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CHILDHOOD OBESITY AND ASSOCIATED PROBLEMS



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The purpose of this Bachelor's Thesis was to find out the current situation regarding childhood obesity and associated problems. Basically the topic has two parts: childhood obesity and the problems associated with childhood obesity. It will also answer basic questions regarding childhood obesity. The aim of this Bachelor's Thesis was to create awareness among children and parents about childhood obesity and associated health problems. Additionally, it would be used as a guide in Terveystietä for families as an educational material.

Method: For this literature review, the author used recent studies from databases such as PubMed, CINAHL and EBSCOhost as main sources to search different review from 2012 to present. Studies were searched using search terms "childhood obesity" and "associated problems". Ten of the most relevant studies summarized that met the inclusion criteria were included.

Results: The prevalence of childhood obesity is increasing in children. There are many factors that lead to childhood obesity such as: genetic, behavioral, and environmental. Moreover, overweight and obesity, as well as their related non-communicable diseases, are preventable. Exercise programs/outdoor activities with a dietary modification are effective for children to maintain normal weight.

Conclusion: Educating parents and children about the healthy life style and the consequences of the health issues can reduce childhood obesity.

KEYWORDS:

Childhood obesity, BMI, Cardiovascular disease

Azeb Tesfaye Deneke

LAPSUUSIÄN LIHAVUUS JA SIIHEN YHTEYDESSÄ OLEVAT TEKIJÄT

Tämän opinnäytetyön tarkoituksena oli selvittää lapsuusiän lihavuutta ja siihen yhteydessä olevia tekijöitä. Kirjallisuuskatsauksessa on kaksi osaa: lapsuusiän lihavuus ja siihen yhteydessä olevat tekijät. Se vastaa myös peruskysymyksiin, jotka koskevat lasten lihavuutta. Tämän opinnäytetyön tavoitteena oli lisätä lapsen ja vanhempien tietoisuutta lapsuusiän lihavuudesta ja siihen yhteydessä olevia tekijöitä. Lisäksi siitä valmistui opas Terveysnettiin.

Menetelmä: Opinnäytetyö toteutettiin kirjallisuuskatsauksena. Siinä käytettiin tuoreita tutkimuksia seuraavista tietokannoista, kuten PubMed, CINAHL sekä EBSCOhost, pääasiallisina lähteinä etsimään erilaisia tarkasteluja vuodesta 2012 eteenpäin. Tutkimuksia haettiin käyttämällä hakutermejä "lapsuusiän lihavuus" ja "liittyvät ongelmat". Kymmenen tärkeimpiä tutkimuksia tiivistettiin, jotka täyttivät osallisuutta koskevat kriteerit.

Tulokset: Lasten lihavuuden esiintyvyys kasvaa lapsilla. On monia tekijöitä, jotka johtavat lapsuuden lihavuuteen, kuten: geneetti syyteen, käyttäytymiseen ja ympäristöön liittyvät tekijät. Lisäksi, ylipaino ja lihavuus sekä niihin liittyvät tarttumattomat taudit ovat estettävissä. Harjoitusohjelmat ja ulkoilu, joihin yhdistetään ruokavalion muutos, ovat tehokkaita lapsille normaalin painon säilyttämiseksi.

Tästä kirjallisuuskatsauksesta voidaan päätellä, että vanhempien ja lasten kouluttaminen terveistä elämäntavoista ja terveysongelmien seurauksista voi vähentää lapsuusiän lihavuutta.

ASIASANAT: Lapsuusiän lihavuus, sydän- ja verisuonisairaudet, BMI

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LIST OF ABBREVIATIONS (OR) SYMBOLS

BMI	Body Mass Index (WHO 2016).
CVD	Cardio vascular diseases (Julian et al. 2015, 1371-1376).
T2DM	Type 2 diabetes mellitus Kumar and Kelly 2017, 251-265).
NCD	Non communicable diseases (WHO 2016).
SES	Socio economic status (McHugh 2016, 94-98).
WHO	World Health Organization

1 INTRODUCTION

Childhood obesity is one of the most serious health issues in the world that children face in their day-to-day activities of their life. According to World Health Organization's definition, childhood obesity is an abnormal or excessive fat accumulation that may damage health. The problem is global. The pervasiveness has increased at an alarming rate. Globally, in 2015, the number of overweight children under the age of five was estimated to be over 42 million. (WHO 2016.)

During three years of study period at the Turku University of Applied Sciences, so many diseases have been covered and it has been shown that most of the diseases are linked to Obesity. Moreover, being a child is about experiencing and learning new things. It is every parent's responsibility to protect their children from suffering with poor diet and different physical and psychological problems that come along with obesity. If we fail to act on obesity in children and young people soon enough, this issue threatens to have a highly negative impact on health and quality of life and may have detrimental effect on our healthcare systems in the near future.

According to Central Disease Control and Prevention (CDC) obesity is defined, as an enormous amount of body fat, in which is body mass index is equal to or greater than the 95th percentile. Overweight is defined as having excess body weight or above 85 percentile of body mass index (BMI). Body Mass Index is a person's weight in kilograms divided by the square of height in meters. (Central Disease Control and Prevention USA 2016.) In this Bachelor Thesis, it has been determined to cover age group between 2-18. World Health Organization (2016) states that a high BMI is a major risk for different kinds of non-communicable diseases. Children with a higher level of BMI are usually at a higher risk of obesity-associated negative health problems.

Obesity has various psychological and physical health effects in childhood. It also affects their quality of life later on, which also often results in increased long-term morbidity and shorter life expectancy. Excessive weight gain (during infancy and early childhood) is not associated only with the risk of later obesity, but also it is associated with early morbidity. For the reasons mentioned above, obesity is not only a health concern, but also an economic concern to society. To avoid negative consequences of obesity, preventive actions should start in early life. (McHugh 2016, 94-98.)

The consequences of childhood and adolescent obesity are broad, not only including health-related physical outcomes, such as high blood pressure; high cholesterol; metabolic syndrome; type 2 diabetes; orthopaedic problems; sleep apnea; asthma; and fatty liver disease, but also psychological, social, and behavioural consequences, such as body image dissatisfaction; low self-esteem; social isolation; discrimination; depression; and reduced quality of life. In addition, this might indicate that children in the current generation are at risk of dying at younger age because there has been a phenomenal rise in proportions of children having obesity in the last four decades, especially in the developed world. (Sahoo et al. 2015, 187-192.)

The increasing prevalence of childhood obesity has risen heavily worldwide and leads to the emergence of multiple serious obesity-related comorbidities that not only threaten the health of those affected but also promise to place a large strain on the health care system. It is possible that food marketing and the universality of unhealthy food choices are contributing to childhood obesity. Besides, psychosocial and emotional distress contribute to excess weight gain in children via maladaptive coping strategies such as eating to suppress negative emotions, appetite up-regulation, and low-grade inflammation. Consumption of fast food has also been purported to contribute to the increasing prevalence of obesity. (Koyuncuoğlu 2014.)

The purpose of this bachelor thesis is to find out current situation regarding childhood obesity and associated problems. Basically the topic has two parts: childhood obesity and the problems associated with childhood obesity. It will also answer basic questions regarding childhood obesity.

The aim of this bachelor thesis is to create awareness among children and parents. Additionally, it will be used as a guide in Terveystietä for families as an educational material.

2 PURPOSE AND RESEARCH QUESTION OF BACHELOR THESIS

The purpose of this bachelor thesis was to find out the current situation regarding childhood obesity and associated problems. The topic has two parts: childhood obesity and problems associated with childhood obesity. It would also answer basic questions regarding to childhood obesity.

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The research questions include:

- 1.What were the common associated health problems of childhood obesity?
2. What were the common factors that contribute to childhood obesity?
- 3.What were the treatment and prevention method for childhood obesity?

3 METHODS AND MATERIALS

A high quality of literature review contains the current theoretical and scientific knowledge about a specific topic. The structure for a literature review should be coherent, systematic and clear. It also identifies what is known and unknown about the topics (Grove, Burns, Gray 2014).

In this bachelor thesis, data collection will be largely performed based on a content analysis from a literature review. Information search was done using Turku University of Applied Sciences search database. The databases searched were the following: CINAHL, EBSCOhost and PubMed. The search terms used were “childhood obesity*AND associated health problems*” that have been made from 2012 to present. Search terms “full text” and “English language” were the secondary search limiters used in the process.

A number of research books were used to help the writer understand the process of conducting a systematic literature review, especially (Grove, Burns, Gray 2014). The reliability of this study can be measured through the reliability of the included research studies. The studies included in this literature review were from around the world but mainly concentrating on western developed countries. Ten most recent and relevant articles were chosen, which cover many areas regarding childhood obesity. (See table 3)

Database	Search words and limiters	Limiters	Number of Results	Selected by Topic	Selected Abstract	Selected Full text
CINAHL	Childhood obesity AND Associated problems	-English language 2012-2017	230	17	7	5
PUB MED	Childhood obesity AND Associated problems	-English language 2012-2017	623	20	8	2
EBESCO HOST	Childhood obesity	-English language 2012-2017	1626	22	3	3

Table 1: Data search table

This table was created for some inclusion and exclusion criteria were used. An inclusion and exclusion criteria helps the author to develop a strategy for searching for the literature related to the research question.

Inclusion criteria	Exclusion criteria
Studies published from 2012-present	Studies published before 2012
Studies in English	Studies in other language other than English
Full text studies	Studies only in abstract
Free access	Paid access

Table 2: inclusion and exclusion criteria

For the rest of information, the author used different official websites such as WHO (world health organization) and CDC (central disease control and prevention) by using the same search term to find recent articles and journals.

4 RESULTS

4.1 Factors that contribute to childhood obesity

A number of factors contribute to childhood obesity: one of the major factors of obesity is an energy imbalance between calories consumed and calories expended. Globally, energy imbalance is a key factor for high rates of obesity. Over time, the increasing consumption of energy-dense foods high in fat and sugar but low in nutritional value, less physical activity due to sedentary life style and modes of transportation will all contribute to this imbalance. (McHugh 2016, 94-98.) Children need more calories for a healthy growth and development. On the other side, if they consume more calories than they're burning off, the result will be more weight gain. In general, factors that are causing childhood obesity fall in to three categories: genetic, behavioural, and environmental. (Rankin et al. 2016, 125-146.)

4.1.1 Genetics Factors

Genetics influences the chance of becoming obese in children among other factors. Additionally, obesity in family is inherited and associated with a higher risk of childhood obesity. Besides other factors, parental obesity is one of the main factors for childhood obesity. Several genes are responsible for obesity-increased fat-cells numbers. Fat cell theory holds that the number of fat cells in the body determines the percentage of body fat an individual carries, which in turn is partially determined by inheritance and partly by eating habits. However, the contribution of environmental factors cannot be removed. It is important to realize that nobody is doomed to be overweight because of his or her genetics. (Mehl et al. 2017, 113-127.)

4.1.2 Behavioural Factors

There are certain behaviours that can be identified as potentially contributing to an energy imbalance and, consequently, to obesity (Karnik and Kanekar 2012).

4.1.2.1 Less physical activity

Less physical activity in children can cause over weight and obesity. Participating in physical activity is important for children and teens, and it has beneficial effects on body weight, blood pressure and bone strength. Physically active children are also more likely to remain physically active throughout adolescence and later on in adulthood time (Guinhouya 2012 438-447.) Overindulgence in indoor leisure activities and entertainment (e.g., television viewing, internet, and computer games) alone or in combination with other factors like unsafe neighbourhoods for walking and other outdoor activities, lack of open spaces and playgrounds in schools and communities along with increasing pressure on children to perform in academics and reduced emphasis on sports, contribute to childhood obesity. (Kar and Kar 2015, 12-17.)

4.1.2.2 Sedentary life style

Increased sedentary time such as watching television and playing computer games for long hours are associated with increased BMI and the prevalence of overweight and obesity in children. The number of children spending more and more of their time sitting in front of the TV or playing on electronic games has increased during recent years even among the toddler age group. In children watching television more than one hour per day, there was a higher consumption of fast food and sweets, one of the key contributors to childhood obesity. This includes the design of the city environment, safety, availability and access of playing grounds, local knowledge and supportiveness of neighbourhoods. All these sedentary life styles play an important role in the decline of walking and cycling over the last decades. (Mehl et al. 2017, 113-127.)

4.1.2.3 Short sleep pattern

Miller et al. (2015) reported that an association between short sleep patterns during early childhood (age 3–7 years) and either concurrent or later obesity. Additionally, chronic short sleep from early childhood through school age associated with increased obesity such as short sleep duration, poor sleep quality, and late bedtimes were associated with emotional eating and restrained eating respectively. Establishing a regular, consistent sleep schedule early in childhood may enhance metabolic regulation and prime healthier sleep and eating habits in the future.

4.1.3 Environment

Several factors in the current “obesogenic” environment have resulted in increased caloric consumption, such as increasing use of sugar-sweetened beverages, sweet snacks, fast foods containing excess fat, large portion sizes, and high glycaemic foods. Consumption of sugar-sweetened beverages (including fruit juice) has been postulated as an important contributor to the development of obesity in children. Eating behaviours in children and risk of childhood obesity have been shown to be associated with parental feeding styles, stress, and depression. Other crucial proposed effects include perinatal factors, birth size, catch-upgrowth, breast-feeding status, antibiotic use, environmental chemicals and negative experiences of life. (Kumar and Kelly 2017, 251-265.)

Additionally, a higher degree of obesity in parents is associated with a higher risk of obesity in their children. Tracking of overweight and obesity through generations may be explained by a number of factors. Furthermore, environmental factors contribute to this relation, as parental eating habits and eating behaviour have been shown to associate with the same habits and behaviours in their children. This underlines the complexity of obesity, where multiple genetic and non-genetic factors interact and affect an increasing number of families, and the need for an intervention strategy integrating the whole family is indeed suitable. (Trier et al. 2016, 1-11.)

4.1.3.1 Socioeconomic factors

Children who have low socioeconomic status (SES) might have higher risk of obesity. In particular, they may have negative health outcomes, and these outcomes are likely to continue into adulthood. Furthermore, children from low socioeconomic status (SES) families, for example, are more likely to have overweight families, which is associated with a higher risk of childhood obesity. Childhood obesity has also increased with the use of media games and hand-held devices, mass media marketing of junk food products, and lack of stay-at-home parenting. (McHugh 2016, 94-98.) The parents’ financial situation is crucial for their choice of diet and activities for their children, and it is considered that parents of children with overweight have financial strains and a low level of education (Isma et al. 2012). Obesity has also been linked to age, ethnicity and gender. The prevalence of obesity is higher in racial and ethnic minorities, perhaps attributable to greater poverty among these groups. Selective weight gain in certain

populations may also indicate that the interaction between people and their environment varies according to genetic background. Certainly some populations are at greater risk of obesity-related morbidity. Therefore, effective prevention and treatment may require racial and ethnic-specific strategies. (McHugh 2016, 94-98.)

5 ASSOCIATED PROBLEMS WITH CHILDHOOD OBESITY

5.1 Physical health consequence

Childhood obesity can adversely affect almost every organ of their body and has serious consequences. It has been linked with co-morbidities and associated with chronic health diseases that can lead to early morbidity in adolescence, such as early sign of cardio vascular diseases (CVD), hypertension, impaired insulin sensitivity, including some types of cancer (kidney cancer, colorectal cancer and esophageal cancer). Additionally, it increases future risk of breathing difficulties and increased risk of fractures. Furthermore, most of the physical health conditions are preventable and can be stopped when a child or adolescent reaches a healthy body weight. In the worst cases, some of these health conditions can lead to death. (WHO 2016.)

5.1.1 Type 2 Diabetes

Type 2 diabetes Mellitus (T2DM) in children is a chronic disease that affects the way the child's body processes sugar (glucose). Over the past decade, there has been an alarming increase in the appearance of T2DM in children, a disease that previously occurred almost exclusively in adults. Additionally, obesity is highly linked to Type 2 diabetes or insulin resistance in children, which leads to glucose intolerance and diabetes mellitus. The predominance of type 2 diabetes mellitus in children is increasing worldwide. Overweight children have been linked twice as often to diabetes when compared to non-obese children. This disease has been found to occur earlier and with more frequency in children who are obese. It's important to manage the diabetes because its long-term consequences can be disabling or even life threatening. (Kumar and Kelly 2017, 251-265.)

5.1.2 Cardiovascular diseases

Children who are obese are more likely to have cardiovascular risk factors resulting in cardiac structural and hemodynamic alterations including hypertension, increases in

ventricular mass endothelial dysfunction, with carotid artery intimal medial thickening, and early coronary and aortic fatty streaks and fibrous plaque, as well as atherosclerosis. Childhood BMI is an independent risk factor for adult cardiovascular risk once adult BMI is taken into consideration. (Yanovski 2015.) A higher BMI in childhood was associated with increased risk for coronary heart disease in adulthood. Obesity produces a variety of cardiac structural changes and hemodynamic alterations and excessive adipose accumulation induces increased blood volume and cardiac output. In morbid obesity, these abnormalities may lead to a cardiomyopathy. Whether childhood obesity increases the risks of myocardial infarction, stroke, and certain malignancies is currently unproved. (Julian et al. 2015, 1371-1376.)

5.1.3 Dyslipidaemia

Dyslipidaemia is an abnormal amount of lipids in the blood. Lipids such as cholesterol and triglyceride, in the blood are widely risk factors for cardiovascular disease. Obesity may have a threshold effect on dyslipidaemia, in which increased adiposity results in abnormal lipid levels. However, the severity of the dyslipidaemia may be determined by other factors. Childhood dyslipidaemia has been shown to persist and to be a predictor of adult dyslipidaemia, adult carotid intimal media thickness, and other cardiovascular disease risks. (Yanovski 2015.)

5.1.4 Hypertension

Hypertension (high blood pressure) in children is a blood pressure that is the same as or higher than 95 precents of children who are the same sex, age and height as your child. Primary hypertension in children was previously considered limited, but in recent years it has become increasingly common in association with obesity and other risk factors. Obese children are at higher risk for hypertension than non-obese children. Moreover, the risk of hypertension in children raises across the entire range of BMI values and is not defined by a simple threshold effect. A Child with elevated blood pressure, the diagnostic evaluation should focus on confirmation of hypertension, determine if an underlying cause can be identified and whether hypertensive target organ damage is present (Kumar and Kelly 2017, 251-265).

5.1.5 Non-alcoholic fatty liver disease

Non-alcoholic fatty liver disease (NAFLD) is strongly associated with visceral adiposity and insulin resistance and is becoming one of the most common liver diseases in the United States and worldwide. Nowadays, the fatty liver disease is frequently met in obese and insulin resistance children. When someone is overweight or obese, too much fat can be stored in the liver and this can lead to a disease called non-alcoholic fatty liver disease. In some children and adults, the extra fat in the liver becomes a more severe problem, causing swelling and scar tissue. (Singer et al.2014.) The spectrum of non-alcoholic fatty liver disease ranges from simple steatosis, believed to be benign and non-progressive, to more severe, potentially progressive non-alcoholic steato hepatitis, which is characterized by hepatic inflammation, hepatocellular injury, and fibrosis. Paediatric fatty liver disease and steato hepatitis in obese children have been increasing and include cases of cirrhosis and liver transplantation. (Ciocca, Ramonet, and Alvarez 2016, 563-569.) Most children with NAFLD have no symptoms. Some have non-specific symptoms such as abdominal pain and fatigue. The physical exam shows an increased waist circumference, stretch marks, and acanthosis nigricans on the neck, armpit and in skin folds, a typical sign of insulin resistance. Liver enlargement may be detected in 50% of cases, whereas spleen enlargement is less common and associated with advanced liver disease. (Ciocca, Ramonet, and Alvarez 2016, 563-569.)

5.2 Psychological health consequences

Obese children have adverse psychological experiences than their normal weight peers, such as emotional, social and psychological problems. Bullying in school, teasing and stigmatization are the main reasons for psychosocial problems in obese children. These problems have significant impact on a weight problem in children, and those children may have smaller social circle in school. Some children may turn to food as a coping mechanism for dealing with problems or negative emotions like stress, anxiety, or disinterest. Childhood is a demanding period of growth and development of body image. Children who were obese in childhood are more likely to have poor body image and have low confidence about their body image. Children struggling to cope with a divorce or death in the family may eat more as a result. These psychosocial

problems may have far-reaching consequences in their life. (Rankin et al. 2016, 125-146.)

5.2.1 Depression and anxiety

Depression may be both a cause and a consequence of obesity. However, no significant relationship is reported between increased BMI and increased anxiety symptoms. A typical depression is characterized by increased appetite and overeating. (Rankin et al. 2016, 125-146.) Overweight and obese children, compared with normal weight children, significantly experience depression. Increasing weight in children was associated with increasing levels of psychosocial distress, which is significantly correlated with depression. Obesity in adolescence may lead to depression in adulthood and the depression symptom, especially among girls, may put individuals at risk for the onset of obesity later on their life. (Kalarchian and Marcus 2012, 241-246.)

5.2.2 Bullying and teasing

Obesity and weight-related teasing in children is a significant risk factor for the development of psychosocial problems, including weight-based teasing, social stigmatization/peer rejection, and later eating disorders and unhealthy weight-control behaviours. Obese children and adolescents are mostly distressed by weight-related teasing issues and might have lower self-esteem and higher depressive disorders. Primary sources of stigma for children and adolescents were reported to include peers, teachers/educators, parents, and health care providers. Obese children being bullied and teased may also have less social circumstances, such as social involvement when compared with normal-weight children. Overweight/obese children between 6 and 13 years were 4–8 times more likely to be teased and bullied than normal-weight peers. (Rankin et al. 2016, 125-146.)

5.2.3 Low academic performance

Childhood obesity has been linked to negatively affected school performance. A research study concluded that overweight and obese children are more likely having problems at school than their normal weight friends. They are also more likely to miss

school more frequently, especially those with chronic health conditions such as diabetes and asthma, which can also affect academic performance. Children with hypertension, insulin resistance and metabolic syndrome have lower cognitive and academic test scores than those without these co-morbidities. These health problems may also cause overweight and obese children to miss school more often. Higher levels of school absenteeism are associated with lower performance in school. (Penn and Kerr 2014, 16-21.)

6 PREVENTION

Prevention is easier to implement than the weight management and weight loss measures necessary once overweight or obesity occurs. Consequently, good strategies for preventing obesity-targeting children are crucial. This includes increased physical exercise and improve nutrition; limiting the consumption of sugar-sweetened beverages; consuming fruits and vegetables; limiting television and screen time to less than 2 hours per day; eating breakfast daily; limiting fast food; encouraging family meals; limiting portion size; and involving the entire family in lifestyle changes. (See Table 3) (Peek 2016, 30-45.)

Overweight and obesity, as well as their related non-communicable diseases, are totally preventable. Childhood obesity intervention programs are most often family-based, as children are not expected to implement changes alone. Dietary intervention, supervised by a dietician if possible, is essential for weight management. (Trier et al. 2016, 1-11.)

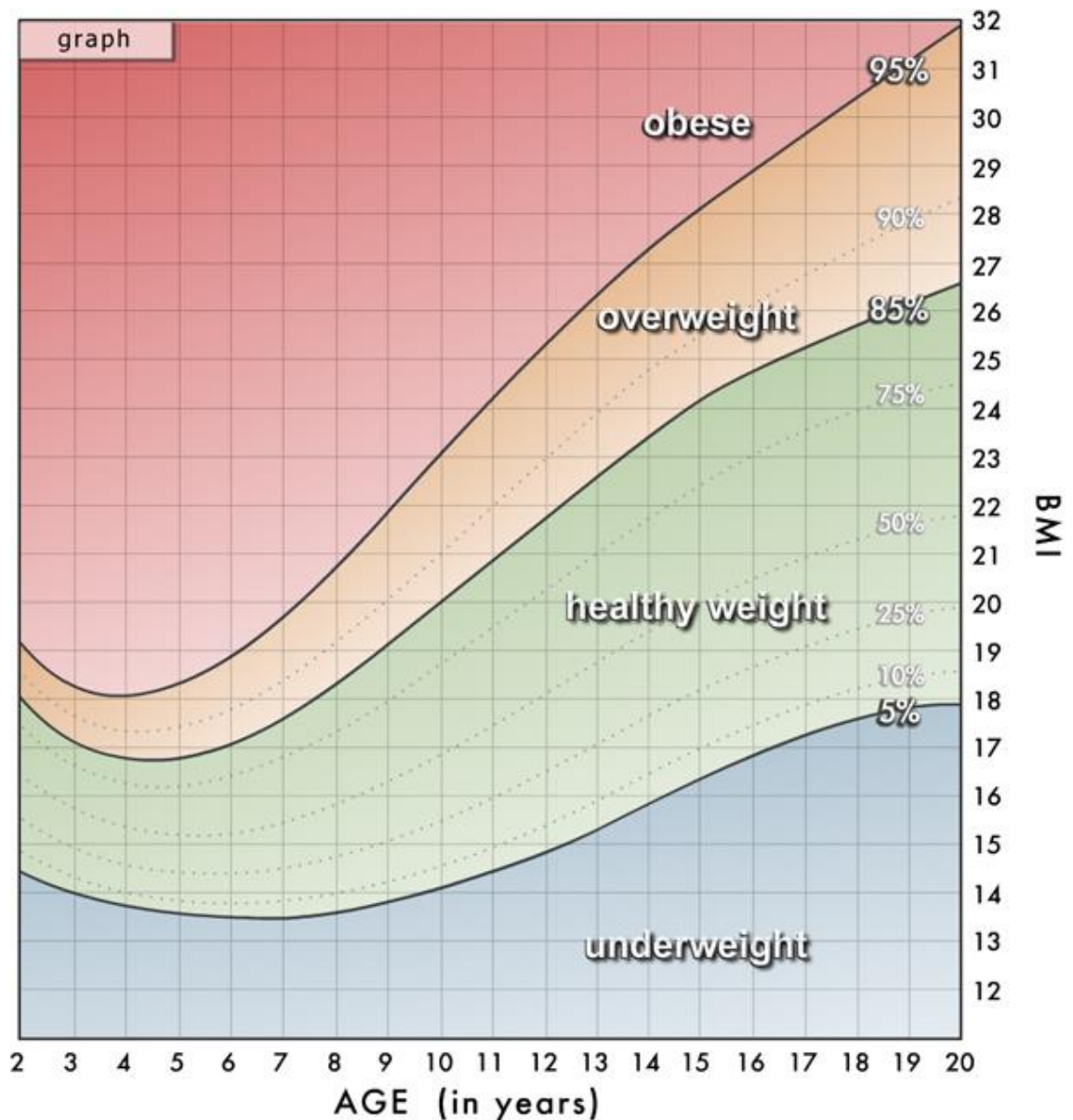
A primary focus on health improvement rather than weight loss would be beneficial for children. Although essential, dietary intervention should be supported by physical activity intervention programs; at least 60 minutes of daily activity is recommended for school-aged children >5 years and adolescents. Younger children should have 180 minutes of any intense physical activity or unstructured free play daily. Screen time should be limited to less than 2 hr. per day. (Gurnani et al. 2015.)

7 TREATMENT

Treatment of childhood obesity is mainly based on non-pharmacologic interventions. For children, surgery or drug therapy it is not recommended unless within a closely monitored or very severe condition. The purpose of the treatment for obesity involves weight maintenance for progressive weight loss. (Julian et al. 2015.)

The growth of children primarily is measured as height, and weight, leading to a decrease of BMI per age point, into a healthier range. For children and teens, BMI is age and sex-specific and is often referred to as BMI-for-age and was used growth chart for children. This means it allows for the health care professionals that help to know how the child is growing among other children the same age and gender. Percentiles are measurements that show where a child is compared with others. (See picture 1). (kidshealth.org.)

In the case of childhood obesity, depending on the health conditions of children, treatment may involve a multidisciplinary team including the family physician, dieticians, counsellor or physical therapist. Specific plans for diet and physical activity have been developed where general guidance is ineffective. Intensive lifestyle interventions, of healthy eating, exercise, and reducing sedentary activity, are the corner stones of treatment of obesity in childhood and adolescence. (Julian et al. 2015.)



Picture 1: Description of BMI in children and growth chart (Kidshealth.org).

Diet and Lifestyle Modification

Life style modifications are necessary to prevent childhood and adolescent obesity. Children are particularly susceptible due to psychological issues during crucial developmental period (Farley and Dowell 2014, 1579-1583). Exercise programs alone without dietary modification are unlikely to be effective, because increased energy expenditure is likely to be evened by increased energy intake. It is the responsibility of every family member to play active role by making healthier choices, healthier foods and more physical activities. Families approach also appears vital, if the parents are

engaged in the process, or even are the leader of the process, at least for younger children such as encouraging healthy diets and plentiful physical activity will benefit the health of all children, whether at risk of obesity or not (Guinhouya 2012, 438-447.)

Dietary approach

- Encourage intake of more fruit and vegetables daily
- Decrease intake of calorie-dense foods such as saturated fat, salty snacks, candy
- Minimize intake of sugar-containing beverages
- Minimize eating outside home and fast food in particular
- Eat breakfast daily
- Avoid skipping meals

Physical Activity

- Decrease sedentary behaviour such as watching television, surfing the Internet, and playing video games to less than 2 hour daily
- Increase intensity, frequency, and duration of exercise
- 1 hour physical activity daily
- Engage in fun and age-specific exercise that is appropriate to children

Table 3: Behavioural Treatment Strategies for Obesity During Childhood (Kumar and Kelly 2017, 251-265).

8 ETHICS AND VALIDITY

Ethics is one of the most important parts of a research. In ethical research it is necessary for generating sound empirical knowledge for evidence-based practice in nursing and should follow an ethical manner. (Grove, Burns, Gray 2014.)

According to Finnish Advisory Board on Research Integrity (TENK), a research must be conducted according to the responsible conduct of researcher in an ethically accepted and reliable manner. For its results to be reliable; the research must be conducted according to the responsible conduct of research, which includes respecting others work, citing their work properly and by giving them credit. This thesis is conducted through a literature review and all works of others are properly acknowledged in the reference part that means there were no consent, participants, interviews or personal contact of patients. (TENK 2016.)

In this thesis, the author has used secondary data collection through reading literatures that have been done previously and outlined different health problem that are associated to obesity and how to prevent or manage childhood obesity before it causes serious health problems in children's life. The information searched was done by using Turku University of Applied Sciences databases and all references appropriately used in the thesis. This literature review follows the code of ethics, regulation and reliability. However, this literature review had some limitations including absence of funding to include price tagged article and time limitation. For this reason, this review covers only freely accessible publications. This restricted the possibilities of covering more topics.

9 DISCUSSION

In this literature review, the author tried to summarize the increase of childhood obesity and health consequences. The purpose of this review was to find out the current situation regarding childhood obesity and associated problems. The topic had two parts: childhood obesity and problems associated with childhood obesity. It also answered basic questions regarding childhood obesity. The aim of this bachelor thesis was to create awareness among children and parents. Additionally, it will be used as a guide in Terveystietä for families as an educational material. Overall, there are certain medical and psychological comorbidities associated with childhood obesity that have been fairly well established in the literature.

Genetics influences the chances of becoming obese in children. This entails that a higher degree of obesity in parents is associated to a higher risk of obesity in their children. On the other hand, the number of children spending their time sitting in front of the TV or playing on electronic games has increased during recent years even among the toddler age group. Participating in physical activity is very important for children and teens, and it has beneficial effects on body weight, blood pressure and bone strength.

Medically, according to WHO, childhood obesity is related with chronic health issues that can lead to early morbidity in adolescence, such as early sign of cardiovascular diseases (CVD), hypertension, impaired insulin sensitivity, including some types of cancer (kidney cancer, colorectal cancer and oesophageal cancer). Additionally, over the past years, there has been an alarming increase rate in the appearance of T2DM in children, a disease that previously occurred almost exclusively in adults, and this leads to long-term health consequences. Children who are obese are more likely to have cardiovascular risk factors resulting in cardiac structural and hemodynamic alterations including hypertension.

Psychologically, many studies in this review reported that obesity is associated with psychological problems such as low self-esteem, depression, poor academic performance and bullying in children.

Overweight and obesity, as well as their related non-communicable diseases, are preventable. Consequently, good strategies for preventing overweight and obesity in

children are crucial. This includes increased physical exercise and improved nutrition; limiting the consumption of sugar-sweetened beverages; consuming fruits and vegetables; limiting television and screen time to less than 2 hours per day; eating breakfast daily; limiting fast food; encouraging family meals and limiting food portion size are helpful to manage obesity in children

Life style modifications are necessary to prevent childhood and adolescent obesity. Exercise programs with a dietary modification are effective for children to maintain a healthy weight. In addition to this, Educating parents and children about the healthy life style and the consequences of the health issues can reduce childhood obesity.

Finally, future research should focus on creating awareness among parents and their children about the adverse childhood obesity health consequences because that helps to reduce the increasing number of obese children all over the world. Parts of the challenge with this topic area are that there are so many potential comorbidities of childhood obesity. This means that a lot of factors can interact at different levels in order to give rise to childhood obesity health problem. Hence, its management should also take into consideration all of these factors. Moreover, studies on genetic factors contributing to childhood obesity are far less as compared to studies on behavioural and environmental factors contributing to childhood obesity. Hence, there is a need to support and encourage more research on the genetics factors contributing to childhood obesity.

10 CONCLUSION

In conclusion, childhood obesity is a complex disorder and leads to various types of problems. It has significant impact on physical and psychological health status of children and leads to an increased risk of morbidity and mortality later on their life such as early cardiovascular disease, Type 2 diabetes, hypertension and many more diseases. Nowadays, it is becoming a serious public health concern all over the world.

1. Educating parents and children about the healthy life style and the consequences of the health issues can reduce childhood obesity. It is obvious that trying to prevent obesity would be more logical and worthwhile than to treat its complications, and prevention should be the primary goal.
2. Healthy life style, physical activity, behavioural and environmental approaches can be used for the prevention and treatment of childhood obesity. This intervention can help children to adopt the healthy life styles and prevent themselves from long-term health illness.
3. Finally, it is very crucial for parents to have information about the adverse health issues behind childhood obesity. They have to encourage their children to follow healthy life styles, including balanced diet, out door activities, exercises, etc. which prevent their children from obesity-related health problems.

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Table 4: Summary of research articles

Author, Country, Year	Aim	Research design, (Data collection)	Results	Quality

Rankin et al UK 2016	To establish what has recently changed in relation to the common psychological consequences associated with childhood obesity	Systematic review	The result shows that childhood obesity was negatively associated with psychological comorbidities. Physical activity and healthy diet could benefit obese children specifically in overall school achievement.	High level
Kumar and Kelly, 2017	Determining the cause of weight gain and assessing for comorbidities resulting from excess weight in children.	Review	Lifestyle interventions have shown only modest effect on weight loss, particularly in children with severe obesity	Medium level
Kar and Kar 2015, India	Potential interventions to reduce the burden of obesity in India.	Review	Behavioural changes, diet control, and physical activity being the core interventions.	Medium Level
Yanovski, 2015 USA	Assessing epidemiology, consequences, and etiopathogenesis of paediatric obesity.	Review		High level
Guinhouya, 2012 France	Analyse contributing factors or influences of habitual physical activity of children, and on how these contributors can be used in designing and developing successful prevention.	Systematic review	The development of motor skills may be a good means for enhancing the self-image of obese children.	High level

McHugh 2016, Australia	Explores the causes, results and management strategies of childhood obesity.	Systematic review	Effective preventative and management Programs to be developed Further education of health professionals may be required to provide access, useful and efficacious support to obese patients.	High level
Kalarchian and Marcus, 2012, USA	Focusing on the most common psychiatric comorbidities of childhood obesity including depression, disorder eating and ADHD	Review	Assessing psychiatric comorbidity may be a cause or consequence of childhood obesity	High level
Mehl et al. 2017 Germany	Assessing self-regulation skills that have been found to influence eating behavior and have been linked to the development of obesity.	Cross sectional design N=50	At an early age children of obese parents are generally not in a disadvantaged position. Study showed no attention bias to food cues regardless of being at risk or not.	Medium level

Laurson et al.2014	To examine the simultaneous influence of physical activity, screen time, and sleep duration recommendations on the odds of childhood obesity (including overweight).	Cross sectional study n=674	7-12 years children achieving all three recommendations simultaneously (9.2% of total sample) were the least likely to be obese.	Medium level
Miller et al. 2015	Assessing on sleep–duration associations in child obesity	Systematic review	Understanding the pathways through which poor sleep patterns could increase obesity risk in children may provide novel avenues for intervention.	High level
Sahoo et al.2015 India	Assessing causes of childhood obesity and its consequences	Systematic review	A combined diet and physical activity intervention conducted in the community with a school component is more effective at preventing obesity or overweight.	Medium level

APPENDICES:

