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Nicotine stimulant as a negative for health factor in the light of the characteristics and indicators of obesity and fat distribution in the body of young adults

Używka nikotynowa jako czynnik negatywny dla zdrowia w świetle analizy cech i wskaźników otluszczenia i dystrybucji tłuszczu w ustroju u młodych osób dorosłych

Summary

Anthropometric study and survey included a random sample of young men and women studying at the largest public universities of Cracow (UJ, EU, UP, UR, AGH, PK). The research was carried out as part of the study, concerning the level of obesity and fat distribution in the light of socio - economic status and lifestyle of students. In order to identify the occurrence of health risks among young people resulting from the habit of smoking cigarettes, the impact of smoking on selected somatic characteristics and indicators of adiposity and fat distribution (BM, BMI, SF, % FAT, FM, FFM, WC, WHR, WTR, CI, ESS, TSS, TER) was analyzed.

In order to show the relationship, normalized differences of features and somatic indicators between categories singled out in terms of prevalence of smoking habit were analyzed.

The effects of nicotine on the level of analyzed biological characteristics is not uniform. No differentiating influence of nicotine on the extend of body fat in subjects was proved. In men increased fatness is characteristic of those who stopped smoking cigarettes. However, the relationships of nicotine with the type of fat distribution are clear and point to a tendency of body fat redistribution in the direction of greater accumulation in abdominal area in people who smoke in large quantities.

Key word: Woman, Man, nicotine, somatic traits, fat tissue, health

Streszczenie

Badaniami antropometrycznymi i ankietowymi objęto próbę losową młodych kobiet i mężczyzn studiujących w największych publicznych uczelniach Krakowa (UJ, UE, UP, UR, AGH, PK). Badania zrealizowano w ramach badań własnych, dotyczących poziomu otluszczenia i dystrybucji tłuszczu w świetle statusu społeczno – ekonomicznego i stylu życia młodzieży akademickiej.

Celem rozpoznania występowania ryzyka utraty zdrowia u osób młodych wynikającego z nawyku palenia papierosów, podjęto analizę wpływu palenia

tytoniu na wybrane cechy somatyczne i wskaźniki otluszczenia oraz dystrybucji tkanki tłuszczowej (BM, BMI, SF, %FAT, FM, FFM, WC, WHR, WTR, CI, ESS, TSS, TER).

Dla wykazania powiązań, analizowano znormalizowane różnice cech i wskaźników somatycznych między wyodrębnionymi kategoriami występowania zwyczaju palenia papierosów.

Wpływ używki nikotynowej na poziom analizowanych cech biologicznych, nie jest jednorodny. Wykazano, brak wpływu różnicującego nikotyny na stopień otluszczenia ciała u badanych. Chociaż u mężczyzn większe otluszczenie cechuje tych, którzy przestali palić papierosy. Natomiast związki nikotyny z rodzajem dystrybucji tłuszczu są wyraźne i wskazują na tendencję do występowania typu rozmieszczenia tkanki tłuszczowej w kierunku większej kumulacji tłuszczu w okolicy brzusznej u osób palących papierosy w dużej ilości.

Słowa kluczowe: kobiety, mężczyźni, nikotyna, cechy somatyczne, otluszczenie ciała, zdrowie.

Introduction

The lifestyle, which is an integral part of the socio-cultural sphere constitute the significant factor responsible for the high statistics of non-transmittable diseases of the societies living in modern civilization. The attitude towards drugs such as nicotine and alcohol is an element associated with lifestyle. The occurrence of drugs, in particular nicotine is a specific element in the context of assessment of the health quality characteristic of the adopted lifestyle. Nicotine has negative effects on health (U.S Department of Health and Human Services, 2004). In addition to the addictive influence of nicotine, chemicals contained in tobacco smoke, inhaled while smoking lead to intoxication of the organism and tobacco-related diseases. The epidemiology of smoking-related diseases enumerates the following: cancer, and cancer concerning areas such as lung, oral cavity, plus it induces non-malignant respiratory diseases, cardiovascular diseases, and stroke. Cigarette smoking is the part of lifestyle which is particularly socially undesirable, taking into consideration the difficult situation of the people who do not smoke, but are equally at risk of tobacco-related diseases due to forced passive exposure to tobacco smoke (Europejski Raport Zdrowia, 2012).

Many reports of specific effects of nicotine on the metabolism of adipose tissue can be found in literature. However, the results of studies on the relationship of obesity with the use of nicotine are not uniform. On one hand, nicotine correlates with greater body fatness, and on the other hand, the results reveal a lower BMI among smokers (Lahti-Koski et al. 2002, Akbartabartoori et al. 2005, Kim et al. 2012, Mackay et al. 2013).

The aim of the study is to identify the occurrence of health risks resulting from smoking cigarettes. Tracing the impact of smoking on the selected somatic features and body fat tissue distribution in young people will give an idea of the possible future health consequences resulting from the lifestyle they adopted.

Materials and methods

The material analyzed in the work comprises anthropometric data and the data of random sample of young men and women studying at the largest state Cracow's universities (Jagiellonian University - UJ, Cracow University of Economics – EU, Pedagogical University - UP Agricultural University - UR, University of Science and Technology-AGH, Cracow University of Technology – PK. The research was carried out as part of the studies, concerning the level of obesity and fat distribution in the view of socio-economic status and lifestyle of students. Measurements were carried out in November 2004, after obtaining the written consent of directors of particular institutions, to implement the research in physical education classes). The study included the students of the second full-time year, chosen in two stage lottery, with a minimum of one hundred men and a hundred women from each university. The study included individuals whose physical activity (taken now or in the recent past) didn't display signs of competitive sports, due to the (Pasiut, 2012) effects of exercise training, concerning people practicing different kinds of sports.

The study sample representing Cracow's subpopulation of students was divided by gender, and the structure of the sample was shown in Table 1. The group which is the subject of the study comprise a homogenous sample in terms of age (average age 20.84 SD = 2.02) and social status of male and female students of Cracow's universities.

In order to assess the level of somatic characteristics and redistribution of body fat, the appropriate test set of anthropometric measurements was chosen, and the measurements were carried out according to the methodology presented in the literature generally available on the topic (Gołąb, Chrzanowska, 2007). Anthropometric measurements included body mass - BM in kilograms, longitudinal features-size characteristics (body height - BH - cm), trunk circumference (waist circumference - WC and hip - HC) and limbs (arm circumference - AC and thighs - TC), as well as measurements of the thickness of skin-fat folds measured according to standard in six areas of the body in the trunk and extremities by using the Harpenden foldmeter with the load of 10g/mm² of contact surface with an accuracy of 0.1 mm. The following features were measured: - Skin-fat fold above the arm bicep – BIC, Skin-fat fold above the triceps - TRC - subscapular skin-fat fold – SSC, skin-fat fold over the iliac crest – SIC, abdominal skin-fat fold – ABD, calf skin-fat fold - CLF.

On the basis of direct anthropometric measurements; body mass index - BMI, and the total thickness of three skinfolds - SF (mm) – (under scapula, on the abdomen and above the triceps) were calculated as the measure of obesity. The percentage of fat in the total body weight (% FAT), fat tissue mass FM (Fat Mass-kg), and fat-free body mass FFM (Fat Free Mass - kg), were calculated. Moreover, measures commonly used to assess the type of fat distribution were calculated: WHR - (Waist to Hip Ratio), Waist-to-thigh ratio - WTR (Waist to Thigh Ratio), - The rate of conicity of the body - CI (Conicity Index) – (the ratio of waist circumference (m) to the product of an empirical index of 0.109 and root of weight (kg)/body height (m). What's more, the following features were measured: the sum of the thickness of three skinfolds on the body TSS (below the shoulder, over the iliac crest and on the abdomen), the extremities ESS (above biceps, triceps and calf) and TER, which is ratio of the total thickness of the three skin-fat folds on the trunk TSS to the total thickness of three skinfolds on the extremities ESS.

Simultaneously to the studies, anthropometric surveys were conducted. The questionnaire includes questions concerning socio-economic status and questions related to the lifestyle of students. The participation in the study was voluntary and the survey was anonymous (29 August Act of 1997 on Data Protection - Dz.U.1997, item 883).

The data on socio-economic status determine: the place of residence, level of education and parents' occupation, family status, and the economic and living conditions. The data concerning lifestyle include leisure time activities and taking any physical activity, while the data on diet determines the amount and kind of meals, their quality and abundance, regularity, of time and place of eating meals and special diets. And finally, the data concerning drugs define the attitude towards drinking alcohol and smoking cigarettes.

The subject of this paper is the relationship of nicotine with selected somatic features and indicators of obesity and fat distribution in the body. The attitude of the respondents towards the nicotine stimulant is described on the basis of the answers given to the questions in the questionnaire. The respondents were defined as smokers and non-smokers and former smokers. The group of smokers was diversified in terms of the number of cigarettes smoked. According to the degree of prevalence of cigarette smoking habit four categories were extracted: everyday more than 20 pieces, each day about 10 pieces, ex-smokers, and non-smokers.

Methods of results analysis: The dependent variables tested in this study comprise constitute somatic features and the indicators describing the type of body fat and fat distribution (BM, BMI,% FAT, FM, FFM, SF, WHR, WTR, CI, ESS, TSS, TER) which were analyzed with regard to the independent variable explaining the prevalence of tobacco smoking (20 cigarettes per day, 10 cigarettes per day, former smokers, non-smoking).

A statistical study of the collected material was carried out in several stages (Sokal, Rohlf, 1995). Thus, descriptive statistics such as mean and median were used to evaluate central tendencies, and the standard deviation (SD) as the measure of dispersion. The compatibility between the data distribution and normal distribution was checked. For variables the distribution of which deviates significantly from a Gaussian curve, a logarithmic transformation was performed in order to increase the data fit to a normal distribution. In order to assess the compatibility of the distribution of variables with normal distribution Shapiro-Wilk test was applied.

After the calculation of descriptive statistics, in order to demonstrate the relationship between the analyzed biological characteristics and cigarette smoking, standardized differences between separated categories in terms of the prevalence of tobacco smoking were analyzed. The results of analyzes are shown graphically in the form of morphological profiles for men and women, and are given in Figures which also indicated statistically significant differences between groups. Moreover, numerical characteristics are given in the Table 3.

In the case of variables with distributions deviating from normal, analyzes were made on the transformed values.

Quantitative variables were normalized according to the formula: $Xn_i = \frac{\bar{X} - X_i}{SD_x}$

Where: Xn_i – normalized value of the variable X for i-case, \bar{X} - the average value of X to the cases which are the basis of the normalization SD_x - the standard deviation of X calculated for cases which are the basis of the normalization.

All the calculations were carried out separately for both sexes and while performing any analysis, $p = 0.05$ was assumed as critical significance level.

Description of study results

The group which is being the subject of the study comprise the homogeneous sample in terms of age (average age 20,84 SD = 2,02) and status of male and female students in their second year of full time studies at the greatest public universities in Cracow. The structure of the sample is shown in Table 1.

Tab. 1. The structure of the sample of students.

	UJ	UE	UP	UR	AGH	PK	
Women	140	107	128	114	113	117	719
Men	101	121	108	110	132	123	695
	241	228	236	224	245	240	1414

Table 2 shows the percentage distribution of answers in each category of declared cigarettes smoking in separate groups of sexes as well as it also contains the values of the test and the level of significance of differences occurring, which was examined by c^2 test describing the statistically significant level of differences between sexes.

Tab. 2. Percentage distribution of the habit of cigarette smoking tested in the sample of male and female students.

Category		Women N %	Men N %	
Cigarettes smoking	20 a day	15 2,13	44 6,33	F = 22,69 D f = 3, p= 0,0001
	10 a day	149 21,16	150 21,58	
	Ex smokers	50 7,10	73 10,51	
	Doesn't smoke	490 69,61	428 61,58	

The vast majority, which is 74,41% of a total number of respondents do not use tobacco, including 69.61% of women and 61.58% of men who have never smoked cigarettes, and 7.10% of women and 10.51% of men who stopped smoking during studies. Over 21% of women and men smoke 10 cigarettes a day, while 2.13% of women and three times more men which is 6.33% smoke 20 cigarettes a day.

It should also be noticed that men and women in the sample of Cracow's students, differ in a statistically significant way in terms of prevalence of nicotine drugs in their lifestyle. Women are more likely to lead healthy lifestyle and often do not smoke cigarettes (76.70%). However, men in comparison with women are more likely to lead unhealthy lifestyle, as they smoke three times more cigarettes a day than women, which is about 20 units per day. 72.09% of men do not smoke cigarettes at all (Tab.2).

In order to show relationship between the level of body fat and body fat distribution in the body, and cigarette smoking, standardized differences between the characteristics

and indicators between particular categories of smoking habit prevalence were analyzed, which is illustrated in the morphological profiles for men and women (Figures). Numerical characteristics of the analyzed biological features are given in Table 3. The results of analyzes concerning the effects of nicotine on the level of analyzed biological characteristics are not uniform.

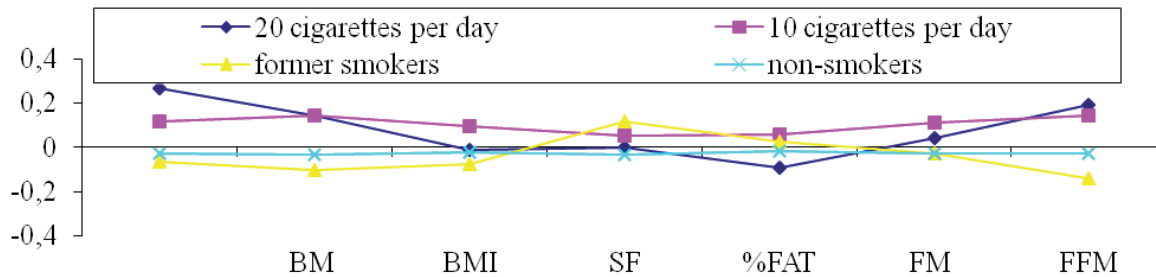


Fig. 1. Morphological profiles of characteristics and indicators of obesity in women in particular categories of cigarette smoking

No significant, differentiating influence of using nicotine on the fatness traits especially in women (Fig.1) was reported.

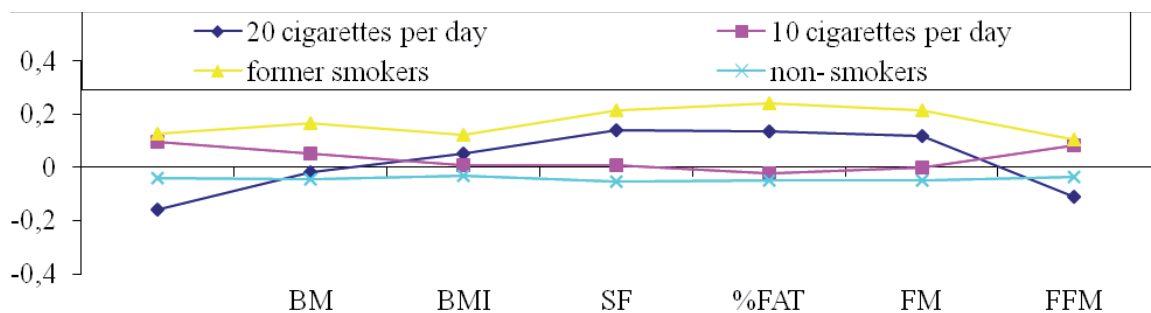


Fig.2. Morphological profiles of characteristics and indicators of obesity in men in particular categories of cigarette smoking

Despite the fact that in men (Fig.2), there was no statistical significance between groups, the fraction of “former smokers” clearly deviates towards the highest mass and body fat indicators. In men, there was also noticed a positive indicators deviation of obesity SF,% FAT, FM within the fractions smoking 20 cigarettes per day, the average of which are slightly lower than the values characterizing men who stopped smoking cigarettes.

Analyses prove that the use of nicotine stimulants affects the direction in which the body fat is being distributed in young adults (female- Fig.3, male- Fig.4). Cigarette smoking in an amount of about 20 units per day is associated with a greater accumulation of body fat in the abdominal region in women and men.

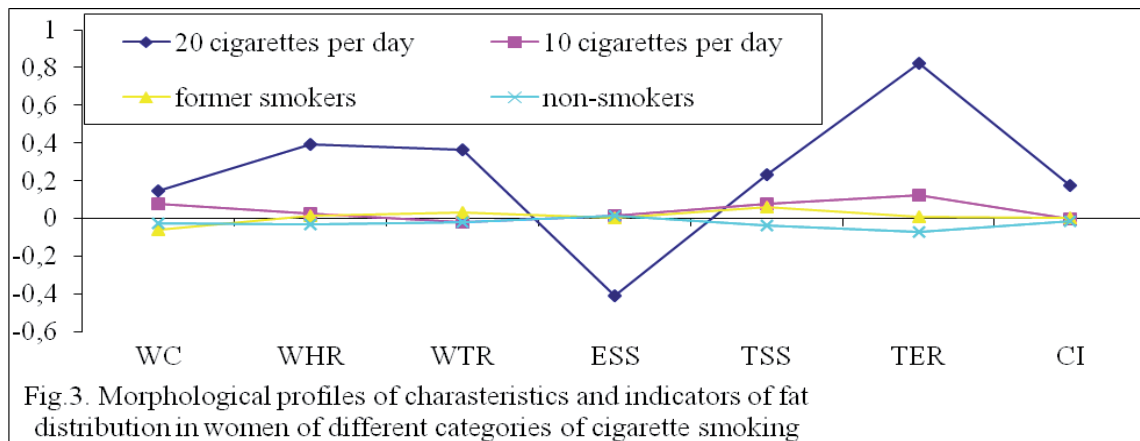


Fig.3. Morphological profiles of characteristics and indicators of fat distribution in women of different categories of cigarette smoking

Women fraction (Fig.3) smoking 20 cigarettes a day, compared to other groups, clearly deviates in the direction of the greatest values of all analyzed indicators (WHR, WTR, WC, CI, TSS, TER), apart from the ESS indicator measuring the peripheral obesity, which is the sum of the thickness of the skin-fat folds on the limbs, which is the lowest in the sample. However, statistically significant differences were found only in relation to TER indicators.

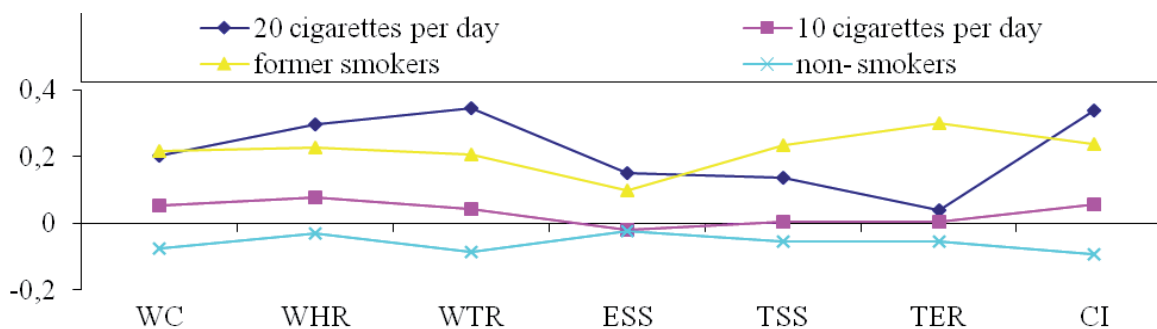


Fig.4. Morphological profiles of characteristics and indicators of fat distribution in men of different categories of cigarette smoking

In the group of men (Fig.4), the effect of nicotine significantly differentiates respondents and reveals the lowest values of all the indicators in male smokers. Students smoking about 20 cigarettes a day have a significantly higher waist circumference (WC), waist - hip ratio (WHR), waist - thigh (WTR) and body conicity index (CI). At the same time the fraction of ex-smokers has a larger thickness of skin-fat folds on the trunk (TSS), and a higher TER ratio (the ratio of the sum of skin-fat folds on the trunk to the total thickness of the skin-fat folds on the limbs), however, the analyses did not show statistical significance of these differences.

In conclusion, the analysis showed no differentiating influence of nicotine on the degree of obesity in respondents. However, increased fatness was reported among the men who stopped smoking cigarettes. Moreover, the relationship of nicotine with the type of fat distribution are clear and point to a tendency of fat distribution in the direction of greater accumulation of abdominal fat in people who smoke in large quantities.

Discussion

Presented in this paper the results of studies illustrate the biological condition of the population of young men and women studying in Cracow. In the course of study the diagnosis of nicotine addiction coexistence with excess body fat and abdominal fat distribution in the context of the adverse health effects of these affiliations was set.

Clinical observations of the connections between abdominal fat with metabolic dysfunctions and atherosclerosis, resulted in the perception of it as particularly dangerous to health (Tatoń, 1996). In numerous studies appear slightly different definitions due to the fact that the metabolic syndrome is compound, and etiologic and pathogenic factors have variable nature (Tatoń, Bernas, 2008). Among factors, the type of abdominal obesity, is an element present in every diagnostic approach. Depending on the definition, however, the detection of it is based on the different classification criteria (Snijder et al. 2003, Kinalska et al. 2006, Sieradzki, 2006).

Due to the risk of negative health effects Tatoń and Bernas (2008) propose suitable rigorous cut-off points: applying the criterion WHR for women of 0.85 and for men of 0.90, and 80 cm in waist for women and 94 cm for men. With regard to this information, it is worth mentioning that the average values characterizing the respondents (Tab.3) did not exceed the limit of standard values settled for each indicator. This result is not surprising while taking into consideration the fact that the group of respondents consists of young people. It is well known that, the level of obesity and fat redistribution increase with age as well as change from infantile to the adult model. Moreover, we can observe determined by gender and age shift in the model of accumulation of fat from fat peripheral (extremities) in the central abdominal.

Increased body fatness combined with cigarette smoking and alcohol consumption in terms of health effects, resulting from the combination of these factors is considered in a particular way and identified as risk factors for arteriosclerosis. Abdominal obesity is by Taton (1996) referred to as the third important internal factor, and cigarette smoking is the third most important external factor contributing to arteriosclerosis.

The relationship between body fat distribution, and cigarette smoking are endocrinology based and concern corticoids, including changes in the level of androgens, estrogens, glucocorticoids and growth hormone. Nicotine induces several metabolic disorders by stimulating the sympathetic nervous system. In smokers higher cortisol level is observed (Czyżewska, 2000). Nicotine-induced transformation of the residual particles impaired lipoprotein stimulates the growth of the concentration of cholesterol, which contributes to hypertriglyceridemia, hyperinsulinemia, and the platelet aggregation and arteriosclerosis (Tatoń, 1996).

Our study shown the differential effects of cigarette smoking. Men who smoked in the past, are distinguished by a higher body weight and more body fat. Although, those smoking 20 cigarettes per day, compared to ex-smokers, are less obese, the mean fat indices (SF,% FAT, FM) also deviate positively at the absence of the statistical significance of observed differences. In the group of women, there is no clear differentiation of the general level of overall body fat, which may be due to a small number of women in the fraction of the chain smokers who smoke 20 cigarettes a day. No significant differences in relation to body mass and body fat, between the analyzed groups of smokers and non-smokers, may result from the young age of the respondents, and thus, in a relatively short period of smoking, which was observed also in the studies made by Saarni et al. (2004).

In scientific literature, we can find results of studies in which young age of non-smoking men affects the lower, average body mass index BMI. However, women in this age group, both smokers and non-smokers have similar BMI, which is lower than the average BMI of former smokers (Akbartabartoori et al. 2005). In our study, no significant differences in the BMI among women and men were found, and its average value calculated for each of the four categories is within the norm.

The results obtained in the study, are confirmed in the studies of other authors (Lahti-Koski et al. 2002, Bamia et al. 2004, Kim et al. 2012, Mackay et al. 2013), revealing a pattern in which higher body fatness is identified more often in ex-smokers and chain smokers who smoke large numbers of cigarettes.

The demonstrated trend that cigarettes quitting is associated with increased body fatness, which decreases with time (Lahti-Koski et al. 2002), is not surprising. The differentiation of the effects of cigarette smoking is based on physiological energy cost of utilization of nicotine, which accounts for about 10% of the total energy balance, which may be associated with lower obesity and body mass, as well as reduced appetite (Palaniappan et al. 2001). On the other hand, the increase in body weight and increasing amount of visceral adipose tissue under the influence of smoking is associated with a reduced level of growth hormone, which inter alia, stimulates the use of fat, especially during starvation (Czyżewska, 2000).

The relationship of nicotine use with body fatness reported in literature, are not uniform. The observed diversity is dependent on age, sex, number of cigarettes smoked and other elements of lifestyle (Ramos de Marins et al. 2001, Visscher et al. 2002, Bamia et al. 2004, Akbartabartoori et al. 2005, Kim et al. 2012, Mackay et al. 2013).

Particularly dangerous in terms of negative health effects, abdominal obesity was in this study estimated on the basis of commonly used for this purpose indicators of different types of fat distribution. In terms of the size of the analyzed indicators of fat distribution, the medium characterizing different categories of male and female students do not exceed the emission limits established for each indicator (Snijder et al. 2003, Kinalska et al. 2006, Sieradzki 2006, Tatoń, Bernas 2008). However, it is worth mentioning that this study revealed the risk of abdominal obesity. The fact that people smoke 20 cigarettes a day is an important result characterized by higher values of the indicators of central fat distribution type. The size of waist circumference (WC), waist-to-hip ratio (WHR), waist-to-thigh (WTR) in men and in women and WHR indicator and TER fat distribution are statistically higher. In addition, men who quit cigarettes, were identified with the effect of giving up of the addiction in the form of increased subcutaneous fat (TSS ratios are larger and TER), which according to what different studies report is the temporary effect.

The study revealed the clear relationship of nicotine with the type of fat distribution, which point to a tendency of fat redistribution in the direction of greater accumulation of abdominal fat in people who smoke cigarettes in large quantities. Thus, taking into account affiliations of the type of fat distribution with tobacco addiction, in relation to negative health effects, then within the sample studied, health risk affects almost one-quarter of the population of women and men who smoke heavily 10 or more cigarettes a day.

Quite a similar relationship of smoking with increased abdominal adiposity, defined by means of WHR, WTR and waist circumference, was mentioned in the research of: Lahti-Koski et al. (2002), Bamia et al. (2004), Akbartabartoori and others (2005) Kim and others (2012), Mackay and others (2013). With regard to the distribution of fat, Akbartabartoori and others (2005) in their study found a number of discrepancies in relation to age and sex. In the comparable category of age among young people, different effects in the size of waist circumference were noticed: non-smoking men have a greater waist circumference, and the larger values of waist circumference in women of the same age, are characteristic of ex-smokers. The rate of fat distribution WHR is higher in non-smoking men and female smokers. The explanation for the discrepancy in the results of existing studies authors search in variability of hip circumference. Both male and female smokers have the smallest hip circumference, which is explained by authors as a result of the reduction in muscle mass, which occurred as an outcome of smoking cigarettes (Akbartabartoori et al. 2005).

A brief review of the reports shows that the variability in body weight and body fat tissue in relation to nicotine stimulant is complex, and the results of their co-existence are ambiguous and point at the same time to association with simultaneous lifestyle elements. Smoking often correlates with drinking of alcohol and the occurrence of other unhealthy behaviors in lifestyle, such as improper diet and low physical activity during leisure time (Ramos de Marins et al. 2001, Visscher et al. 2002, Bamia et al. 2004).

Moreover, the data analysis made in this study showed that men and women in the sample of Cracow's students, differ in a statistically significant way in their lifestyles in terms of prevalence of drugs. Women more likely tend to lead a healthy lifestyle and do not smoke cigarettes. Thus, three times more men than women smoke cigarettes. Cigarettes are not used by two-thirds of women and ten percent fewer men. In addition, within the group of students we can observe some positive trends towards a better quality of lifestyle: women usually do not smoke cigarettes, and men try to stop smoking.

However, as it was presented in our study, 6 % of smoking men addicted to cigarettes, and three times fewer women are at risk of health deterioration due to the excessive use of nicotine stimulants. Thus, if we take into account the problem of nicotine addiction in conjunction with excessive obesity, particularly abdominal with reference to health effects, then in the sample of our study the risk of damaging health concerns almost one-quarter of the population of young men and women.

Summary and conclusions

Presented in this paper study results illustrate health potential of the population of young men and women studying in Cracow. The study comprise the diagnosis in terms of nicotine addiction coexistence with excess body fat and abdominal type of fat distribution in the context of the adverse health effects of these links. The risk of health loss affects almost one-quarter of young men and women who were diagnosed with central type of fat distribution in relation to cigarette smoking.

Nicotine addiction among people who smoke a lot of cigarettes, shows the modifying impact of the distribution of body fat towards the abdominal accumulation. Men who stopped smoking cigarettes, disclose the effect of termination of addiction in the form of increased subcutaneous fat, which according to what literature reports, is the transitional effect.

The information provided by the research is important for the health prophylaxis:

Among the elements of lifestyle, the habit of smoking cigarettes is definitely a negative environmental factor in terms of its bad effects revealing at young age of smokers.

Nicotine abuse correlates with visceral model of body fat deposition even in young people's bodies.

Nicotine at young age reveals the destructive effects on health involving changes in metabolism that are manifested in the diversity of anthropological indicators.

Smokers should be aware of the costs of health deterioration as a result of nicotine addiction and the necessity to stop smoking and go to rehab due to numerous health consequences such as the reduced quality of life and capacity of physical exertion, as well as a number of diseases including abdominal obesity and cardiovascular diseases, which are merely postponed in time.

The people who have stopped smoking cigarettes should have the awareness of the mechanism (effect) of nicotine withdrawal and on one hand should control the energy consumption obtained from the food, and on the other hand not resign from nicotine rehab due to increasing body weight and fat cover of the body, moreover, they should obtain the emotional support from the loved ones or specialist help.

Anthropological indicators of fat distribution may be treated as good external identifiers of health risks in the area of lifestyle (environmental).

The differences observed in biological characteristics between groups, reflect the diversity in the potential of health, identified in the area of lifestyle factors such as smoking habit.

Tab. 3. Numerical characteristics of the analyzed biological features in men and women of different categories of cigarette smoking

	Women				Men			
	20 cigarettes per day N= 15	10 cigarettes per day N = 149	Former smokers N = 50	Non-smokers N =490	20 cigarettes per day N =44	10 cigarettes per day N= 150	Former smokers N = 73	Non-smokers N = 428
BM (kg)	X	59,07	57,04	57,63	72,97	73,70	74,90	72,67
	Me	59,00	56,00	56,60	69,20	71,80	73,60	71,30
	SD	10,040	9,390	7,720	11,880	10,080	10,660	10,350
	p	P = 0,304				P = 0,291		
BMI	X	21,16	20,98	21,13	22,97	22,85	23,17	22,73
	Me	21,76	20,45	20,84	22,54	22,38	22,84	22,28
	SD	2,740	3,080	2,440	2,910	2,740	2,880	2,870
	p	P = 0,593				P = 0,650		
SF mm	X	37,69	39,17	37,34	35,59	33,63	36,74	32,74
	Me	39,40	36,00	34,60	29,70	28,65	31,90	28,60
	SD	12,390	14,540	11,680	17,010	14,850	14,720	14,540
	p	P = 0,762				P = 0,074		
% FM	X	17,27	17,68	17,53	15,80	15,09	16,28	14,97
	Me	18,60	17,79	17,18	14,39	14,29	15,74	14,24
	SD	4,170	3,650	3,470	5,080	4,440	4,510	4,490
	p	P = 0,847				P = 0,107		
FM (kg)	X	10,54	10,29	10,28	12,01	11,43	12,49	11,19
	Me	11,02	9,79	9,74	10,52	10,45	11,42	9,93
	SD	3,890	3,970	3,220	6,000	4,870	4,760	4,840
	p	P = 0,657				P = 0,127		
FFM (kg)	X	48,53	46,75	47,34	60,96	62,27	62,41	61,47
	Me	47,98	46,25	46,85	58,97	61,45	61,29	61,29
	SD	6,390	4,600	5,170	6,690	6,530	7,320	6,790
	p	P = 0,203				P = 0,395		

WC (cm)	X	71,97	71,49	70,59	70,83	84,14	82,85	84,27	81,74
	Me	71,50	70,30	69,10	70,00	81,00	81,35	84,00	80,20
	SD	7,609	7,185	6,740	6,425	10,479	8,597	7,801	8,471
	p	P = 0,678			P = 0,032				
WHR	X	0,75	0,74	0,73	0,73	0,85	0,84	0,84	0,83
	Me	0,75	0,74	0,72	0,73	0,84	0,83	0,84	0,82
	SD	0,050	0,050	0,040	0,050	0,060	0,050	0,050	0,050
	p	P = 0,425			P = 0,049				
WTR	X	1,28	1,25	1,26	1,25	1,47	1,44	1,45	1,43
	Me	1,26	1,25	1,25	1,25	1,45	1,43	1,43	1,42
	SD	0,080	0,100	0,070	0,080	0,100	0,080	0,090	0,090
	p	P = 0,530			P = 0,008				
CI	X	1,11	1,10	1,10	1,10	1,21	1,19	1,20	1,18
	Me	1,11	1,11	1,09	1,10	1,21	1,18	1,20	1,17
	SD	0,050	0,060	0,060	0,050	0,080	0,070	0,060	0,070
	p	P = 0,907			P = 0,003				
TSS	X	45,63	43,12	42,87	41,22	43,32	40,45	45,35	39,19
	Me	46,70	37,60	40,90	37,80	35,00	33,65	39,80	32,75
	SD	17,450	17,550	18,410	15,480	25,650	21,530	21,650	20,610
	p	P = 0,539			P = 0,062				
ESS	X	24,43	27,67	27,57	27,64	20,51	19,34	20,16	19,32
	Me	24,40	26,70	26,45	26,30	18,70	17,75	19,00	17,65
	SD	7,340	8,740	6,890	7,330	9,210	6,590	6,040	6,760
	p	P = 0,241			P = 0,486				
TER	X	1,87	1,58	1,53	1,50	2,06	2,04	2,23	2,00
	Me	1,82	1,47	1,52	1,43	1,98	1,93	2,02	1,84
	SD	0,450	0,460	0,360	0,390	0,650	0,580	0,780	0,620
	p	P = 0,028			P = 0,264				

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