SELECTED RISK FACTORS FOR ATHEROSCLEROSIS (TOBACCO CONSUMPTION, OBESITY, DIABETES MELLITUS) AND THEIR TRENDS IN POLAND OVER 20 YEARS

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Aim *The aim of the study was to analyze three risk factors of atherosclerosis - tobacco consumption, obesity, diabetes mellitus and their trends in Poland over 20 years (2000-2019).*
Material and methods *Data from OECD statistics online database was used.*
Results *Increase of deaths caused by diabetes mellitus in years 2000-2018, increase of self-reported obesity in years 2004-2017 and decrease in tobacco consumption in years 2001-2019 (decrease of percent of population aged 15+ who are daily smokers).*
Conclusion *Reducing risk factors for atherosclerosis is crucial for reducing the development and progression of the disease. Reduction of risk factors should be addressed by social campaigns, health promotion, preventive measures and education.*

Key words: *atherosclerosis, diabetes mellitus, tobacco smoking, obesity, prevention*

Introduction

Atherosclerosis is multifactorial disease. There are certain lifestyle factors that are linked to increased risk of developing atherosclerosis, such as unhealthy diet, tobacco smoking, lack of physical activity. Also, some diseases are considered to be risk factors for atherosclerosis – diabetes mellitus, hypertension and hyperlipidemia. All of above mentioned are modifiable risk factors. Non-modifiable risk factors include family history of atherosclerosis, older age and South Asian descent [3, 10].

In this article we will analyze selected risk factors - tobacco consumption, obesity, diabetes mellitus and their trends in Poland over 20 years (2000 - 2019).

Material and methods

We used the data from OECD statistics online database. Moreover, we searched for the scientific articles in PubMed. Search terms such as "obesity, diabetes mellitus, atherosclerosis, tobacco, smoking, risk factors" were used. Articles describing obesity, diabetes mellitus and tobacco consumption were found and studied.

The aim of the article was to analyze the trends of selected risk factors for atherosclerosis (tobacco consumption, obesity, diabetes mellitus) in Poland over time.

Results and discussion

Diabetes mellitus

Dysglycemia is a major risk factor for development of coronary artery disease. Hyperglycemia affects blood vessel function directly, but it also has indirect effects – it modifies the response to other cardiovascular risk factors – e.g., hypertension, hyperlipidemia.

Hyperglycemia has such strong effects, that even slight deviations in blood glucose levels show increased risk of development of cardiovascular diseases. Nevertheless, the higher the glycaemia, the higher the risk [16].

Diabetes mellitus increases the risk of development of heart failure, and they often coexist [4, 20]. Studies have shown that patients with coexisting diabetes and heart failure have increased risk of mortality in comparison to non-diabetic patients with heart failure. Heart failure is most caused by ischemic heart disease, which in turn is caused by coronary artery atherosclerosis. Diabetes interferes with renal and cardiac function, thus increasing mortality in patients with heart failure [21].

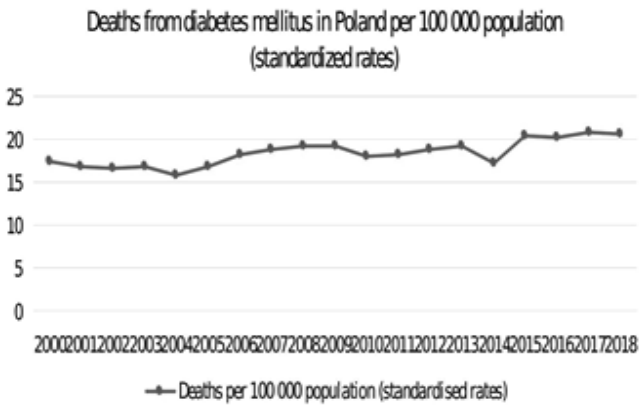
In 2019, Topor-Madry et. al. published an article about prevalence of diabetes in Poland. They estimated that the number of people with diabetes in Poland was 2.16 million in 2013, which accounts for 5.65 % of the population at the time [17].

In Table 1 we collected data about deaths from diabetes mellitus in Poland in years 2000-2018. It shows increasing trend over the years, starting at 17.4 deaths per 100000 in 2000 and increasing up to 20.7 deaths per 100000 in 2018 [12].

Table 1 Deaths from diabetes mellitus in Poland per 100 000 population in years 2000-2018 [12]

Year	Deaths from diabetes mellitus in Poland per 100 000 population (standardized rates)
2000	17.4
2001	16.8
2002	16.7
2003	16.8
2004	15.9
2005	16.9
2006	18.2
2007	18.8
2008	19.2
2009	19.2
2010	18.0
2011	18.3
2012	18.9
2013	19.3
2014	17.2
2015	20.5
2016	20.2
2017	20.9
2018	20.7

Figure 1 Deaths from diabetes mellitus in Poland per 100 000 population in years 2000 - 2018 [12]



Tobacco consumption

The health consequences of tobacco smoke exposure are broadly discussed over the years and its impact on health is widely known. Tobacco smoking is risk factor for numerous diseases – e.g., atherosclerosis, lung cancer, coronary artery disease, stroke, COPD [18, 22].

Second- hand smoking bears similar risks and has countless adverse effects [19].

Tobacco smoke leads to endothelial dysfunction, increased oxidative stress, and increased cardiovascular morbidity and mortality. Study shows that e-cigarette vapor bears similar risks (endothelial dysfunction, increased vascular and cerebral oxidative stress), although it is less toxic than tobacco smoke [9].

Approximately seventy thousand deaths every year are caused by smoking, just in Poland itself [11, 23].

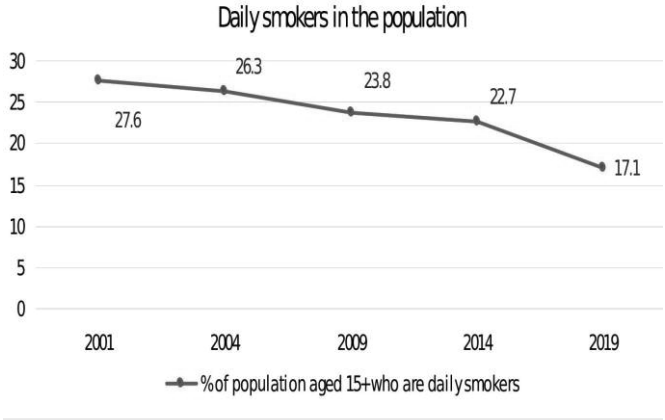
Janik-Koncewicz et al. discussed tobacco smoking in Poland in 2019 and its prevalence by certain sociodemographic characteristics. What they realized is the fact, that in 2019 in both sexes the most crucial factor affecting smoking prevalence in Poland was education. In men, correlation of education and smoking prevalence was inversely proportional - the lower the education level, the higher the prevalence of smoking. In women, the pattern was slightly different – the highest prevalence of smoking was recorded among women with vocational education. The lowest prevalence was among women with both highest and lowest levels of education [5].

In Table 2 we gathered data about tobacco consumption in Poland in the past years. We analyzed the percent of population aged 15+ who are daily smokers – which shows significant decrease since 2001 until 2019 [13]. Data is also presented in Figure 2.

Table 2 Prevalence of smoking in Poland in years 2001-2019 [13]

Year	2001	2004	2009	2014	2019
% of population aged 15+ who are daily smokers	27.6	26.3	23.8	22.7	17.1

Figure 2 Prevalence of smoking in Poland in years 2001 - 2019 [13]



We can notice that the drop after year 2014 is more significant than in other years. This drop, in regards of timing, correlates which introduction of picture and text warnings on tobacco products, which by the decision of European Commission was adopted by year 2016. European Union countries were obliged to modify tobacco products packages, so that the warnings covered 65 % of the front and back of the packages [2].

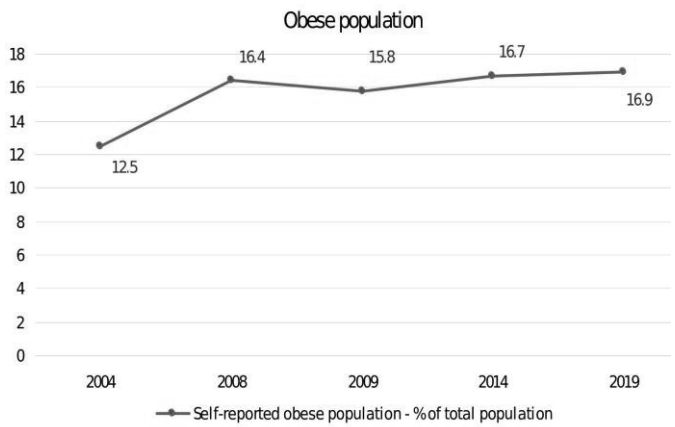
Obesity

Obesity is another risk factor, which shows increasing tendency. In the data gathered by OECD the percent of obese population (self-reported) in Poland in 2004 was 12.5 %, 16.4 % in 2008, 15.8 % in 2009, 16.7 % in 2014 and 16.9 % in 2017 [14]. Obesity prevalence in Poland in years 2004 - 2017 is presented in Table 3 and Figure 3.

Table 3 Obesity prevalence in Poland in years 2004 - 2017 [14]

Year	2004	2008	2009	2014	2017
Self-reported obese population - % of total population	12.5	16.4	15.8	16.7	16.9

Figure 3 Obesity prevalence in Poland in years 2004-2017 [14]



Obesity is multifactorial disease, where visceral fat and subcutaneous fat accumulate in an extensive manner. Obesity is risk factor for numerous chronic diseases, atherosclerosis being one of them [6].

Atherosclerosis and obesity share pathophysiological mechanisms. Elevated levels of free fatty acids and oxidized LDL are risk factors for both of mentioned conditions [16]. When studying the pathophysiology of obesity and atherosclerosis, what points out is the fact that adipokine imbalance if often mentioned to be significant factor in their development [1]. Nevertheless, mechanisms such as inflammation, endothelial dysfunction, abnormalities in lipid metabolism, play significant role in development of both obesity and atherosclerosis as well [7].

Study shows that different adipose tissue locations have different characteristics and effect. While adipose tissue in upper back and neck was found to be sensitive to glucocorticoids, adipose tissue in the breast and buttocks was estrogens sensitive. Also, subcutaneous and visceral fat shows its differences – visceral adipose tissue being responsible for secretion of proinflammatory adipokines in higher amount than subcutaneous tissue [25].

Obesity seems to depend on the region. In the study performed between 1993 and 2003 it was more prevalent in eastern parts of Poland. In the same study it showed higher prevalence in female population [8].

In the study run by Magdalena Żegleń et. al. prevalence of obesity and overweight among Polish children and adolescents were analyzed in regards of socioeconomic status. The study group consisted of 3 - 15-year-olds from two cross-sectional surveys (1983 and 2020). Socioeconomic status was established by analyzing the place of birth of the parents, parents' education status and number of children in the family. The results showed that in 1983 obesity and overweight were more prevalent in individuals from families of high socioeconomic status, in 2020 on the other hand it was the exact opposite - obesity and overweight were more prevalent in individuals representing low socioeconomic status [24].

Conclusions

Reducing risk factors is crucial for reducing the development and progression of atherosclerosis. We analyzed selected lifestyle factors – diabetes mellitus, obesity, and tobacco consumption.

In gathered data we observed following trends: increase of deaths caused by diabetes mellitus in years 2000 - 2018, increase of self-reported obesity in years 2004-2017 and decrease in tobacco consumption in years 2001 - 2019 (decrease of percent of population aged 15+ who are daily smokers).

Given the impact of these factors on atherosclerosis, each one of them should be approached individually in terms of their reduction. Social campaigns, advertisements, education, preventive measures should be administered.

Tobacco consumption has been addressed by anti-smoking campaigns – e.g., administering graphic images and warning phrases on cigarette packages since year 2016 in Poland.

Steps like this should be taken and more risk factors should be addressed, as prevention is the key to reduction of atherosclerosis morbidity and mortality.

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We hereby declare that the authors do not have a potential conflict of interest.

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