

The relationship between diet and other elements of lifestyle and the health status of adult high school students

MAŁGORZATA KOZIARSKA-ROŚCISZEWSKA^{1, A-E, G}, KATARZYNA WIŚNIEWSKA^{2, A-F}

¹ Department of Nephrology, Hypertension and Family Medicine, Medical University of Lodz, Poland

² Students' Scientific Association of Family Medicine, Medical University of Lodz, Poland

A – Study Design, B – Data Collection, C – Statistical Analysis, D – Data Interpretation, E – Manuscript Preparation, F – Literature Search, G – Funds Collection

Summary Background. Obesity is one of the main causes of “civilization-related” diseases (diabetes mellitus, hypertension, atherosclerosis). Poor dietary habits can influence health even in teenagers.

Objectives. The aim of the study was to analyze the relationship between the lifestyle and health of adult high school students (18–20 years old) from Lodz.

Material and methods. A group of 106 high school students in Lodz (76 women – 71.7% and 30 men – 28.3%) were enrolled. A questionnaire concerning lifestyle and selected diseases was completed. Anthropometric measurements and physical examination were carried out. BMI and WHR were calculated. In addition, in 35 volunteers out of the respondents blood tests (lipids, glycemia) were done.

Results. BMI was ≥ 25 kg/m² among 19 students (18%). Abnormal waist circumference was observed in 8 (8%) patients, 1 person had abnormal WHR (0.9%). Elevated systolic and/or diastolic blood pressure was observed in 4 students (4%). Elevated total cholesterol was found in 4 respondents (4%), hyperglycemia in the case of 1 person (0.9%). 73 participants (68.9%) attended physical education classes; 62 (58.5%) of them were physically active in their leisure-time.

Conclusions. In the examined group of adult high school students cardiovascular risk factors (excessive body weight, dyslipidemia, hypertension) were observed. Improper dietary habits affect the health status in teenagers. The physical activity of the examined young people seems satisfactory. Most of the high school students participate in physical training at school and spend their leisure-time actively. Preventive methods in young people should include proper diet and the promotion of an active lifestyle.

Key words: obesity, dietary habits, lifestyle, overweight, youth, Young Adult.

Koziarska-Rościszewska M, Wiśniewska K. The relationship between diet and other elements of lifestyle and the health status of adult high school students. *Fam Med Prim Care Rev* 2017; 19(3): 230–234, doi: <https://doi.org/10.5114/fmPCR.2017.69281>.

Background

With the development of civilization, an increasing incidence of metabolic diseases is observed. One of the main causes of this is obesity. Obesity contributes to multiple health pathologies. Fat accumulation has an influence on many conditions leading to the development of atherosclerosis and its serious consequences (e.g. heart attack, stroke). Pathological changes occur in all systems and organs. Lipid abnormalities are more common in obese people. Obesity increases the risk of coronary heart disease leading to, e.g. circulatory insufficiency, as well as to increased death risk [1, 2]. Obesity and diabetes can also coexist with autoimmune diseases, especially Hashimoto's thyroiditis [3]. Metabolic changes that result from excessive body mass can cause damage to the central nervous system (CNS). Overweight and obesity contribute to the development of Alzheimer's disease and Parkinson's disease. Obese people often suffer from diabetes mellitus type 2. Diabetes, in turn, is closely linked to the development of neurodegenerative diseases. The relationship between overweight and insulin resistance (which plays a major role in the development of dementia) may also be a cause of changes in the CNS [4].

Metabolic syndrome, the main criterion for the diagnosis of which is central obesity, is also a risk factor for the development of chronic kidney disease. Overweight and obesity among children and adolescents are conducive to the occurrence of metabolic syndrome, even four times more often than among

children with normal weight. The sooner the patient develops metabolic syndrome, the greater the risk of complications of chronic kidney disease in the future [5].

According to world data, the occurrence of overweight and obesity affects all age groups – adults, children and adolescents. About 107.7 million children and 603.7 adults worldwide were obese in 2015. Obesity among adults is more common than childhood obesity. However, the rate of obesity growth in many countries is higher in children compared to the growth rate of obesity among adults. From the 20 most populous countries, the highest level of adult obesity was observed in Egypt (35.3%), while in the United States the highest level of obese children was observed (12.7%) [6]. According to the results of the European Health Interview Survey (EHIS), in 2014 obese people in Poland accounted for 16.8% of the population aged 15 years and over [7]. This is an increasingly common problem in highly industrialized countries and also in developing ones [6]. Recent research shows that the worldwide rate of death related to high body mass index increased by 28.3% in the 25 years between 1990 and 2015 (from 41.9 to 53.7 deaths per 100,000 people). 70% of these deaths were caused by cardiovascular diseases [6].

Diet and lifestyle have a huge impact on human health. Consuming too many calories and limited physical activity can result in overweight or obesity. In addition to the calorific value of meals, the quality of the products used and the use of alcohol or cigarettes may matter. Proper nutrition means eating the right amount of nutrients with the right energy and nutritional value.



That should maintain proper weight and a normally functioning body. Nutrition must therefore be adapted to the age of the person, sex, physiology, and the type of work performed.

It is important to identify the risk factors and early symptoms of cardiovascular diseases (CVD) at the earliest stage. The presence of certain pathologies is conducive to people leading a worse lifestyle than healthy people lead. Patients treated for cardiovascular events are less physically active, have worse dietary habits, and are more likely than healthy individuals to have addictions [8].

Adequate prophylaxis and treatment are also necessary in young people. Young people should be aware of the risk factors affecting health, and quality and length of life in the future. Physicians should be aware of common health risks in young patients. Young people with overweight and metabolic disorders should be referred to a dietitian. Family physicians should also remember lipid profile control and blood pressure measurement in this group of patients.

Objectives

The aim of the study was to evaluate the lifestyle of adult high school students (18–20 years old) from Lodz and to examine the relationship between the lifestyle and health of the respondents.

Material and methods

The study group consisted of 106 high school students in Lodz (76 women – 71.7% and 30 men – 28.3%).

Inclusion criteria were: 1) age 18–20 years old, 2) being an adult high school student from one of three selected schools in Lodz, 3) patient's consent to participate in the study. Exclusion criteria were: 1) age below 18 years, 2) lack of consent to participate in the study (obligatory part – the questionnaire).

The study included: a questionnaire concerning lifestyle (physical activity, nutrition, alcohol, cigarettes), selected diseases (hypertension, diabetes mellitus type 2, dyslipidemia, overweight, obesity, hyperthyroidism and hypothyroidism), medication and anthropometric measurements. Body mass index – BMI (BMI = body mass [kg]/body height²[m]) and waist-hip ratio – WHR (WHR = waist circumference [cm]/hip circumference [cm]) were calculated. Blood pressure (BP) was measured with

the use of the Korotkov technique, 2 measurements in each participant, mean was calculated. Measurements were made in the sitting position after 5 minutes of rest.

In 35 volunteers out of the respondents, total cholesterol (CHOL), HDL, triglyceridies (TG) and glycemia were marked. The level of LDL cholesterol was calculated with the Friedewald formula (LDL cholesterol = CHOL - (TG/5 + HDL) [9].

All 106 patients agreed to participate in the questionnaire and anthropometric measurements. 35 of them consented to a blood test.

The collected data were statistically analyzed using the STATISTICA 10.0 package. Conformity of distribution of quantitative variables with normal distribution was tested using the Shapiro–Wilk W test. The assumption of homogeneity of variance was checked using Levene's test. For analysis of the interdependencies of variables Student's *t*-test, ANOVA, the Mann–Whitney U test, Analysis of Variance (ANOVA), the Kruskal–Wallis test and Spearman correlation were utilized. *P*-value ≤ 0.05 was assumed as significant in all conducted tests. Table 1 (in the Results section) contains the *p*-value for the normal distribution test (Shapiro–Wilk test). If *p*-value > 0.05, the variable had a normal distribution; if *p*-value ≤ 0.05 – the distribution was not consistent with the normal distribution.

The study was approved by the Ethical Committee of the Medical University of Lodz.

Results

The study group consisted of 76 women (71.7%) and 30 men (28.3%). BMI ≥ 25.0 kg/m² was reported in 17.2% of the subjects, abnormal waist circumference (according to the International Diabetes Federation (IDF) 2006 and the Polish Forum for Prevention (PFP) consensus 2009 – women ≥ 80 cm, men ≥ 94 cm – 7.5% and abnormal WHR (women ≥ 0.85, men ≥ 0.9) – in 0.9% of the subjects [10, 11]. Abnormal systolic and/or diastolic BP values (≥ 130/85 mm Hg) were found in 3.8% of the subjects [11].

Out of the 35 participants who agreed to take part in the laboratory tests, elevated CHOL serum concentration was found in 3.8% of subjects, and abnormal LDL in 1.9%. All participants had normal TG and HDL plasma cholesterol. Glycemia above the reference values was reported in 0.9% of the subjects. The descriptive characteristics of the examined group are summarized in Table 1.

	<i>n</i>	Average	Median	Min	Max	SD*	<i>p</i> **
Age (years)	106	18.5	18.0	18.0	20.0	0.6	< 0.001
Weight (kg)	106	63.2	60.3	30.0	110.6	14.0	< 0.001
Growth (m)	106	1.7	1.7	1.5	1.9	0.1	0.3720
Waist circumference (cm)	106	72.6	70.5	50.0	100.0	9.7	< 0.001
Hip circumference (cm)	106	97.7	96.0	70.0	125.0	8.6	0.0268
BMI (kg/m ²)	106	21.6	21.2	13.0	33.9	3.5	0.0073
WHR	106	0.7	0.7	0.6	0.9	0.1	0.0010
Systolic BP (mm Hg)	106	111.9	110.0	90.0	160.0	13.2	0.0040
Diastolic BP (mm Hg)	106	66.9	65.0	50.0	90.0	8.1	< 0.001
CHOL (mg/dl)	35	161.3	161.0	122.0	220.0	22.5	0.4901
TG (mg/dl)	35	77.8	70.0	39.0	144.0	27.6	0.0035
HDL (mg/dl)	35	62.5	63.0	45.0	80.0	9.3	0.6700
HDL%	35	39.5	39.0	25.0	58.0	7.4	0.2527
LDL (mg/dl)	35	83.6	84.0	45.0	150.0	22.1	0.4156
Glycemia (mg/dl)	35	85.1	85.0	74.0	99.0	6.4	0.5491

*SD – standard deviation, **Shapiro–Wilk test, BMI – body mass index, WHR – waist-hip ratio, BP – blood pressure, CHOL – total cholesterol, TG – triglycerides, HDL – HDL cholesterol, LDL – LDL cholesterol.

Table 2. Dependence between values of laboratory parameters and features of examined persons – *p*-value

	CHOL	TG	HDL	LDL	Glycemia
Sex (W vs M)	0.6318*	0.2420 [#]	0.0791*	0.3403*	0.2411*
Participation in PE classes (yes vs no)	0.3242*	0.6206 [#]	0.5400*	0.6107*	0.5433*
Physical activity apart from PE classes (yes vs no)	0.2796*	0.9340 [#]	0.1924*	0.0944*	0.2900*
Number of meals per day (< 2 vs 2–3 vs > 3)	0.6662**	0.1548 ^{##}	0.0994**	0.3406**	0.5975**
Frequency of sweets consumption per week (1–2 vs 3–5 vs 7)	0.7990**	0.1981 ^{##}	0.7579**	0.8927**	0.4240**
“Fast food” consumption (yes vs no)	0.0331*	0.6886*	0.8806*	0.0320*	0.7973*
Preferred type of food (fruits/vegetables vs meat vs vegetarianism vs other)	0.1470**	0.9168**	0.0978**	0.5285**	0.8957**
Relationship between food and stress (yes vs no vs sometimes)	0.7787**	0.9710**	0.2670**	0.4240**	0.9322 ^{##}
Energy drinks intake (yes vs no)	0.3041*	0.8539 [#]	0.0005*	0.9519*	0.8887*
Cigarette smoking (yes vs no)	0.2231*	0.4391 [#]	0.4802*	0.2716*	0.3219*
Alcohol consumption (yes vs no)	0.7555*	0.7414 [#]	0.9508*	0.5655*	0.5649*
Medication (yes vs no)	0.6585*	0.9858 [#]	0.4753*	0.9241*	0.3195*

W – woman, M – man, PE – physical education, **t*-Student’s test, **ANOVA, [#]U Mann–Whitney test, ^{##}Kruskal–Wallis test.

Lifestyle of respondents

Physical activity

68.9% of the respondents participated in physical education (PE) classes. 58.5% declared physical activity besides physical education classes; on average 5.5 hours per week.

Diet

64.2% declared consuming more than 3 meals a day. Nearly 30% – 2 or 3 meals a day. 6.6% of the respondents declared consuming fewer than 2 meals a day.

Sweets were consumed by 91.5% of participants; 41.5% ate such products no more than 2 times a week. 25.5% consumed sweets 3–5 times a week. A similar percentage of respondents (24.5%) declared everyday consumption of sweets.

51.9% declared eating “fast food”. The vast majority of them (46.2%) consumed such food 1–2 times a week, 4.7% of those examined 3–5 times a week, and daily only 0.9% of the respondents.

Approximately 39% of the respondents declared vegetables and fruits as their preferred type of food. 34% of the respondents indicated meat, 8.5% declared vegetarianism or “fast food” consumption (5.7%). Other types of diet – 13.2% in total.

Stress

42.3% of the respondents indicated a relationship between increased food consumption and stress – “sometimes” for 24.5% of the respondents, and “always” – for 19.8% of them.

Protein supplements, energy drinks

Protein supplements were used by 5.6% of respondents, 2–7 times a week. Nearly 24% consumed “energy” drinks (e.g. Burn, Red Bull, R20), in the amount of 0.1–2.0 litres per week.

Alcohol and cigarettes

Approximately 28% of the respondents reported smoking cigarettes, 1–70 per week. More than 50% consumed alcohol (therein 23.4% “occasional”). The rest drank 0.1 to 4.0 litres of alcohol per week.

Medication

Over 25% of the respondents reported medication. 85.2% took drugs every day, the rest 4 to 21 times a month. The most commonly used were contraceptives (43.2%), antiallergic drugs (15.4%), analgesics (15.4%), endocrine treatment (8.3%) and antidepressants (7.6%).

The relationship between the values of laboratory parameters and selected features of respondents

The relationship between the values of laboratory parameters and selected features of the examined subjects was examined. The test probability values *p* for the tested dependencies are summarized in Table 2.

There was a statistically significant relationship between CHOL and serum LDL concentration and “fast food” consumption. Mean CHOL and LDL levels were higher in the group of students who declared “fast food” consumption than those who did not eat such food.

A statistically significant negative relationship was found between serum HDL cholesterol and energy drinks intake. Mean HDL level was higher in the case of people who didn’t drink this type of beverage than those who drank energy drinks.

Discussion

According to the concept of the “health fields” identified by Lalonde, lifestyle influences more than 50% of an individual’s health [12]. Abnormal nutrition and lack of physical activity are well known causes of overweight and obesity. Excessive body weight contributes to the development of dyslipidemia, hypertension or carbohydrate disorders. Each of these pathologies increase cardiovascular risk, as well as the risk of death.

In the study group, 68.9% of students participated in PE classes and nearly 60% declared physical activity in their lei-

sure-time. In the study by Wojtyła-Buciora and Marcinkowski 89% of the 999 high school students in Kalisz declared participation in PE classes, and only 22% were physically active after school classes [13]. The differences between our research and the study by Wojtyła-Buciora and Marcinkowski may result from the different environmental and social background of the young people and their related lifestyle, e.g. students from Kalisz county were often engaged in farm work in their leisure-time.

Dietary habits are among the most important lifestyle elements. A survey conducted in 2012 among 160 high school students in Ostrołęka showed that 69% of them consumed more than 3 meals a day, and 31% – 2 or 3 meals [14]. These results are similar to the results obtained in our study (64% consumed more than 3 meals, 29% ate 2–3 meals, and about 7% – 1 meal). The study also revealed a high percentage of sweets and “fast food” consumption by high school students. 92% of the students from Ostrołęka declared sweets consumption, which corresponds to the results obtained in our study. Students from Ostrołęka consumed more “fast food”, in comparison to the high school students in Lodz (77% vs 52%). This may be due to societal differences (in bigger cities it seems more “fashionable” to be active, and presumably the place of living may affect how leisure-time is spent, physical activity or even diet). The comparable results confirm that sweets and “fast food” are constant ingredients of almost all young adults’ diet. This may raise justified concerns about the dietary habits of this part of the population and the expected health consequences in future. It is interesting that 92% of school students (13–16 years old) from Warsaw declared regular sweets consumption (92% of 101 students) [15]. Therefore, it seems necessary to improve the dietary habits not only of young adults, but also middle school students and probably primary school pupils.

Alcohol is commonly used among the examined group. We observed an alarming fact – that 50.9% of the respondents admit drinking alcohol. Although this is a much lower percentage than that obtained in a study conducted by the state agency responsible for solving alcohol problems (PARPA) in 2015 (96% pupils from the second class drank alcohol), the number of alcohol-users in our study is high [16]. Similar results were obtained by Piotrowska et al. in a study from 2009 [17]. In a group of 409 Wrocław girls – aged 16–18, 89% declared drinking alcohol. In both studies the most common type of alcohol was beer, which was also confirmed in our study. Similar results show that the type of school does not influence the alcohol consumption (in Piotrowska et al.’s study 52.6% of the respondents attended a vocational secondary school, and the rest attended a general secondary school). An alarming fact is that even younger people declared alcohol consumption. The average age in which middle high school students from Szczecin reached for alcohol was 13 years. The average age at which they first got drunk was 14 years [18].

Hypertension, dyslipidemia and hyperglycemia should be considered the first pathologies resulting from excessive body mass or incorrect lifestyle. In our study hypertension seems

Source of funding: This work was funded by the authors' resources.
Conflict of interest: The authors declare no conflict of interests.

References

1. Must A, Spadano J, Coakley EH, et al. The disease burden associated with overweight and obesity. *JAMA* 1999; 282(16): 1523–1529.
2. Pi-Sunyer FX. The obesity epidemic: pathophysiology and consequences of obesity. *Obes Res* 2002; 10(2): 97–104.
3. Szczeńiak GR, Zdybel W, Kozak-Nurczyk P, et al. An evaluation of the prevalence of autoimmune diseases in patients with diabetes and obesity hospitalized in the Department of Diabetology, Rural Medicine Institute in Lublin. *Fam Med Prim Care Rev* 2016; 18(3): 345–347.
4. Mazon JN, de Mello AH, Ferreira GK, et al. The impact of obesity on neurodegenerative diseases. *Life Sci* 2017; 182: 22–28.
5. Banaś IM, Lewek PK, Kardas P. In which group of children and adolescents should a family doctor look for metabolic syndrome? *Fam Med Prim Care Rev* 2016; 18(3): 217–220.
6. GBD 2015 Obesity Collaborators. Health effects of overweight and obesity in 195 countries over 25 years. 2017 [cited 23.06.2017]. Available from URL: <http://www.nejm.org/doi/full/10.1056/NEJMoa1614362#t=article>.
7. *Stan zdrowia ludności Polski w 2014 r.* Warszawa: Główny Urząd Statystyczny; 2016 (in Polish).

to be the most significant pathology in young adults. Elevated systolic and/or diastolic BP were found in 3.8% of the examined students. This is an alarming result, especially when compared to the results of the research on students of Lodz universities in 2007, indicating the occurrence of hypertension in 2.06% of respondents [19]. However, Lodz university students, compared to the high school students, had improper waist circumference more often (16.19% vs 7.5%) as well as improper WHR (10.68% vs 0.9%) [19]. This problem certainly requires further analysis. Perhaps the differences are a result of the 7-year interval between studies. Lifestyle changes over time, so perhaps nowadays there is a different approach to physical activity and diet. Additionally, high school students have mandatory PE classes at school. In the same research, BMI ≥ 25 kg/m² was observed in nearly 21% of the respondents, which is similar to the results obtained in our study (BMI ≥ 25 kg/m² obtained 17.2%). Suliburska et al. also found similar results – in almost 23% of the 18-year-olds from Wielkopolska, BMI values were ≥ 25 kg/m² [20].

Limitations of the study

Our study had some limitations. The surveyed population was relatively small but exceeded 100 people and appears to meet the requirements of statistical analysis. The main aim of the study was to assess lifestyle, and the assessment of possible pathologies in laboratory studies in the field of glycemia and lipids was only an additional element of the work. There were 35 (out of 106 participants, 33%) volunteers here, but some conclusions could be drawn. In the future, it would be worthwhile to conduct such a study on a larger group.

Conclusions

Adult high school students (18–20 years old) often have improper dietary habits. Some of them do not consume enough meals every day. Sweets and “fast food” are common diet components of high school students. A significant percentage of young people drink alcohol and smoke cigarettes.

The occurrence of excessive body mass promotes the occurrence of metabolic disorders. Hypertension and dyslipidemia are the most common problems among young people.

The physical activity of the examined group seems satisfactory. Most of the high school students are physically active in physical education classes, and over half of them spend their leisure-time actively.

Prophylaxis in young adults should focus on education on the role of proper diet and physical activity in everyday life. Also, knowledge about the influence of smoking, alcohol intake and stress on health should be promoted in primary care. It is necessary to detect pathologies at the earliest stage. Therefore, physicians who take care of young adults should pay particular attention to the health problems that may result from an incorrect lifestyle.

8. Muszyński J, Żółtańska J, Michalczak W, et al. Analiza stylu życia dorosłych mieszkańców Dolnego Śląska w aspekcie zapobiegania chorobom sercowo-naczyniowym. *Fam Med Prim Care Rev* 2016; 18(1): 33–38 (in Polish).
9. Kapoor R, Chakraborty M, Singh N. A leap above Friedewald Formula for calculation of lowdensity lipoproteincholesterol. *J Lab Physicians* 2015; 7: 11–16.
10. Alberti KG, Zimmet P, Shaw J. Metabolic syndrome – a new world-wide definition. A Consensus Statement from the International Diabetes Federation. *Diabet Med* 2006; 23: 475.
11. Polskie Forum Profilaktyki Chorób Układu Krążenia: Wytyczne PFP dotyczące zespołu metabolicznego. 2009 [cited 03.06.2017]. Available from URL: <http://www.pfp.edu.pl/wytyczne/metaboliczny.html> (in Polish).
12. Lalonde M. *A new perspective on the health of Canadians: a working document*. Ottawa: Government of Canada; 1974: 31–34.
13. Wojtyła-Buciora P, Marcinkowski JT. Aktywność fizyczna w opinii młodzieży licealnej i ich rodziców. *Probl Hig Epidemiol* 2010; 91(4): 644–649 (in Polish).
14. Łupacz E, Urban M. *Nawyki żywieniowe młodzieży licealnej w wybranych szkołach w Ostrołęce*. Łomża: Wydawnictwo Wyższej Szkoły Agrobiznesu w Łomży; 2013: 91–101 (in Polish).
15. Nitsch-Osuch A, Kędzierska M, Topczewska-Cabanek A, et al. Nawyki żywieniowe młodzieży w wieku gimnazjalnym – co nastolatki jedzą w szkole? *Fam Med Prim Care Rev* 2009; 11(3): 433–436 (in Polish).
16. Sierostawski J. *Używanie alkoholu i narkotyków przez młodzież szkolną. Raport z ogólnopolskich badań ankietowych zrealizowanych w 2015 r.* Warszawa: Krajowe Biuro ds. Przeciwdziałania Narkomanii, Państwowa Agencja Rozwiązywania Problemów Alkoholowych; 2015: 19–36 (in Polish).
17. Piotrowska E, Żechałko-Czajkowska A, Biernat J, et al. Ocena wybranych cech stylu życia kształtujących stan zdrowia 16–18-letnich dziewcząt. Cz. I. Stosowanie różnych diet, aktywność fizyczna, palenie papierosów i picie alkoholu. *Rocz Panstw Zakł Hig* 2009; 60(1): 51–57 (in Polish).
18. Brzeźniak H, Mroczek B, Kotwas A, et al. Analiza wybranych zachowań zdrowotnych oraz samooceny masy ciała szczecińskich gimnazjalistów. *Fam Med Prim Care Rev* 2015; 17(2): 82–85 (in Polish).
19. Koziarska-Rościszewska M, Panasiuk M, Cypryk K. Prevalence of metabolic syndrome and its' components in the young adult – students of universities in Lodz, Poland. *Pediatr Endocrinol Diabetes Metab* 2010; 16(4): 277-283.
20. Suliburska J, Bogdański P, Pupek-Musialik D, et al. Analysis of life style of young adults in the rural and urban areas. *Ann Agric Environ Med* 2012; 19(1): 135–139.

Tables: 2

Figures: 0

References: 20

Received: 30.04.2017

Revised: 17.06.2017

Accepted: 18.06.2017

Address for correspondence:

Małgorzata Koziarska-Rościszewska, MD, PhD

Klinika Nefrologii, Nadciśnienia Tętniczego i Medycyny Rodzinnej UM

ul. Żeromskiego 113

90-549 Łódź

Polska

Tel.: +48 42 63-93-750

E-mail: malgorzata.koziarska-rosciszewska@umed.lodz.pl