

StudHeart–diabetes mellitus t.2 risk factors in senior medical students

Research Article

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Received 6 December 2012; Accepted 5 March 2013

Abstract: Introduction. StudHeart research was performed to evaluate the risk of diabetes mellitus type 2 (T2DM) amongst the senior medical students. Material and methods. The research involved 506 students aged 22-27 (mean age 23.96±1.52 yrs) in their 5th and 6th year of the medical faculties at the Medical University of Lodz. Each of the examined students has filled out an anonymous survey comprising 12 questions, which enabled us to use the FINDRISC scale in estimation of the risk for T2DM. Analysis was performed in relation to gender. Results. Overall in 16.80% of respondents the body mass index (BMI) was >25 kg/m². Almost all students (93.48%) admitted to drinking alcohol and 9.68% smoked cigarettes. Only 13.64% of participants exercised daily (women 8.16% vs. men 21.30%; P=0.000). Everyday consumption of fruit and vegetables was reported by 55.34% of the respondents whereas 6.92% of them (women 4.42% vs. men 10.40%; P=0.026) ate fast-food 2-3 times a week. The overall risk for T2DM was elevated in 17.2% of examined students. It is predicted that by the time participants will reach age of 45, 40.52% of them (mostly men) will have their risk of T2DM elevated. Conclusion. Despite the awareness of risk factors for T2DM among senior medical students, their lifestyle remains unchanged. In the given population it is predicted that the risk of T2DM will enhance about 2.5-fold in the next 20 years.

Keywords: Students • Medical • Risk Factors • Diabetes Mellitus • Type 2

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The study was presented at the “JUVENES PRO MEDICINA” 2012 in Lodz – The 50th Polish and 8th International Training and Scientific Conference of Students' Scientific Societies and Junior Doctors. The study was awarded with the 1st prize in Cardiology Session.

1. Introduction

In recent years an increase in prevalence and incidence of diabetes mellitus type 2 (T2DM) has been observed. In about 80% of the cases, development of T2DM is linked to obesity and overweight, which are the results of improper diet and insufficient levels of physical activity- i.e. easily modifiable factors [1]. The aim of the StudHeart study was to evaluate whether the knowledge and awareness of the risk factors is reflected by the healthy

lifestyle habits and to assess the risk of T2DM amongst the students in their 5th and 6th year of medical degree (now and over the next 20 years).

2. Material and methods

The StudHeart research was conducted between 2011-2012 among students of the Faculty of Medicine and the Faculty of Military Medicine of Medical University of Lodz. The study involved 506 persons aged 22-27 (mean age 23.96±1.52 yrs), within 212 were men (41.90%). The respondents were students in their 5th (n=267) and 6th (n=239) year of medical degree. The inclusion criteria were: only medical students aged 22-27. The exclusion criteria: students from other faculties, over or below the age limit.

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StudHeart is a student-conducted cross-sectional study within Students' Research Club at the Department of Cardiology and Cardiac Surgery, Medical University of Lodz. In the anonymous survey comprising 12 questions, the respondents were asked about their lifestyle (dietary habits – fruit/vegetables intake and the fast food eating frequency, frequency of physical activity – for at least 30 minutes continuously, frequency of alcohol intake – at least one beer or one shot of vodka (50 g) – 20 g of pure alcohol, smoking – number of cigarettes and period of smoking), occurrence of arterial hypertension, diabetes mellitus (type 1 or 2) and/or family history of diabetes mellitus (Supplement of StudHeart's survey). Additionally, the following data was obtained: sex, age, height, weight, waist circumference, which enabled the authors to use the Finnish Diabetes Risk Score (FINDRISC) scale [2] in estimation of the risk for developing T2DM for each of the respondents. All the questions used with FINDRISC scale were obtained from the original FINDRISC questionnaire. The FINDRISC scale is a useful tool for assessing the risk of T2DM onset in adults within the next 10 years basing on the following factors: age, BMI, waist circumference, physical activity, diet (fruit and vegetables consumption), use of antihypertensive drugs, at least one laboratory-confirmed event of elevated blood glucose and positive family history of diabetes mellitus type 1 or 2. The risk is evaluated upon answering 8 questions. For each answer the examined participants are given points, which added together determine the following levels of risk:

<7 points – low;

7-11 points – slightly elevated;

12-14 points – moderate;

15-20 points – high;

>20 points – very high [4].

At the next stage of the analysis it was assumed for each participant that the only variable risk factor within

the next 20 years is age. Based on this assumption, the risk for developing T2DM in the studied group has been calculated once they reach the age of 45.

The collected data was subjected to statistical analysis. To characterize the quantitative variables, the elements of descriptive statistics were used, namely the median and the interquartile range. The qualitative variables have been characterized by cardinality and percentage. The Shapiro-Wilk test revealed random distribution of the data so the Mann-Whitney U test was performed to compare two independent groups of individuals (women vs. men). In order to detect statistically significant correlation between the groups, depending on the anticipated size of the sample, chi-squared test of independence, Cramer's V or Yates' chi-squared test were used. The statistical analysis was carried out with use of Statistica 10.0 PL software (StatSoft, Cracow, Poland). The results were considered statistically significant when $P < 0.05$.

The StudHeart research was positively reviewed by the Bioethical Committee of Medical University of Lodz, Consent no. RNN/722/11/KB, October 18th, 2011.

3. Results

Table 1 presents the general structure of the studied population. The majority of the participants were women. Analyzed according to the gender, respondents differed in terms of age, BMI, dietary habits, alcohol consumption and level of physical activity (Table 1 and 2, Figure 1). In 17% of total participants BMI exceeded 25 kg/m². Being overweight was 8 times more frequent among men than women (Table 1, Figure 1, $P = 0.000$).

There was no case of type 1 or 2 diabetes, while 0.99% ($n = 5$) of the studied population suffered from arterial hypertension (HA).

Table 1. Characteristics of the StudHeart study population.

	Overall		Women		Men		P
	N	%	N	%	N	%	
Cases [n]	506	100	294	58.1	212	41.9	
	Overall		Women		Men		P
	Median	Interquartile range	Median	Interquartile range	Median	Interquartile range	
Age [years]	24	2	24	1	24	2	0.001
BMI [kg/m ²]	22.04	4.36	20.45	2.99	24.29	2.98	0.001
	Overall		Women		Men		P
	N	%	N	%	N	%	
>25	85	16.80	12	4.08	73	34.43	0.000
20-25	287	56.72	156	53.06	131	61.79	0.040
<20	133	26.28	126	42.95	7	3.30	0.000

Table 2. Overall results of the StudHeart study research.

	Overall		Women		Men		P
	N	%	N	%	N	%	
Diet – consumption of fruit and vegetable							
Daily	280	55.34	180	61.20	100	47.20	NS
2-3 times/week	184	36.36	95	32.30	89	42.00	0.026
a few times/month	35	6.92	17	5.78	18	8.49	NS
less frequently	7	1.38	2	0.68	5	2.36	NS
Diet – fast-food consumption							
Daily	1	0.20	0	0	1	0.47	NS
2-3 times/week	35	6.92	13	4.42	22	10.40	0.095
a few times/month	250	49.41	136	46.30	114	53.80	NS
less frequently	219	43.28	144	49.00	75	35.40	0.021
Alcohol consumption (at least one beer, 50 grams of vodka or 20g of pure alcohol)							
YES	473	93.48	269	91.50	205	96.70	0.018
NO	32	6.32	25	8.50	7	3.30	
daily	8	1.69	1	0.34	7	3.30	0.029
2-3 times/week	78	16.49	22	7.48	56	26.42	0.000
a few times/month	257	54.33	159	54.08	98	46.23	0.014
less frequently	131	27.70	87	29.59	44	20.75	0.009
Smoking							
YES	49	9.68	22	7.48	27	12.74	NS
NO	456	90.12	272	92.52	185	87.26	
Onset of smoking							
<5 years	15	30.61	5	22.73	10	37.04	NS
>5 years	34	69.39	17	77.23	17	62.96	NS
Physical activity (at least 30 minutes of continuous exercise)							
daily	69	13.64	24	8.16	45	21.30	0.007
2-3 times/week	201	39.72	111	37.80	90	42.70	NS
a few times/month	167	33.00	111	37.80	56	26.50	0.083
less frequently	68	13.44	48	16.30	20	9.48	0.026

*NS – not significant, P<0.05 considered significant using Mann-Whitney U test

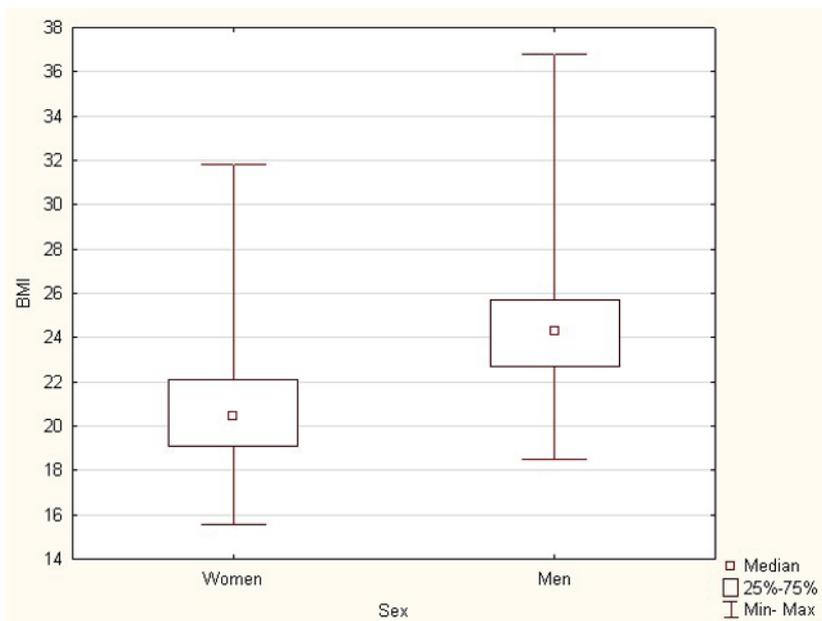


Figure 1. Differences in the body mass index (BMI) according to gender.

Interestingly, only about half of the participants ate fruits and vegetables daily while almost 7% ate fast food at least twice a week. Women care considerably more about their diet than men; with only 4.42% of them eating fast food meals 2-3 times a week or more frequently (Table 2, $P=0.078$). Almost two-thirds of the female students and less than half of the males reported eating fruits and vegetables at least 2-3 times a week ($P=0.07$).

The vast majority of the medical students consumed alcohol. Twenty percent of them, mostly men, admit to drinking 2-3 times per week or more. Thus, general alcohol consumption was significantly higher in man compared with that in women (29.72% vs. 7.82% respectively, $P=0.018$).

Cigarette smokers comprise nearly 10% of the examined students, most of who were men (Table 2), although there was not a significant difference revealed between sexes ($P=0.07$). One-third of the respondents have started smoking in the last 5 years, which means this habit was developed already during their medical degree studies.

At the same time an inadequate level of physical activity (predefined as continuous exertion for at least

30 minutes) was shown among the examined students, with little over 10% of the participants reporting daily exercise. It is predominantly men who engage in physical activity 2-3 times a week or more (64% men compared with 45.96% women; $P=0.000$).

At the next stage of the analysis, using the FIND-RISC scale authors demonstrated that the risk of onset of T2DM was elevated in 17.2% of the respondents (Figure 2). What is more, almost one-fourth of the examined is on the verge (5-6 points of FINDRISC) of joining the elevated risk group despite their young age. In this group approximately 1 person in 25 will develop T2DM within the next 10 years. The analysis conferring participants' sex in this study showed that over one-fourth of women and nearly one-fifth of men are close to having elevated risk of developing T2DM (5-6 points of FINDRISC). This tendency, however, is inverted in the higher risk brackets (>7 points), whereby the risk of developing T2DM is predominantly elevated amongst men (Figure 3). Almost 20% of the men and nearly 15% of the women ($P=0.12$) have their risk slightly elevated as shown in the Figure 3.

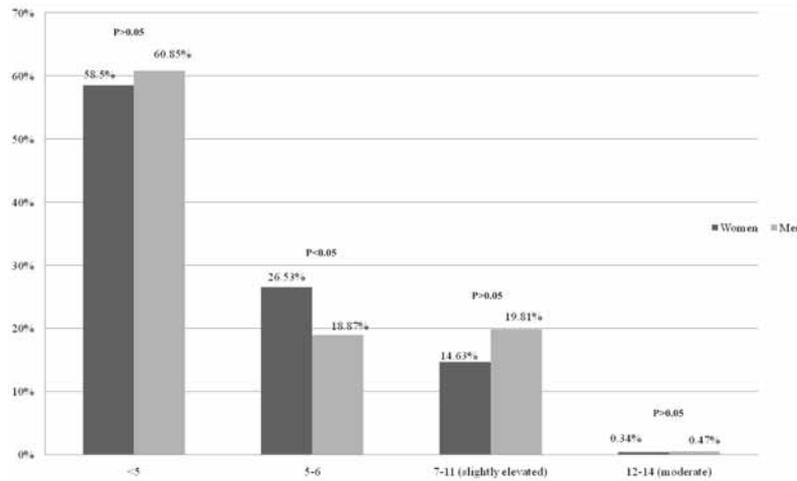


Figure 2. The risk level of diabetes mellitus type 2 (T2DM) in the studied population - now and over the age of 45.

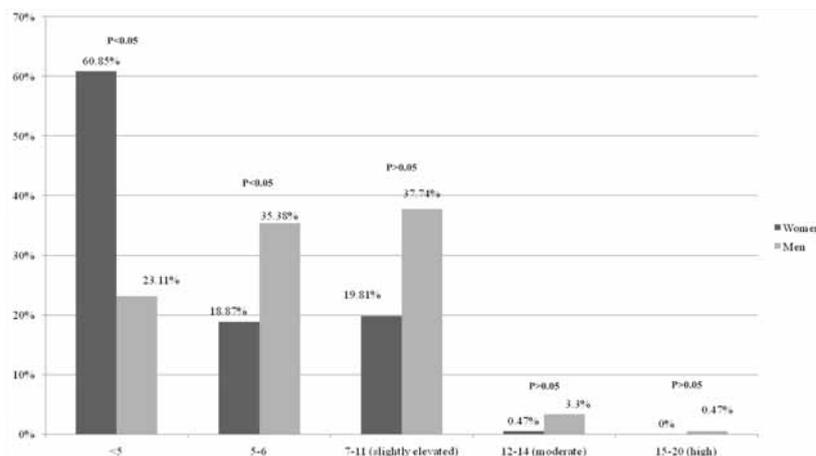


Figure 3. The risk of diabetes mellitus type 2 according to gender.

Assuming that within the next 20 years the only variable risk factor according to the FINDRISC scale is age, the risk for developing T2DM before the age of 45 was estimated.

A considerable rise in proportion of the respondents was found in each risk bracket. Figure 2 demonstrates a comparison between current and prospectively estimated risk levels amongst the students. The rise in the slightly elevated risk group (7-11 points) exceeds 100% ($P=0.000$). There is a significant difference in other FINDRISC levels, including the group on the verge of elevated (5-6 points) and with moderate (12-14 points) risk ($P=0.027$ vs, $P=0.009$, respectively).

The last stage of the analysis compared the risk of developing T2DM in examined women and men, before they reach the age of 45. The results are demonstrated in the Figure 4. The calculated risk, suggests that men are nearly twice as likely to develop T2DM as women, both under the age of 45 (very low risk $P=0.004$, low $P=0.000$, slightly elevated $P=0.39$, moderate one $P=0.38$, high $P=0.63$ and very high $n=0$). Additionally, considerably more women rather than men over the age of 45 are still likely to have lower risk of developing T2DM (low risk according to FINDRISC i.e. <7 points). There are only 0.47% of men ($n=1$) and no women, who will join the high-risk group; i.e. 1 in 3 persons could develop T2DM in the next 10 years, according to FINDRISC. No woman and 0.47% of the men ($n=1$) would join the high-risk group, in which about 1 in 3 persons will develop T2DM within the next 10 years, according to FINDRISC.

4. Discussion

The StudHeart study showed that in spite of the knowledge that medical degree students gain during their education, their knowledge of the risk factors for cardiovascular diseases is inadequate and does not translate into their daily lives. This is shown by the research results upon examining lifestyle of medical students (diet, physical activity, use of substances, BMI) as well as by the individual FINDRISC scores.

The StudHeart study results show that majority of students is not addicted to nicotine (only 9.69% admitted to smoking tobacco). The percentage of smokers is lower than that of the general Polish population. According to the World Health Organization (WHO) [3], over 30% of Polish admit to smoking addiction. In comparison with the studies conducted in other Polish health facilities, the medical faculties of the Medical University of Lodz have a lower percentage of smokers. According to Poreba et al. [4], who examined young adults studying at the Wroclaw Medical University, 18% of future medical doctors regularly reach for cigarettes. An even greater percentage of smokers was found amongst medical degree students at the Gdansk Medical University (29%). [5] In another study, conducted by the latter facility [6] in total 13% of the population was addicted to nicotine. Lewandowski's publication [7] shows that amongst the medical degree students in their 6th year of Medical University of Warsaw, there are twice as many smokers (double percentage) than that of the parallel group examined in the StudHeart study. The highest number of smokers was found at the Medical University of Lublin [8] and at the Medical University of Bialystok in the faculty of Public Health [9]. In the recent years some

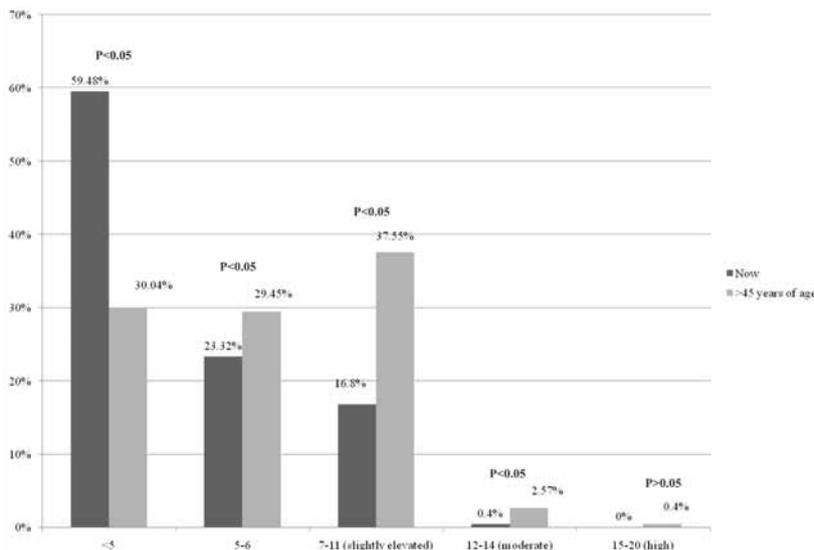


Figure 4. Predicted differences in the risk levels of diabetes mellitus type 2 over the age of 45 according to gender.

studies illustrating the smoking among students of the Medical University of Lodz have also been published. Among the students of physical therapy [10] and also in a group of randomly selected students [11] the overall percentage of smokers was significantly higher than that in the StudHeart study (respectively 21.42% vs. 36%). Although medical students gain full knowledge of the risk and consequences of smoking, many of them develop this habit, which is most likely adopted by the social environment as an easy way to cope with the daily stresses and strains.

In the studies conducted in several European Universities, La Torre *et al.* [12] found high percentages of smokers amongst students in Italy (31.3%), Spain (28.9%), Poland (28.7%) and Germany (28%), which exceed the percentages revealed in the Medical University of Lodz. In the Polish population, majority of smokers are women, but this has not been confirmed in any other studies.

The time at which a person begins to smoke is also worth noticing. In the StudHeart study, 31% of the surveyed students ($n=15$) reported that they began smoking during their university education. Wojtowicz-Chomicz *et al.* [8] observed this regularity in 66.9% of the students, whereas Sieminska *et al.* [6] observed it in every fifth surveyed person. Both authors claimed that certain factors, like stress, parting, peer pressure and simultaneous alcohol consumption contributed to smoking habits.

It would appear that despite the knowledge acquired during medical degree studies, a portion of students, who will have the responsibility for preventing nicotine addiction and treating its after-effects in near future, still smoke cigarettes.

Nowadays drinking alcohol is very popular among young people. Thus, StudHeart survey has asked about recent alcohol consumption as well. Unlike smoking, alcohol drinking was reported by great majority of medical students (over 90%). Similar studies across other Medical Universities showed smaller percentages: 78.7% in Warsaw [7], 88.6% in Wroclaw [4] and 85.1% in Poznan [13]. About 7.5% of women and about 25% of men studying medicine at the Medical University of Lodz admit to drinking alcohol at least 2-3 times a week. In the study conducted by Klimberg *et al.* [13] the results for alcohol consumption were somewhat higher, 20% and 28% of women and men, respectively. Every third female student and every fifth male student reaches for high-proof alcoholic beverages less than few times a month or do not drink at all, which is reasonably comforting. The most often consumed form of alcohol is beer [4,11,13]. Only in the study done by Sidor *et al.* [14] the surveyed medical students were shown to drink vodka more often (32.5%). Drinking alcohol is very popular in Poland, espe-

cially among young people, students included. Such high percentage of medical students reaching for alcohol may simply be due to their social environment and the peer group pressure.

Physical activity plays a key role in every healthy young person's life style. Experts speak of a necessity to exercise for a minimum of 30-60 minutes at least three times a week, depending on the type of activity [15,16]. Students participating in the StudHeart study are mostly physically active (86.56%). In other studies these percentages ranged from 61.9% to 98.4% [4,5,17]. Students of the medical faculties of the Medical University of Lodz usually exercise 2-3 times a week for at least 30 minutes (39.72%). It is mostly men (62% of the males) who abide by the indicated norms for physical activity, whereas this is not observed in women. Almost 50% of the surveyed students are physically active only a few times a month at the most or not at all. Studies done by Stasiolek and Jegier in 2003 confirmed insufficient level of physical activity amongst students of the Medical University of Lodz [18].

Young people do not often pay much attention to their diet and the number of meals consumed and this causes a problem especially for those who tend to lead irregular lives, students above all. The StudHeart study revealed that over a half of the surveyed medical degree students (55.34%) eat fruits and vegetables daily and over 7% of them reported eating fast-food meals 2-3 times per week or more. However, in the study conducted in Wroclaw, out of 100 students of Wroclaw Medical University (WMU) [19], 63% percent ate fruits and vegetables and 4% ate fast-food meals. The study involving 100 students of Wroclaw University of Environmental and Life Sciences (WUELS) and 100 ones of Wroclaw University of Technology (WUT). The dietary profile of the students of WUT was relatively the worst (vegetable consumption – 41%; fruit – 34%; fast-food – 21%), whereas among students of WUELS percentages were as follows: vegetable consumption – 55%, fruit – 54%, fast-food – 3% [19]. Considering the above dietary statistics, it would appear that participants of the StudHeart study present less healthy habits compared with their peers at the WMU or WUELS.

With obesity becoming increasingly serious social problem nowadays, so much that it is often considered an epidemic in many countries, the problem of excessive body weight is also common among the medical students. According to the WHO, the number of people with obesity has doubled since 1980 [20]. The Greek study conducted in 2002 [21] showed that among 989 students in total, 40% of men and 23% of women had their BMI over 25 kg/m² ('obese' BMI). These percentages are noticeably higher than in the population of stu-

dents in Poland. However, one Polish study performed in 2010 by the students of Bialystok University of Technology [26] showed that 21.69% of men and 4.48% of women were overweight or obese (in the StudHeart study 34.43% and 4.08%, respectively). These results suggest that there are more male students of medicine who are overweight or obese in the StudHeart study compared with the students from other faculties. According to the Central Statistical Office, in 2009 there were 24.3% of people in Poland, aged 15-29, who were overweight or obese (BMI >25 kg/m²) [23], whereas in the year 2004 there were in total 17.7%. The StudHeart study however, showed that 16.8% of the examined students had elevated BMI, but this is still below the average of the aforementioned values given by the Central Statistical Office for their age group.

The aim of the StudHeart study was mainly not to evaluate the knowledge of the participants, but to show whether how does the prior knowledge gained during the medical degree actually translates into the students' everyday lives. Few similar studies have been published. It has been shown that the knowledge of diabetes mellitus among the graduating medical students is generally better than that amongst the freshers, although still not sufficient [24]. One other Polish study [25] showed that the level of knowledge level on the same subject among the students of the 5th and 6th year of the medical degree faculties was surprisingly low as well. Upon comparison of these results with the results of the StudHeart study, one can assume that the students do not follow the recommendations for healthy lifestyle due to lack of prior knowledge or awareness. The results of the StudHeart study concerning eating habits and physical activity of the medical students are discouraging. However, such unhealthy lifestyle could probably be due to lack of time, hard work during medical degree studies as well as economic problems, which are common among the students.

Curriculum for every medical degree course consists of many hours of lectures and classes in internal or family medicine during which the topic of T2DM and its preventions is well presented and discussed. Notwithstanding this, the results of both studies evaluating the students' knowledge [24,25] and estimating their risk for the onset of T2DM (StudHeart) remain unsatisfactory.

5. Limitations

The main limitation of the StudHeart study is the method of data collection, i.e. the anonymous survey itself. The authors cannot be certain whether all respondents have answered consistently and if the answers reflect their actual status. The use of only one risk factor (age) to evaluate the prospective risk levels for developing T2DM is another restraint to this study. We are aware that the prognoses might have been worse if other risk factors (i.e. hypertension, obesity, coronary artery disease) were found in the examined, as well as we recognize that a number of the respondents will develop some of the aforementioned conditions in the future.

The lack of a control group, which probably decreases the credibility of the results, presents another restraint to the StudHeart study. The differences between results across many similar studies conducted in Poland perhaps reflect the differences in methodology. Moreover, StudHeart is a small sample study and hence the reported results may not easily extrapolate on larger cohort. The results of StudHeart and other similar studies, e.g. Noto et al. [26], can not be directly compared because of the different type of data acquired and analyses performed with them, including laboratory tests (e.g. HDL-C levels or the factor VII activity).

6. Conclusions

In the studied population, health awareness and the knowledge of risk factors for cardiovascular diseases among the students in their 5th and 6th year of medical faculties have little or no impact on their lifestyle habits. Despite gained medical knowledge during the course of their education, the vast majority of medical students neglect recommendations for the prevention of circulatory system diseases or diabetes mellitus. If the modifiable risk factors related to the lifestyle remain unchanged, the risk of diabetes mellitus type 2 will be 2.5-fold greater, by the time they reach the age of 45. This fact remains essential for further prevention of cardiovascular consequences, which the participants in StudHeart study may encounter in the future.

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Students' Research Club at the Department of Cardiology and Cardiac Surgery,
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StudHeart SURVEY

The aim of the study is to evaluate the knowledge of risk factors for developing diabetes mellitus type 2 among the students of the 5th and 6th year of the medical faculties and to determine whether their knowledge is reflected by healthy lifestyle habits. In the survey you will be asked either to write your answer down or mark the best option with a cross [x]. Please fill out the survey precisely and carefully. The survey is anonymous.

UNIVERSITY: _____ FACULTY: _____ YEAR: _____
 AGE: _____ SEX: W / M WEIGHT: _____ HEIGHT: _____
 MEAN BLOOD PRESSURE AT REST: _____ MEAN HEART RATE AT REST: _____

- What is your waist circumference?
 MEN: < 94cm > 94cm WOMEN: < 80cm > 80cm
- Do you smoke? If yes, how many cigarettes a day and for how many years?
 YES NO
 Number of cigarettes (packs): _____ Years: _____
- Do you drink alcohol? If yes, how often? (at least one beer or 50 grams of vodka)
 YES NO
 daily 2-3/week a few times/month less frequently
- How often do you take physical activity for at least 30 minutes without a break?
 daily 2-3/week a few times/month less frequently
- How often do you eat fruit/ vegetables?
 daily 2-3/week a few times/month less frequently
- How often do you eat fast-food meals (burgers, hot-dogs, pizzas, etc.)?
 daily 2-3/week a few times/month less frequently
- Have you ever been found to have elevated blood glucose? If yes, what was the level?
 YES (glucose level: _____) NO
- Have you been diagnosed with diabetes mellitus type 1 type 2 ? NO
- Have any of the members of your family been diagnosed with diabetes mellitus type 1 or 2?
 YES (parents, your own child, brother or sister) NO
 YES (grandparents, aunt, uncle, first cousin)

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10. Has there been any incident of myocardial infarction or sudden cardiac death in your father <55. year of age or in your mother <65. year of age?
YES: father mother NO
11. Do you suffer from any diseases of the cardiovascular system (including congenital heart defects)? YES NO If yes, which? _____
12. Have any of the members of your closest family (parents, siblings, grandparents, your own children) been diagnosed with a cardiovascular disease? If yes, at what age?
YES (age _____) NO

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