



Civilization diseases in childhood – state-of-the-art literature review

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Abstract

Introduction and Objective. Civilization diseases are widespread in the adult population. However, their occurrence has been increasing recently in children. The aim of this review is to introduce the most common diseases and present their diagnosis and treatment methods.

Review Methods. The review is based on scientific publications in PubMed, Google Scholar, Wiley Library, Web of Science, and NCBI databases. Over 95% of the articles are less than eight years old. The languages of articles were mainly English (97.5 %) and Polish (2.5%). After initial evaluation of the articles, meta-analyses and reviews considering civilization diseases in childhood were selected. Publications were analyzed using the non-systematic review method with the intention of producing a short synthesis of the available information. Mainly developed countries were covered by the analysis.

Brief description of the state of knowledge. The review shows an increasing prevalence of type 2 diabetes, obesity, dental caries, and hypertension in the paediatric population. This is associated with lifestyle changes, improper nutrition, and decreased physical activity in children. There is also a higher incidence of mental illnesses in the child population. The main factors contributing to this increase are unhealthy lifestyle, lack of sleep hygiene and education, and lack of mental health education.

Conclusions. Civilization diseases are no longer the leading cause of adult morbidity but are increasingly occurring in children. Prevention of civilization diseases is much more beneficial for children. Early detection of the civilization disease is crucial for the subsequent well-being of the child. Rapid treatment and education of the patients and their families are essential to avoid complications. Paediatricians should be aware of their occurrence and aim to actively prevent them.

Key words

obesity, civilization diseases, childhood, Mental health disorders

INTRODUCTION AND OBJECTIVE

Civilization diseases, to a large extent, are linked to the global economic situation, children's lifestyle and their diet. One of the most common diseases of the 21st century is simple obesity, which affects many young people and threatens their health and life. It predisposes to obesity in adulthood and many subsequent diseases, such as hypertension and cancer [1]. Lifestyle is considered the primary factor playing a considerable role in the development of civilization diseases. Educating the public can significantly reduce the incidence of another disease – caries. Diabetes-related caries has been recognized as an epidemic. A lack of basic knowledge about healthy eating habits leads to numerous complications related to this disease. It is a metabolic disease of various etiologies, influenced by genetic factors and an unhealthy lifestyle. The development of many civilization diseases is caused by a diet rich in processed products, as well as a high intake of salt and sugar. Nowadays, more and more children spend their free time on the telephone and computer, while their active participation in sports activities is decreasing. This leads to increased body weight and consequent diabetes and hypertension. Troubled relationships with parents

and peers harm the mental health of young patients and many children visit a psychiatrist due to anxiety disorders, depression, or neurosis. The most dangerous mental illness in children is addiction with younger and younger children turning to cigarettes or alcohol. This rapid immersion in stimulants leads to numerous risks for the digestive system (gastro-oesophageal reflux disease, constipation, diarrhea, or stomach ulcers). The incidence of lung, stomach, and intestinal cancers is increasing annually. It is worth emphasizing that the increased incidence of civilization-related diseases has enormous social costs, and the money spent on diagnostics and treatment of young patients incurs vast losses [2, 3].

The aim of this review is to provide information on the civilization diseases occurring in the paediatric population, as well as potential methods for their diagnosis and treatment.

REVIEW METHODS

The review is based on scientific publications in PubMed, Google Scholar, Wiley Library, Web of Science, and NCBI databases. Over 95% of the articles are less than eight years old, and the languages of articles were mainly English (97.5 %) and Polish (2.5 %). After initial evaluation of the articles, meta-analyses and reviews considering civilization diseases in childhood were selected. Publications were analyzed using the non-systematic review method with the intention of

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producing a short synthesis of the available information. The countries Mainly developed countries were covered by analysis in the review. The age of respondents was between 0–18 years.

DESCRIPTION OF THE STATE OF KNOWLEDGE

Obesity. Obesity is an increasingly common problem in the paediatric population. According to the World Health Organization (WHO), about 5.6% of girls and 7.8% of boys aged 5 – 19 are obese worldwide. In Europe, this ratio totals about 5% of girls and 10.1% of boys [4]. According to these figures, it is clear that there is a worldwide phenomenon known as the ‘obesity epidemic’ [4, 5]. Many factors cause obesity in children, including the mother’s diet during pregnancy, and the occurrence of hyperglycaemia and gestational diabetes. Abnormalities in this regard contribute to glucose imbalance in the foetus and its hypertrophy, which leads to weight gain [6]. According to Sanchez et al., maternal obesity during pregnancy also has a significant impact on the neurological development of the child. Children of obese mothers were significantly more likely to be diagnosed with ADHD, autism spectrum disorders, and developmental delays than the children of healthy pregnant women [7]. Another factor is the feeding of newborns with modified milk instead of breastfeeding. Modified milk has a consistently higher protein content than breast milk, and parents often overfeed their newborns and add additional substances, such as flakes, to the modified milk [6,8]. Consuming too many calories in sweetened beverages and fatty meals contributes to weight gain in children. In addition, obese children have a higher incidence of caries than their peers with lower body weight [6, 9]. It is worth adding that nowadays, physical activity in children is decreasing, with many of them spending their free time watching TV or playing computer games in a sedentary lifestyle. Studies have shown that spending more than 2 hours a day watching TV contributes to the development of obesity and also lowers children’s self-esteem and social skills [6, 10].

Obese children struggle with many problems in their lives. The quality of their sleep is significantly reduced compared to their peers with average body weight [6, 11]. They have an increased risk of developing type 2 diabetes, obstructive sleep apnea, asthma, hypertension, and non-alcoholic fatty liver disease. Obesity also affects the psyche of children. Children with an elevated BMI are more likely to be diagnosed with depression and eating disorders [12].

Childhood obesity has a significant impact on adult life. Bad eating habits acquired at home and the lack of physical activity affect the psyche and health in adulthood [6,11]. Young adults who were obese as children have an increased risk of colon, endometrium, ovary, and breast cancer, they are additionally at a higher risk of heart attack and stroke [13]. This means that public money spent on the health care of patients with obesity is twice as high as in patients with average body mass [14].

The world is striving to stop the ‘obesity epidemic’. For this reason, various educational campaigns have drawn attention to healthy lifestyles, proper nutrition, and the need for physical activity. Paediatricians and school teachers conduct health education and, if every country; so far, it has been introduced mainly in the developed countries. It is worth noting that the intervention should address not only

the lifestyle of the child, but the whole family. The child’s diet should consist mostly of vegetables, fruits, dairy, meat, and whole grains, and they should not consume simple sugars and highly processed products. Physical exertion should be adapted to the child’s age, and should preferably consist in aerobic exercise. An experienced trainer must supervise the course, as well as set goals and tasks for the child to achieve [6, 11].

If the behavioural methods fail and the child’s body weight increases, a doctor may prescribe medication or refer the child for bariatric surgery. Pharmacological treatment is recommended for children with BMI >30 kg/m² and over 16 years of age. This includes substances that affect glucose metabolism and distribution, such as orlistat, acarbose, metformin, and recombinant leptin [6]. Studies have shown that these drugs reduce the patient’s weight to a small extent, averaging about 1 kg/m², but also have gastrointestinal side-effects [15].

Surgery is performed when the child’s BMI exceeds 40 kg/m² or when it is higher than 35 kg/m² and there are comorbidities (such as type 2 diabetes or hypertension). Children must reach the Tanner Scale of 4 or 5 and be at the end of their physical development [6,11,13]. Although this method of treatment has excellent results, it also has many side-effects, including malabsorption syndromes, postoperative wound infection, malnutrition, and deep vein thrombosis [16].

It is essential to prevent obesity in the youngest children, which will significantly facilitate their entry into adulthood.

Hypertension. Hypertension is one of the leading civilization diseases in adults, and in the USA the incidence ranges from 0.3% – 4.5% in the paediatric population [17]. Hypertension in children is diagnosed when the mean values of the two measurements exceed the 90 percentile of the norm for height, gender and age, measured by a sphygmomanometer in a physician’s office. In Europe, adult blood pressure values are applied for patients aged 16 years or more, with an upper limit of 140/90 mmHg [18].

Obesity, a high-sodium diet, and lack of physical activity are the main factors that increase the risk of primary hypertension in children. The causes of secondary hypertension include kidney disease, aortic coarctation, adrenal disease, and some medications [19, 20]. Hypertension is insidious because its course can lead to organ complications, such as left ventricular hypertrophy, renal failure, or hypertensive retinopathy. Worse still, it is a disease that often goes undetected [19].

A vital element in the prevention of hypertension is the early detection of the disease and the early initiation of treatment. In addition, every child should be checked for the secondary causes of the disease. In the case of obesity-related hypertension, a low-sodium diet, exercise, and patient education are recommended. The pharmacological treatment of hypertension in children consists of ACEI, ARB, and calcium channel blockers. Secondary hypertension is treated by addressing the underlying disease [19,20]. Hypertension in children predicts hypertension in adults, and increases the risk of cardiovascular events in adulthood [19].

Diabetes Mellitus. In the diagnosis of diabetes, several types of the disease are distinguished, divided into type 1 and type 2 diabetes. Type 1 diabetes is more common in children. Its symptoms increase rapidly and are associated with too high

blood glucose levels. They include polydipsia, polyuria, and general weakness. Often, the first manifestation of the disease is ketoacidosis, which can be life-threatening. The main etiological factor is the body's autoimmune response against the pancreatic antigens. Anti-pancreatic antibodies destroy the beta cells of the pancreas that produce insulin, leading to the lack of insulin in the body. In developed countries, this disease usually occurs sporadically [21]. However, its incidence in children aged 1 – 7 years has increased recently. Treatment of type 1 diabetes is based mainly on insulin therapy, using insulin pumps and sensors measuring blood glucose around the clock. Maintaining a proper diet for the child from the onset of the disease is also essential. This treatment is necessary from the onset of the illness until the end of life. A trained adult healthcare professional should supervise the treatment of the child [22].

Disease monitoring involves measuring blood glucose levels and HbA1c levels, which should be lower than 6.5%, and monitoring glucose management over three months. It is essential to look for organ complications, such as maculopathy, neuropathy, or kidney failure from the early stage of the disease [22, 23].

Children with type 1 diabetes experience different problems, including psychological problems, during the treatment. Diagnosing type 1 diabetes involves a change in the lifestyle of the whole family. Fear of hypoglycaemia is common among both the parents and their children. Children with type 1 diabetes may have learning difficulties at school, and disrupted sleep because of the need frequent insulin injections or measuring blood glucose levels during the night. The diagnosis of diabetes must include psychological care of the family [22, 23, 24, 25].

Children with type 1 diabetes must have an adequate amount of activity with the recommendation to perform about one hour of aerobic exercise per day. It is important to remember that although exertion may lead to hypoglycaemia, it positively affects the body's glucose metabolism [23, 24].

Type 2 diabetes in children has become more common in recent years [26]. A vital disease mechanism is tissue insulin resistance leading to elevated blood glucose. The main factors leading to type 2 diabetes include obesity of the child and factors related to the foetal period, such as obesity and the mother's diet, as well as infant nutrition. Adolescence changes the body's insulin management and increases the risk of type 2 diabetes [27, 28].

Blood glucose test or the OGTT test can be used to diagnose type 2 diabetes. What is important is the lack of anti-pancreatic antibodies in the blood, which would qualify the patient for type 1 diabetes [28, 29].

Type 2 diabetes is treated in children mainly with lifestyle changes and weight loss. It is vital to introduce a diet with a low glycaemic index, as well as physical activity. Pharmacological treatment includes metformin, GLP-1 agonists, and SGLT-2 inhibitors. If the patient is obese, bariatric surgery may be considered. Treatment of the disease is monitored in the same way as for type 1 diabetes [28]. The main complications of type 2 diabetes are hypertension, kidney failure, non-alcoholic fatty liver, polycystic ovarian syndrome, and retinopathy. Patients may also experience fertility problems [28, 30]. Early diagnosis of type 2 diabetes is important because an appropriate intervention can prevent further complications of the disease.

Mental health disorders. Mental health diseases among children have become an increasingly prevalent issue in modern society. With the rise of digital technology and the stresses of modern life, such as sleep deficiency, growing up in non-full families, and disturbed relationships with parents, many children experience mental health disorders such as depression and anxiety. These disorders can significantly impact a child's development and lead to long-term consequences if left untreated. As such, mental health diseases in children have become a civilization disease that requires urgent attention and action [31–33].

Depression and anxiety are the two most common mental health diseases among children. Studies have shown that these disorders are on the rise, with more and more children experiencing symptoms. Sleep deprivation is one of the factors linked to the development of health disorders in adolescents. Sleep plays a critical role in a child's physical and psychological development, and the lack of sleep can profoundly impact their well-being. The importance of sleep in children cannot be overstated. Studies show that almost a quarter of children and teenagers do not get enough sleep; one in four report sleeping less than six out of nine hours. Insufficient sleep can be associated with the influence of evening-type circadian phase preference, electronic media and blue screen light, stress, caffeine, or modern society lifestyle. Suggested time of sleep changes depending on children's age: 14–17 hours for newborns, 10–13 hours for preschoolers, and 8–10 hours for teenagers. [31, 32]

Furthermore, studies reported that older students suffer more from altered sleep duration. With age, the biological clock of young people tends to shift toward night hours rather than daytime. With increasing age, decreased sleep duration patterns are observed in the early school hours. Many adolescents attempt to reduce their sleep debt on weekends. However, chronic sleep loss cannot be compensated by oversleeping up to a few more hours on free days. Students who are more exposed to parental pressure can be more affected by mental health diseases caused by sleep loss. A good relationship between parents and children has important health implications by decreasing stress levels. Studies show that sleep deficit can affect obesity risk, asthma morbidity, anxiety, depression, and psychological stress. It can also impact adolescents' social life (early alcohol use, suicidal thoughts). Sleep deficiency is also linked to behavioural problems, poor academic performance, and an increased risk of accidents and injuries. Parents and caregivers should prioritize sleep hygiene for children, including maintaining a consistent sleep schedule, creating a calm and comfortable sleep environment, and limiting screen time before bed [31, 33].

Nowadays, children grow up in an electronic age. Although digital technology has many benefits, including increased connectivity and access to information, it can also negatively affect a child's mental health. Media use may cause increased sleep loss and disturb children's psychological arousal. This may be due to the social isolation and disconnection resulting from spending too much time on digital devices. A study found that children who spent more than two hours daily on their smartphones had a higher risk of developing mental health disorders. The most significant impact on the problem between phone usage and mental health is not the usage of smartphones, but particular associated patterns of usage. Children are more vulnerable to becoming addicted to smartphone use. Behavioural addiction can cause anger,

depression, inappropriate reactions, or emotional crises. Problematic smartphone usage, associated with symptoms such as anxiety without a phone or neglecting other activities, can have the following outcomes: poor sleep quality, depressed mood and anxiety. The importance of sleep for children cannot be overstated.

Objectively speaking, inappropriate data found online can also impact young people's mental health. Fictional characters or pathological celebrities becoming role models with an impact on young people can disturb their relationship with their parents and themselves, leading to body dysmorphia and eating disorders.

The blue light emitted by smartphones can disrupt the circadian rhythm by suppressing melatonin release. This can result in the inability to fall asleep at a reasonable time. Studies show that after playing video games before sleep, children tend to have shorter REM sleep due to the brightness of screens. As an effect, they are in sleep debt, despite sleeping the recommended amount of time. Setting limits on screen time can help mitigate the negative effects of excessive smartphone use. By encouraging physical activity and social interaction and modeling healthy digital habits, parents and caregivers can decrease the time spent by children in front of the screen. It is also important for parents to monitor their child's digital activity and to have open and honest conversations about the risks and benefits of digital technology [31–34].

The environment in which children grow up has a huge impact on their mental health. There are suggestions that positive effects may be the end product of pathways that link several elements, such as reduction in air pollution or traffic noise and restoration, whereby attributes of the physical environment, such as greenness, may promote physical activity, social capital, and cohesion. Children raised far from urban noise are less likely to be stressed by environmental pressures. On the other hand, there is rapidly growing research on the connection between depression and the risk of cardiovascular diseases among children and adolescents. Studies show that chronic stress can be a risk factor for depression. Furthermore, there is a hypothesis that inflammatory pathways can be associated with cardiovascular diseases and be a factor in premature death. Are children raised in cities more affected by mental health diseases? There are more risk factors, but further research is necessary. Urban life has benefits, but an unhealthy lifestyle, easy access to fast food restaurants, and a poor social environment can impact developing modern world civilization diseases [35–37].

Another factor linked to mental health disorders in children is growing up in non-full families, such as single-parent households or households with absent parents. Children who grow up in non-full families may experience greater stress, anxiety, and emotional instability, increasing their risk of developing mental health disorders. Separation and divorces are more common nowadays, and studies found that children who experienced parental separation had a higher risk of developing mental health problems. While growing up in a non-full family is not a guarantee of developing a mental health disorder, it is important for parents and caregivers to be aware of the potential risks, and to provide additional support and resources to children in such situations. This may include seeking counseling or therapy, connecting with community resources, and creating a stable and supportive home environment.

The COVID-19 pandemic has also changed children's growth environment. Isolation was a huge potential stressor that could affect their mental health [36,38–40].

Focus must be placed on early detection and intervention to help children overcome these challenges and to thrive. Raising awareness and investing in resources and support can ensure that every child has the opportunity to reach their full potential.

Respiratory disease. In adults, chronic obstructive disease is one of the primary civilization diseases of the respiratory system. It does not occur in children because its main etiological factor is long-term cigarette smoking [41].

Asthma is a common disease in both adults and children and its incidence has been increasing recently. Factors influencing the occurrence of the disease are air pollution, exposure to allergens and tobacco smoke, stress, and obesity. Asthma can also occur in the family [42]. The primary confirmatory test is spirometry with a challenge test. For younger children, the disease diagnosis is mainly based on examination of the child and an interview with the parent [43]. The main symptoms of asthma are wheezing and breathing difficulties. Glucocorticosteroids, beta2-mimetics and biologics, such as omalizumab, are primary mediators in treatment of the disease.

Asthma can be severe. It occurs mainly in the form of severe exacerbations of symptoms. An untreated asthma attack can even result in death; therefore, diagnosing the disease early and implementing treatment as soon as possible is crucial [44].

Dental caries. Caries are one of the most common diseases in children. Nearly 54% of children have caries on permanent teeth, and about 46.2% on milk teeth [45]. The leading causes of the disease are non-brushing of teeth, a poor diet rich in simple sugars, intake by children of medicines in the form of sweet syrups, low production of saliva, and failure of parents to take care of proper oral hygiene of their children [46]. The main diagnostic examination is a dental examination. To prevent the disease, children should brush their teeth after every meal, have a proper diet, and fluoridation of the teeth. Dental treatment is recommended if the examination confirms a cavity in a tooth [47].

CONCLUSIONS

The review of state-of-the-art literature in databases such as PubMed, Google Scholar, Wiley Library, Web of Science and NCBI, established that even though civilization diseases are no longer the leading cause of adult morbidity, they have become an urgent problem in the paediatric population. Type 2 diabetes, obesity, hypertension and mental illnesses, which were found sporadically in this population in the past, have been reported to occur more and more frequently in children over the course of recent years and decades. Studies have shown that civilization diseases carry an increasing number of complications that significantly worsen the quality of life in children, and, subsequently, young adults. These complications are also believed to blur the clinical picture of the underlying diseases and, therefore, impose a different approach to the patient by paediatricians.

Different meta-analyses and reviews indicate that behavioural intervention is a crucial step that improves the state of the

Table 1. Comparison of factors, diagnostics, treatment and complications

Civilization disease	Factors indicating	Diagnostics	Treatment	Complications
Obesity	<ul style="list-style-type: none"> mother's diet during pregnancy gestational diabetes maternal obesity feeding of newborns with modified milk sweetened beverages and fatty meals low physical activity 	<ul style="list-style-type: none"> BMI>30 kg/m² 	<ul style="list-style-type: none"> healthy lifestyles proper nutrition physical activity pharmacological treatment bariatric surgery 	<ul style="list-style-type: none"> type-2 diabetes, obstructive sleep apnea asthma hypertension non-alcoholic fatty liver disease depression eating disorders increased risk of colon, endometrium, ovary, and breast cancer higher risk of heart attack and stroke.
Hypertension	<ul style="list-style-type: none"> Obesity high-sodium diet lack of physical activity 	<ul style="list-style-type: none"> increased blood values 	<ul style="list-style-type: none"> low-sodium diet exercise patient education pharmacological treatment 	<ul style="list-style-type: none"> left ventricular hypertrophy renal failure hypertensive retinopathy
Diabetes Mellitus type 1	<ul style="list-style-type: none"> autoimmune response 	<ul style="list-style-type: none"> anti-pancreatic antibodies in the blood hyperglycaemia 	<ul style="list-style-type: none"> insulin therapy 	<ul style="list-style-type: none"> maculopathy neuropathy kidney failure
Diabetes Mellitus Type 2	<ul style="list-style-type: none"> obesity 	<ul style="list-style-type: none"> OGTT hyperglycaemia 	<ul style="list-style-type: none"> lifestyle changes weight loss pharmacological treatment 	<ul style="list-style-type: none"> hypertension kidney failure non-alcoholic fatty liver polycystic ovarian syndrome retinopathy fertility problems
Mental diseases	<ul style="list-style-type: none"> digital technology sleep deficiency growing-up in non-full families disturbed relationships with parents 	<ul style="list-style-type: none"> psychological diagnostics 	<ul style="list-style-type: none"> prioritise sleep hygiene for children spending less time using blue screen electronics devices early intervention pharmacological treatment 	<ul style="list-style-type: none"> obesity risk asthma morbidity anxiety depression psychological stress poor academic performance
Asthma	<ul style="list-style-type: none"> air pollution exposure to allergens and tobacco smoke, stress, obesity 	<ul style="list-style-type: none"> spirometry with a challenge test younger children: interview with patents 	<ul style="list-style-type: none"> pharmacological treatment 	<ul style="list-style-type: none"> exacerbations of symptoms
Dental caries	<ul style="list-style-type: none"> non-brushing of teeth a poor diet rich in simple sugars failure of parents to take care of proper oral hygiene of their children low production of saliva 	<ul style="list-style-type: none"> dental examination 	<ul style="list-style-type: none"> dental treatment brush teeth after every meal fluoridation of teeth 	

patient in most of the discussed diseases, which also includes lifestyle education of the child and family. It is conclude that early diagnosis and treatment, as well as patient education and psychological support (especially in the case of mental illnesses), is essential for avoiding complications and improving the quality of life in children with civilization diseases.

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