressure and left ventricular muscle mass index are related to the body mass index. This is why early damage to the heart and blood vessels occurs. Surveys show that these are not individual exceptions, but obesity is a widespread and ever-increasing disease, especially in western industrialized nations. Firstly, a definition of obesity is given, which corresponds to the generally recognized current knowledge.

2. Methodology

The present research is a bibliographic review study, presenting the critical points of the existing knowledge about the significance, causes and effects of obesity on children and adolescents. There is no specialized and comprehensive work on this subject in the relevant international literature. This work endeavours to cover this gap, and will perhaps also be a useful aid for those who in the future will attempt similar efforts. The main aim of the bibliographic review is to frame the study within the "body" of the relevant literature. The review of the current study concerns clearly formulated questions and uses systematic and explicit criteria for critically analysing a body of published papers by summarizing, sorting, grouping and comparing.

Bibliographic review study

3. Definition and classification of obesity

Definition of overweight

Excess body weight, which is not uniformly defined. Usually we are talking about overweight if the weight is 15 - 20% above the value stated in the tables of normal values depending on age, body structure, height and gender. Overweight strains the body's motor system, especially joints and lower back. Overweight is not identical with obesity. Due to the fact that the specific weight of the muscles is greater than that of fat, athletes may for example be overweight, although their fat reserves are not higher (KENT, 1998).

Definition of obesity

Excessive fat storage, mainly under the skin as well as around the internal organs. Obesity occurs as an expression of a positive energy balance or as a consequence of the absence of a balanced diet. Obesity is an acknowledged and important risk factor for a number of diseases, especially diabetes, hypertension and cardiovascular diseases (KENT, 1998). Excess weight can be defined by different measurement methods.

Previously it was measured with the help of the Broca index. This index accepts that the normal weight should correspond to the height in centimetres, minus 100 (in kilograms).
From life insurance tables, the so-called ideal weight was calculated, deducting additionally from the normal weight 10% for men and 15% for women. This ideal weight is no longer valid today, in terms of health, because it has resulted from an interpretive error. A measurement system that has been established in the meantime is the body mass index (BMI). BMI is calculated by the fraction of a person's weight in kilograms, divided by height in meters squared:

$$\text{BMI} = \frac{\text{Body weight in kg}}{(\text{Height in m})^2}$$

In the case of very tall and very short people it is more accurate than the Broca index in terms of total fat (BENECKE & VOGEL, 2003). BMI serves for the classification of weight groups, because with the use of this fraction the percentage of body fat is more accurately characterized. According to the World Health Organization (1998) guidelines, overweight in adults is defined as BMI ≥25. Obesity begins with BMI ≥30. There are three different degrees of obesity.

Name	**BMI (kg/m^2)**
Normal weight	**18,5 - 24,9**
Overweight	**25,0 – 29,9**
Class I obesity	**30,0 – 34,9**
Class II obesity	**35,0 – 39,9**
Class III extreme obesity	**≥ 40**

Table 1: Classification of body mass index (WHO, 1998)

In the case of children and young people, when calculating BMI, age and gender should be taken into account, because BMI, depending on the physiological changes of the body fat percentage in children and adolescents, is affected by important age and gender specificities. International Obesity Task Force (IOTF) special scientists are therefore recommending the use of BMI percentile (percentages of the age group with a BMI below the corresponding value).
The *Obesity in Childhood and Adolescence* working group suggests in its guidelines the use of the 90th or 97th percentile as a limit value for the definition of overweight or obesity. Although this is a purely statistical definition of limit values, in the adult age there is an almost continuous shift to the fixed limit values.

Percentiles for the body mass index of boys and girls aged 1 to 18 years

BMI = weight / height^2; kg/m^2						
	Boys			Girls		
Age (in years)	50º percentile	90º percentile	97º percentile	50º percentile	90º percentile	97º percentile
1	16,8	18,7	19,8	16,4	18,3	19,2
2	16,1	18,0	19,1	15,9	17,9	19,0
3	15,6	17,6	18,8	15,5	17,6	18,8
4	15,5	17,5	18,8	15,3	17,5	18,9
5	15,4	17,6	19,0	15,3	17,7	19,2
6	15,5	17,9	19,4	15,4	18,0	19,7
7	15,7	18,3	20,2	15,6	18,5	20,4
8	16,0	19,0	21,1	16,0	19,3	21,5
9	16,4	19,8	22,2	16,5	20,0	22,5
10	16,9	20,6	23,4	16,9	20,1	23,5
11	17,4	21,4	24,5	17,5	21,6	24,5
12	15,0	22,2	25,4	18,2	22,5	25,5
13	16,6	23,1	26,3	19,0	23,4	26,4
14	19,3	23,7	26,9	19,7	24,0	27,0
15	19,9	24,4	27,5	20,3	24,6	27,5
16	20,5	24,9	28,0	20,7	24,9	27,7
17	21,0	25,4	28,4	21,0	25,1	27,7
18	21,6	25,9	28,8	21,3	25,3	27,8

Table 2: Percentiles for the body mass index of boys and girls
(KROMEYER-HAUSCHILD et. al., 2001)

3.1 Social significance of obesity

The significance of obesity as a condition in childhood and adolescence arises from functional and individual constraints as well as psychosocial negative influences. On the one hand, children and young people suffering from obesity have higher co-morbidity (appearance of two or more diseases in the same individual) than those with a normal weight and, moreover, have a significantly increased risk of morbidity (morbidity = incidence of the disease in a certain population) and the mortality risk (mortality = percentage of deaths, percentage of individuals of a certain population dying within a certain time period) of adults. With regard to adults health risks due to obesity are scientifically well documented, when it occurs already in childhood there is an additional negative influence irrespective of co-morbidity. Increased morbidity as a consequence of obesity is already documented in childhood (disorders of fat and glucose metabolism, orthopaedic problems and increased blood pressure). Obese children and obese young people are stigmatized because of the ideal of the lean body that is generally advertised. Thus, obese children and

obese young people develop a low sense of self-esteem, which in turn is a risk factor for psychosocial development as well as eating disorders (WABITSCH & KUNZE, 2003).

3.2 Economic significance of obesity

With the increased occurrence of obesity, congestion in healthcare facilities and increased healthcare costs are expected. The US healthcare system spends $ 45 billion a year, that is 8% of the national health expenditure, to treat obesity and related illnesses. And in Austria, the cost of treating obesity is also up to 8%. The corresponding calculations for Germany accept that if the spread of obesity among adults does not increase, by 2030 total costs of early obesity will increase by about 50% including co-morbidity (TROSCHKE & STOESSEL, 2012).

Although motivated by other reasons, food industry and fast food enterprises have recognized the significant issue of the overweight population with an increasing tendency to obesity. Extremely overweight customers do not fit to the advertisement image characterized by a beauty model lean and athletic. It also means total tangible profit losses if the dietary behaviour of the population develops to the detriment of the food companies groups. In the USA, they are seriously considering the threat of lawsuits, as was the case with damages actions against the tobacco industry. Two American women have accused the American company McDonald's of misleading advertising to persuade customers into consuming fast food and thus promote obesity, especially among children and young people. Although after the initial court decisions there was a feeling of complacency, because the lawsuits were dismissed, the food business groups are getting prepared and devise their new strategy. McDonald's and Burger King fast-food chains have had great success offering healthy new products such as salads and low-fat foods with the label *fitness*, and meanwhile a large part of their turnover comes from those products. The same will apply to other branches of the *fitness* industry, from sports manufacturers to the *lifestyle* industry. If these developments continue, businesses will lose some of the clientele they are targeting (GELINSKI, 2003).

In the meantime, obesity is considered a chronic disease and not just a biological variation. In the USA, about 280,000 deaths a year are attributed to obesity and its consequent diseases. This is the second cause of death among adults after smoking. Therefore, the spread of obesity as early as childhood is one of the most important health policy challenges in the context of general health promotion (WABITSCH & KUNZE, 2003).

3.3 Obesity – Basic principals

As mentioned before, the spread of obesity worldwide is increasing in all industrialized countries. In Germany, 10-20% of all school children and young people are overweight. Studies also show that the degree of obesity has increased significantly and therefore the number of extremely obese. The causes of this are not attributed only to inappropriate diet, but also to the change in living conditions and to a large number of other factors. Excessive intake of food rich in calories and fat, as well as lack of physical activity, which act based on a genetic predisposition, lead to increased body fat. Causes must also be sought in the psycho-social field, such as lack of communication (WABITSCH & KUNZE, 2003).

3.3.1 Causes of obesity

Individual motor and nutritional conditions are constantly determined by environmental and social peculiarities. Over time, physical activity has been reduced due to increasing modernization (excessive use of television and computer games) and the increasing use of machines. In many families, nutrition and dietary behaviour have changed radically due to the almost unlimited supply of tasty but energy-damaging foods as well as the uncontrolled composition of prepared foods. Both the food industry and the media promote this behaviour with advertising, which is targeted mainly at children. For this reason, the World Health Organization calls on all governments to ensure that the advertising of food and beverages does not exploit children's naivety.

It is doubtful whether children and young people have the ability to control on their own determination their motor and nutritional behaviour under unfavourable environmental conditions so that they can maintain their weight constantly. All-day schools with pre-cooked meals, prepared food products as a basis for family meals, life in large cities without sufficient physical activity and journeys to school by bus or car; these are environmental factors that cannot be determined by a child or a young person with a strong predisposition (a person's tendency to develop a certain attribute, for example, a disease in the course of his life) to obesity (PUDEL, 2003).

3.3.1.1. Genetic predisposition

Often overweight people or their relatives attribute the weight problem to innate body structure and a genetic or medical predisposition. While it does not seem unlikely that there has been a change in genetic predisposition over the last 20 years, studies show that overweight children and adolescents are becoming heavier and that the weight of lean children and young people is not changing at all. This is made clear by the changing distribution of BMI percentiles: the level of the 3^{rd}, 10^{th} and 50^{th} percentiles did not change at all, but there was a significant increase in the 90^{th} and 97^{th} percentile. This implies a biological or genetic predisposition for the target group. Obviously this does not directly affect body weight, but rather the regulation of energy balance is more vulnerable to disorder magnitudes such as changing environmental factors (DGE, 2003).

In fact, obesity belongs to the diseases that, in addition to genetic factors, are also affected by environmental conditions, which play a role in the expression of the phenotype (external appearance) in terms of existence and course. Almost throughout the history of humanity the most advantageous gene variants were those that led to a higher percentage of body fat. Through evolution from the primate form through humanoids to Homo sapiens, humans learned to eat all the substances they can digest (HOLLER, 2002). They are omnivorous. In the "thrifty genotype" theory it is mentioned that the populations who were able to better store the food they received (= fat storage) had an advantage in terms of their survival, and therefore could survive better in deprivation seasons. Today all of these factors often have a negative effect, because these individuals in the current life conditions become sooner overweight or obese (HEBEBRAND et al., 2003). Basically, genes that can cause obesity are divided into recessive and dominant. A recessive gene is typically covered by a dominant gene (the dominant attributes always appear). However, if both parents

carry a recessive disease, there is the possibility for each child to inherit both of the recessive genes or none of the two. In addition, the child can pass the recessive gene to one of his/her offspring.

Until now, we know four monogenic autosomal recessive forms of obesity for humans. To an early observed and excessive obesity lead the leptin mutants, leptin receptors, convertase regulators -I-PC-I- and proopiomelanocortin. A common feature of these individuals is hyperphagia (abnormally increased food intake). These four forms appear very rarely and cannot explain the significant percentage of obesity cases. Predominant forms of obesity include mutations (change of the hereditary material of an organism) to receptor 4 of melanocortin (MC4R). Until today, more than 40 different MC4R mutations have been identified, which in most cases result in partial or complete loss of receptor function. About 2-4% of the children with extreme obesity have such mutations. Also in most human chromosomes there are areas that are most likely to contain one or more genes that are involved in the appearance of obesity. Philippe Froguel of the Imperial College in London has identified such a gene and mentions that the GAD2 gene is more active in some people than in most of the people and therefore causes unlimited appetite. We hope that in the future doctors will be able to identify the children who are predisposed to excessive food intake, so that new treatment options may arise (HEBEBRAND et al., 2003).

3.3.1.2 Eating disorders

Excessive and uncontrolled eating can be a sign of an eating disorder, resulting in overweight and obesity. Today, in particular, two forms are linked to obesity: ***Binge Eating Disorder*** and ***Night Eating Syndrome***. They are described in detail below.

In the ***Binge Eating Disorder*** form there are constantly recurrent bulimia outbreaks. A large amount of food is taken, which is definitely greater than the amount that other people would eat at the same time. In this outburst, people lose control of what and how much they eat. The ***BED*** is associated with at least three of the following characteristics:

- *Eating faster as if it were something normal.*
- *Eating until one is unpleasantly full.*
- *Eating a very large quantity even if one is not hungry.*
- *Eating alone because one is ashamed of how much one eats.*
- *After eating, feeling disgusted, oppressed or guilty* (GRILO, 2002).

There is considerable despair due to BED. These incidents occur on average two days a week for at least six months. In these, the people involved - mostly women - do not compensate for calorie intake with vomiting, physical exercise, beauty treatments, etc., like bulimics.

Night Eating Syndrome can also lead to obesity. Clinical investigations show that this eating disorder appears disproportionately often in obese people at times of major crises, in order to achieve an anxiety reduction. Night eating syndrome seems to be a special response to anxiety for some obese people, depending on the pace of the day (STUNKARD, 2002).

People that suffer from this condition have sleep disorders and try to compensate with night food. Surveys have found that people suffering from the Night Eating Syndrome consume 37% of their daily food before 18:00. The remaining 63% they consume it during the time period between 6 in the afternoon and 6 in the morning. The sufferers stay awake at night. About one in two adults will end up eating. Unlike in the ***Binge Eating Disorder***, here they do not consume too much food. The portions have a normal size, averaging 271 kcal. But the percentage of carbohydrates in these meals is very high. The ratio of carbohydrate to albumin is about 7: 1. This diet pattern increases the concentration of tryptophan, which is transferred to the brain and converted to serotonin there. Serotonin in turn strengthens sleep and helps the patients to fall asleep - until they wake up again (STUNKARD, 2002).

3.3.1.3 Endocrine disorders

In very rare cases, obesity occurs due to glandular disorders. That may well be what many obese people claim, but the incidence of reported cases is very low. In less than one in 100 severe overweight people, physical disease is the cause of obesity. Here some hereditary diseases are included, innate or acquired functional disorders of the pituitary, thyroid or adrenal glands. A type of endocrine disease is Cushing's syndrome. At this case, too many hormones of the type called glucocorticoids are produced in the adrenal cortex. A typical type of obesity is created, which mainly concerns the body trunk and less the extremities. The main fatness, often associated with stretch marks, is located in the abdomen. Typical for this is diabetes disease due to glucocorticoids (BIRCH, 2002).

3.3.1.4 Medicines

Some drugs can cause obesity. Most known is the weight gain due to long-term treatment with cortisone. Significant changes in appearance are noted: moon face, stiff neck, weight gain, and gaining trunk fat (fat limited in the trunk area). All of these cases are summarized under the term Cushing Syndrome, which is similar to Morbus Cushing's disease, which is due to over-production of cortisol by the body itself. Other medicines (insulin, neuroleptics, etc.) result in weight gain as a side effect. Most of the time weight gain by a few pounds is kept within the limits and does not lead to severe obesity that needs to be taken seriously (BIRCH, 2002).

3.3.1.5 Prenatal and postnatal incorrect diet

The tendency for obesity may occur even in the foetus or in a new born baby still in the cradle. Thus, children whose mother has diabetes, even new born infants who are overfed, but even those who are malnourished, are at a significantly higher risk of suffering from illnesses such as obesity, diabetes and hypertension later in life. The cause is the increased insulin and cortisone levels in the late stages of pregnancy and during the first few days of the new born. The increased concentration of these two substances at this early stage results in life-long incorrect programming of brain regulatory centres for hunger and saturation. More specifically this means: Excessive weight increases insulin production. As a consequence, children grow disproportionately to the mother's body. A chain reaction begins, which can no longer be stopped. Increased growth leads to incorrect brain programming. The hypothalamic (pituitary)

centres, which regulate the feeling of saturation and inhibition of insulin, diminish, while areas that regulate hunger and insulin secretion are of normal size. This insulin overproduction, that the body gets accustomed to, remains for a lifetime and causes increased appetite, overweight, elevated blood insulin levels and impaired glucose tolerance. These are all factors that increase the risk of obesity, cardiovascular and sugar diseases. Postnatal overfeeding in the early stages causes too high insulin values and thus results in a predisposition for obesity that is not primarily due to genital causes, but is rather acquired during the development of the baby and then remains for life. This explains the transfer of this acquired disorder to several generations, when the affected female progeny become pregnant. A tendency for obesity and diabetes can therefore be created, with no genetic predisposition. But also intrauterine (in the mother's body), a developmental delay, which can be caused, for example, by anxiety or mother's inadequate nutrition or by consuming alcohol and nicotine, can lead to a wrong programming of the child's brain. Under these conditions, more cortisone is secreted, which in turn results in greater insulin production. The brain is programmed very early in the direction of "too much food" and the children who at first were small and malnourished later have the same weight problems as the overfed ones (PLAGEMANN, 2000).

3.3.1.6 Family configuration

A purely genetic predisposition or diseases that occur very rarely, as described earlier, are not sufficient to explain the spread of obesity, which is increasing. Genes play a role of only 30-50%. Overweight also occurs due to the wrong diet of the family: fast food and junk food, the minimum amount of time dedicated to the child and a compensation for this lack with sweet treats or because grandparents wrongly express their affection in the form of sweets offered. Small fat children grow up and become fat adults, who in turn often have fat children. Diet is a matter of education because eating behaviour is passed on from parents to children. This includes eating schedule choices, cooking manner, the frequency of meals as well as rewarding habits (for example, sweets as a reward for good grades or help offered). Therefore, the incorrect diet is transferred from generation to generation. Starting from birth, nature, with breast milk, provides the ideal nutrition for infants. In the following years they have to adapt to a diet consisting of solid and liquid food. In this development, parents play a great role. They have a decisive influence on the shaping of the subsequent nutritional preferences of children and young people. This starts with the parents' decision as to whether the baby will be fed on breast milk or ready-made baby food. Once the transition to solid food has taken place, parents have the opportunity to shape the children's nutritional patterns by deciding what foods they will accept and what not, when and in what amount the food will be offered to the child, and in what social occasions it takes place. For children, eating is a social event during which other people at the table act as role models. Thus, children whose parents are overweight or obese have a greater risk of becoming overweight because they adopt their parents' eating patterns. So it's not surprising when in a family there is more than one overweight member (BIRCH, 2002).

3.3.1.7 Social environment

Parents' social status seems to be a risk factor for the spread of obesity. Thus, a study in the state of Brandenburg showed that the percentage of obesity in children of a lower social level is three times higher

than that in children of a higher social level. Based on this, we can assume that families of higher social status have different dietary patterns than those of a lower social status. Such differences are important for the design of prevention measures. This theory is also supported by a study by the State Health Agency (LGA) in Brandenburg, which measured obesity rates in some areas. Here, it is striking that in some remote areas of Berlin, where mostly families of lower social status reside, the number of obese school children in the first grade is higher than those residing in areas directly next to Berlin (ELLSAESSER et al., 2002).
In a study by DORDEL and KLEINE (2003), residential areas are also mentioned, and from those it follows that social status is a risk factor for obesity. Thus, according to the survey, children attending school in Cologne show significantly higher overweight rates than school children in rural areas. This is substantiated by the fact that, in this study, pupils in cities most often belong to the lower and middle classes, while pupils in rural schools can be ranked mainly in the middle and partly in the upper class. Thus socio-ecological and socio-economic influences are mixed. We also accept that in the countryside more value is given to more favourable conditions for the motor development of children, so the area of residency has a positive effect on body weight. By accepting that children in the countryside have better opportunities to realize their desire for physical activity than the children in the cities, that most of the time have only the neighbourhood square to play, it is not surprising that obesity rates are much higher among urban children compared to rural children.

3.3.1.8 Diet

The diet provides the energy necessary to preserve life and to obtain the necessary substances for the preservation of the biological structure (HOLLER, 2002). Over time, the diet was developed through the combination of natural resources and evolution. For the increase in the weight of children and young people, besides the incorrect and rich in calories diet, the amount of food is also responsible. Over the decades, the idea of portion size has changed significantly. So, in the earlier times, the portions were smaller than today. What today is considered a “normal” portion formerly was considered a 'huge portion'. Although, in former times motion and physical work were much more intense in the daily lives of most people, the size of the current portions is much larger. Overweight people on average eat about 25 grams of fat more than those with normal weight. This difference, which at first seems small, is concentrated in the annual balance and leads to weight gain by nine pounds (LAESSLE et al., 2001).

3.3.1.9 Lack of physical activity

Surprisingly, the spread of obesity has risen even further over the past few years in Germany, although the average calorie intake and in particular the high fat consumption has fallen slightly lately. And in the US between the years 1976 to 1980 and 1988 to 1991 there was a reduction in fat consumption from 41.0% to 36.6% of total calories and in total energy intake by 4%. However, at the same time, the spread of obesity among adults increased from 25.4% to 33.3%.
Even if there is no comparable data on the corresponding energy consumption, this paradox is only explained by the growing lack of physical activity. There are a number of indirect indications on this issue: For example, in recent years, the daily journey made by children and young people on foot or by bicycle

significantly decreased, while the time spent watching television was significantly increased, which is something closely related to weight gain (WINKLER, 1998).

The use of technology in the workplace and in leisure time played also a big part in the spread of the obesity epidemic. For example, human power as a power supply for productive processes was replaced by machines that take their energy from raw materials. Moreover, even for short trips, people nowadays travel mostly by car or bus, while formerly they would have walked the same distance. According to various surveys and estimates, about two-thirds of adults in North America and Central Europe are physically inactive, that is, in their daily lives they move very little and do not engage in any sport.

In Germany, a maximum of one third of the population aged 18 to 55 is engaged in sport, which we now accept that has a significant preventive action. The world of children that usually involves a lot of physical activity is becoming increasingly sedentary. The more children and young people sit in front of the TV or the computer, the more weight they gain. Especially at school, it is noticeable that fewer and fewer children are willing to exercise and an increasing number of them hardly move at all. During school breaks, many children prefer to play with their Game-Boy, which takes on the role previously played by football or other physical activities. A vicious circle is created: Lack of activity reduces body efficiency. Consequences: negative experiences, junk food, even more television and more abstention from sport, and social isolation manifested by mockery and teasing (BOES et al., 2002).

3.3.1.10 Mental causes

Obesity can also be due to mental causes. Obesity as a consequence of psychological reasons may be caused by loss experiences. Parents' divorce, the death of a parent or running away from the parental home are considered as such. Excessive eating is also caused by loneliness, boredom, long-term anxiety and stress, or a feeling of diminished self-esteem in the sense of ***feeling unpopular***. In these cases food does not serve to satisfy hunger, but rather to take away the sadness. Food intake is used as a substitute satisfaction, in order to feel better and to do something good for oneself. Thus food becomes the defense against bad mood, fears and depression. Many overweight people have depressive personalities. However, some scientists are of the opinion that the mental peculiarities observed in obese people appear to be consequences rather than causes of obesity. Excessive eating can also be seen as an expression of unintentional aggression towards others and as unconscious self-destruction. Obesity can also serve as a defence mechanism against the role of sexes. But this only occurs in girls (PUDEL, 2003).

3.4 Consequences and diseases

Overweight is not in itself an independent risk factor, but rather increases the incidence of other risk factors such as diabetes, hypertension or metabolic disorders. Thus, overweight is characterized as ***the risk factor of risk factors***. Overweight and obesity can cause a number of physical annoyances. Children with severe overweight often snore and suffer more often from a sleep related breathing disorder that appears with paroxysms, the sleep apnea syndrome (breathlessness lasting more than ten seconds). Typically dyspnoea and shortness of breath also occur. In addition to increased sweating, it can also cause orthopaedic problems such as back pain (mainly lumbar spine) and knee obstruction. The joints are constantly stressed by the

weight and wear out more quickly. Frequent evidence of articular cartilage damage of the knee joint and hip joint damage is present, as well as flat feet and lack of the transverse arc of the foot due to mechanical strain. The efficiency of the body of extremely overweight people is considerably limited. Even in small fatigue, the cardiovascular system is overly strained, which is manifested by dyspnoea, pulse increase, sweating and rapid exhaustion. In extreme cases, complete inertia or even motor disability (immobility) is observed. Among the skin folds of overweight, inflammations (wet eczema) are easily created. There is also increased risk for bile stones (cholelithiasis) and increased uric acid in the blood (hyperuricemia, and as a consequence gout). A more recent study notes that overweight children are at greater risk of developing asthma. Approximately in 40% of the cases menstrual disorders are also present. Disproportionate intake of food disrupts the processing of food components during the metabolism of sugar and fat. Excessive weight is considered to be the most important risk factor for the occurrence of sugar disease (diabetes mellitus) and high blood pressure (hypertension). Overweight children also present signs of vascular inflammation. These may develop into atherosclerosis, which often result in coronary heart disease, myocardial infarction or syncope. Because of these complications, life expectancy of overweight people is lower than those who have a normal weight. A study by Vrije University in Amsterdam confirms these effects. Children's blood samples have already shown the first signs of inflammation in the artery walls, something known to adults as a preliminary stage of heart disease. 7% of boys and 6% of girls had in their blood first signs of inflammation of their arteries. Some of these children were only eight years old. However, it is not only the medical consequences that play a role. The psychological and social consequences of obesity should not be underestimated.

Minority tolerance today is widely glorified, but this does not seem to apply to overweight people. Most obese children and obese young people suffer from the sarcasm and disdain of their environment. Especially children have no hesitation in mocking and humiliating others. In a survey among nursery children it was revealed that they had already created a negative image for obese people. They were shown images of normal weight children, overweight and disabled children and were asked whom they preferred. Their reply was that they considered the overweight children less popular and said that it would be less pleasurable to become friends with them. Another empirical study showed that overweight children and overweight young people develop a negative image of themselves as the duration of their overweight increases. Particularly overweight people suffer greatly from this and develop a feeling of low self-esteem. Also obese children present inhibitions, depressions, unused social potential and phobias. A negative body image and a negative perception of the body are further consequences of overweight. Humiliated children often try to be comforted with sweets and crisps, and thus they enter a vicious circle that they cannot interrupt alone without help and understanding. There is a risk that this behaviour may be established, and another eating disorder could be developed (anorexia nervosa, bulimia), especially in girls (LAESSLE et al., 2001).

For overweight children aged six to nine years there is a 55% chance of living a life as an overweight adult. The risk is twice as high in comparison to children with normal weight. 67% of overweight children aged between 10 and 14 years are at risk of having to fight obesity as adults. The risk is greater, the older the child is. Parents' weight also has a decisive influence. At the age of 7 an overweight boy with normal weight

parents has a probability of 37% of continuing to be overweight as an adult. On the other hand, for a boy of the same age that has an overweight parent the probability of becoming an overweight adult is up to 71%. This is explained by the fact that people who were first overweight as adults generally have a normal number of adipocytes, which have just grown in size. With a diet their size returns to normal. But if obesity develops from childhood, it is generally based on a large number of fat cells, which later in life are no longer degraded. In this case, diets lead to abnormally small adipocytes, which tend to return as quickly as possible to their previous size. As a result, overweight adults who were fat as children, find it hard to achieve and maintain a normal weight; so it is common that overweight and obesity will afflict them for a lifetime (PUDEL, 2003).

4. Summary

Overweight and obesity have always existed. However the voluptuous body, that formerly was considered a sign of wealth or a survival strategy, is now stigmatized. Overweight people not only have a higher risk for their health in the form of cardiovascular diseases, diabetes mellitus or premature bone and joint damage, but they do not correspond to today's ideal of beauty. Due to the changing living conditions, the spread of overweight and obesity in industrialized countries has greatly increased, therefore rapid action is needed. Obesity from a medical perspective has been investigated. Its epidemic effects, particularly in industrialized countries, have been demonstrated in numerous studies and the results show both an increasing spread and an increase in the impact of obesity. The causes of obesity are due to many interdependent factors. It is therefore difficult to formulate therapeutic proposals that have general validity. In summary, we can say that for the increasing number of overweight and obese children and adolescents the medical factors are less important. The causes should be sought in the social conditions and behaviours of certain social groups. It is important that children and young people are permanently involved in the subject of nutrition and movement, and that this engagement accompanies them throughout their development. The weakest link in the chain of measures will be children and young people. Here art must be expressed with imagination; their interest should be awakened with subtle and patient moves. Even if the politics supports, doctors encourage, health funds, kindergartens and schools raise awareness, sport clubs motivate, the media inform, parents recognize and offer incentives, the hardest part of the job should be done by the target group in order to achieve personal success; that is to remain or become "healthy". Furthermore the treatment of obesity is more difficult, than preventing its occurrence. Particular attention must therefore be paid to prevention, particularly in childhood and adolescence.

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