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Schemat i korelacje palenia tytoniu wśród losowo wybranych byłych sportowców

Patterns and correlates of smoking among randomly selected former athletes

Streszczenie

Wstęp. Powiązanie między paleniem tytoniu a nieaktywnością lub umiarkowaną aktywnością fizyczną jest dobrze udokumentowane. Mało natomiast wiadomo o związkach między paleniem tytoniu a uczestnictwem w sporcie wyczynowym.

Cel. Celem badań była ocena rozpowszechnienia palenia tytoniu wśród sportowców, opisanie kierunków zmian w paleniu po zakończeniu ich kariery sportowej, a ponadto ustalenie czynników zwiększających ryzyko palenia wśród byłych zawodników.

Materiał i metody. Losowo wybranych polskich byłych sportowców (n=351, wiek 18-66) objęto anonimowymi badaniami ankietowymi dotyczącymi palenia w czasie sportowej kariery, okresu uprawiania sportu i osiągniętego w przeszłości poziomu sportowego, a ponadto obecnego statusu palacza, poziomu uczestnictwa w rekreacji ruchowej oraz cech demograficznych. W celu określenia zmian w statusie palacza poszczególnych badanych zastosowano test rangowanych znaków Wilcoxon'a. Ryzyko palenia oceniono wykorzystując analizę regresji logistycznej.

Wyniki. Stwierdzono, że w czasie sportowej kariery badani charakteryzowali się niskim rozpowszechnieniem i małą intensywnością palenia. Po zakończeniu uprawiania sportu wyczynowego wzrastał odsetek palących mężczyzn ($p<0,001$) i kobiet ($p<0,01$), jednakże intensywność palenia była nadal niska. Analiza regresji logistycznej wykazała, że wśród byłych sportowców niepaleniu sprzyjały: starszy wiek wśród mężczyzn ($p<0,05$), niepalenie podczas kariery sportowej przez kobiety i mężczyzn ($p<0,0001$), a także długi staż treningowy wśród kobiet ($p<0,01$).

Wnioski. Rezultaty badań sugerują, że promowanie uprawiania sportu wyczynowego wśród młodych ludzi może być ważną częścią strategii przeciwko paleniu w późniejszych okresach życia.

Słowa kluczowe: sportowcy, byli sportowcy, palenie tytoniu, rekreacja ruchowa, cechy demograficzne.

Summary

Introduction. The relationship between smoking and inactivity or moderate physical activity is well documented, but little is known about the relationship between smoking and participation in competitive sports.

Aim. The objectives of our investigation were to present prevalence data for cigarettes smoking among athletes, describe the direction of changes in smoking habits after finishing their sports career, and examine the independent risk factors of smoking among female and male former athletes.

Material and methods. Randomly selected Polish former athletes (n=351, aged 18-66 yr) responded to an anonymous questionnaire regarding smoking during their sports career, period and level of participation in competitive sports in the past, and current smoking status, level of leisure time for physical activity, and socioeconomic status. Wilcoxon's signed rank test was used to determine changes in smoking behaviours during and after finishing respondents' sports career. Risk factors of smoking were identified through the logistic regression analysis.

Results. The prevalence and intensity of smoking among men and women during their sports career were low. The increase in prevalence of smoking after finishing sports career was observed among both men ($p<0.001$) and women ($p<0.01$). However, the intensity of smoking among former athletes was generally low. The multifactorial analysis showed that low risk of smoking was associated with older age among men ($p<0.05$), being non smoker during sports career among both men and women ($p<0.0001$), and participation in competitive sports for many years among women ($p<0.01$).

Conclusion. Our results suggest that promotion of participation in competitive sports can be a part of strategies against smoking.

Key words: athletes, former athletes, tobacco consumption, leisure time physical activity, demographic.

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INTRODUCTION

Smoking accounts for more than one third of all deaths in middle age, and although rates of smoking are declining among adults, they are increasing in adolescents [1]. According to The World Health Organisation 49% males and 17% females of world population are smokers [2]. Because the percentage of current smokers is still relatively high, new ways have to be found to reach and motivate the smokers to quit smoking.

Preliminary study describes physical exercises as a healthful alternative behaviour to smoking and demonstrate its usefulness in enhancing quit rates and decreasing the likelihood of relapse following smoking cessation [3]. A review of 50 articles reporting empirical relationships between smoking and physical activity show that almost 60% of the articles reported a definitely negative relationship, but this relationship is often attenuated or reversed among adolescents and males and for moderate (vs. vigorous) exercise [4]. Few reports analyse the relationship between smoking and participation in competitive sports. The lower percentage of smokers among practicing school sports than among individuals of the same age not participating in sports, is described in the United States students' population [5]. It is also shown that the percentage of smokers among Polish sportswomen and ex-sportswomen are lower compared to the general population [6]. The relationships between smoking and level of physical activity were analysed in the above described surveys only. Therefore, it remains unclear how demographic variables, duration of sports career and achieved sports level are associated with smoking in the population of athletes and former athletes (FA).

A better understanding of the factors that influence smoking among athletes and FA is important for reduction of the number of smokers in these groups. From the public health perspective, it is interesting that promotion of participation in competitive sports may be shown as a significant part of effective interventions to create non-smoking habit in some communities, especially among young people.

The objectives of our investigation were to: (1) present prevalence data for cigarettes smoking among athletes, (2) describe the direction of changes in smoking habits after finishing sports career, (3) compare the extent and patterns of smoking in female and male FA, and (4) examine the risk factors of smoking in randomly selected cohort of FA.

METHODS

The study is a part of the "Former Athletes' Lifestyle Project" conducted in May and June 2004 by the University School of Physical Education in Poznań, The Branch Faculty of Physical Culture in Gorzów Wlkp. (Poland). The main objective of this project was to examine the relationship between former participation in competitive sports and health-related behaviours in later life. In this study we used the definition of former athletes after Telama et al. [7] who defined them as people who took part in training and competition in sports clubs. The target FA sample was determined in a three-stage drawing of lots. In the first stage, lots were drawn for regions. In the second stage, lots were drawn for sports clubs in these regions. The third stage included randomly chosen FA from the club lists.

Postal anonymous questionnaires with self-addressed stamped envelopes were sent by sports clubs to 477 FA. The response rate was 74% (n=353). Two questionnaires were not completed and therefore excluded from further analysis. A total of 351 questionnaires were qualified for the analysis: 158 were responded by women and 193 by men.

The questionnaire comprised 50 structured questions regarding the health behaviours, past participation in competitive sports, demographic and socioeconomic status (SES). Our article is based on data regarding demographic, past participation in competitive sports, cigarettes smoking and engagement in leisure-time physical activity (LTPA). All data collected in this study were self-reported by the FA.

For evaluation of respondents' current smoking status the following categories were used: (0) I do not smoke, (1) I smoke occasionally (not every day), (2) I smoke 1-10 cigarettes/day, and (3) I smoke more than 10 cigarettes/day, (how many?). Respondents were also asked: Did you smoke cigarettes during your competitive sports career? (0) no, (1) yes.

To estimate LTPA, the respondents recorded the duration and forms of LTPA during last week. The reliability and validity of these self-reported measures were studied in previous study conducted among adults [8]. Based on these data respondents were classified to one out of three levels of LTPA:

- I - sufficiently active: persons who reported recommended level of physical activity in leisure time, meaning at least 30 minutes of moderate physical activity five or more days per week (walking, bicycling, light gardening) or at least 20 minutes of vigorous physical activity three or more days per week (jogging and other recreational sports or heavy gardening);
- II - insufficiently active: persons who reported physical activity in leisure time during the week that was less than recommended level, but greater than none;
- III - inactive: persons who reported no physical activity in leisure time during the week [9].

In order to describe FA' sport careers the following measures were used:

- a/ Training experience (years): (0) 1-6, (1) 7-12, (2) 13-19, (3) 20 and more;
- b/ The sports level achieved, measured by sports class: (0) I or II class, (1) national master class or international master class;
- c/ Period of time since the end of sports career (years): (0) 1-5, (1) 6-10, (2) 11-15, (3) 16-20, and (4) more than 20 years.

The following characteristics of demographic and SES were taken into consideration: gender, age (18-34, 35-50, and 51-66 years), and level of education (elementary/vocational, secondary, and higher).

The gender differences in distribution of all variables were assessed using the two-side two-element structure test. In order to determine changes in smoking behaviour during and after finishing FA' sports career we used the Wilcoxon's signed rank test. Risk factors of smoking were identified through the logistic regression analysis. A dichotomy of: (0) I smoke occasionally, I smoke 1-10 cigarettes/day, and I smoke more than 10 cigarettes/day, and (1) I do not smoke was defined. Independent variables were age, education level, training experience, sports class, period of time passed since the end of sports career, smoking status during sports career, and current level of LTPA. At the first stage, crude

TABLE 1. Distributions of demographic, smoking, LTPA and participation in competitive sports in the past by gender (%).

Variables	Categories	Females	Males	p ^a
Age categories (years)	18-34	54.4	45.6	0.102
	35-50	39.9	43.5	0.496
	51-66	5.7	10.9	0.084
Education level	Higher	51.9	41.9	0.734
	Secondary	45.6	42.0	0.499
	Vocational and elementary	2.6	8.9	0.816
I smoked during sports career	No	73.7	72.6	0.879
	Yes	26.3	27.4	0.879
Currently smoke	I do not smoke	60.1	55.4	0.376
	I smoke occasionally	20.3	24.4	0.339
	I smoke 1-10 cigarettes/day	10.8	11.9	0.747
	I smoke > 10 cigarettes/day	8.9	8.3	0.842
Level of LTPA	Inactive	9.5	7.8	0.572
	Insufficiently active	70.9	68.9	0.678
	Sufficiently active	19.0	23.3	0.329
Competitive sports training experience (years)	1- 6	20.3	15.5	0.242
	7-12	51.9	52.3	0.945
	13-19	27.8	30.1	0.637
	20 and more	0.0	2.1	0.068
Sports class	I and II	81.6	85.0	0.380
	NM b and IM c	18.4	15.0	0.394
Period of time since the end of sports career (years)	1-5	31.6	35.8	0.401
	6-10	33.5	25.9	0.121
	11-15	15.2	16.1	0.818
	16-20	10.8	10.9	0.976
	more than 20	8.9	11.4	0.443

^ap value for the two-side two-element structure test, ^b national master, ^c international master

odds ratios (CORs) and 95% confidence intervals (CIs) of the impact of odd variables on smoking among the FA were calculated. Subsequently, the multifactorial analyses, considering simultaneous effects of all variables on the risk of smoking among the examined FA, were employed. Results of the multivariate analyses for the models are presented as odds ratios (ORs) and their 95% confidence intervals. All p-values were two-sided and $p < 0.05$ was defined as statistically significant. The statistical analyses were performed separately for male and female. Calculations were performed using the Statistica 7.0 PL Software.

RESULTS

Table 1 presents distributions of demographic, health related behaviors and sports career characteristics by gender. In this study female and male subgroups are similar in terms of all these variables.

Statistically significant increase in number of smokers is observed after finishing sports career among both men ($p < 0.001$) and women ($p < 0.01$). Among individuals who were non-smokers during their sports career almost 23% of women and 28% of men currently smoke (Table 2).

TABLE 2. Smoking among male and female former athletes during and after finishing their sports career (%).

Smoking during sports career	Current smoking status	
	Non-smokers	Smokers
Women		
Non-smokers	77.23	22.77
Smokers ^a	16.67	83.33
P ^b	< 0.01	
Men		
Non-smokers	72.44	27.56
Smokers ^a	18.75	81.25
P ^b	< 0.001	

^a periodically or during the whole sports career

^b P for the Wilcoxon's signed rank test

The results of the logistic regression analysis of association between current smoking status and independent variables among female and male FA are presented in two models in Table 3, models I and II). In the female group

the crude examination shows negative relationships between smoking and age, education level, competitive sports training experience, and level of LTPA. The positive relationship between smoking and sports class, period of time passed since the end of sports career, and smoking during sports career are observed (model I). The fully adjusted model II shows that in the female FA group only two factors are statistically significant associated with smoking in later life. A decrease in risk of smoking is associated with longer competitive sports training experience. Among females who practiced competitive sports for 20 years or more, the risk of smoking decreases 14 times compared to women who practiced sports only for 1 to 6 years (adjusted OR: 0.07; 95% CI: 0.01-0.50, $p < 0.01$). Smoking during sports career is a significant predictor of smoking also after finishing it. Those female FA who were smokers as athletes are 22 times more likely to continue smoking after finishing their sports career than non-smoking athletes (adjusted OR: 22.41; 95% CI: 7.63-65.85, $p < 0.0001$).

Based on crude analysis, a higher level of education, achieved master sports class, period of time since the end of sports career, and smoking during sports career support smoking among male FA. Being non-smoker after finishing

sports career is favoured by older men, long time of participation in competitive sports, and high level of LTPA (Table 3, model I). After controlling for all independent variables, the youngest men from the study group are about six times more likely to smoke than the oldest FA (adjusted OR: 0.18; 95% CI: 0.04-0.90, $p < 0.05$). The cigarettes consumption during sports career also strongly supports being a smoker in later life. Men who smoked as athletes are 14 times more likely to continue this habit after finishing sports career than respondents who reported non-smoking during practicing competitive sports (adjusted OR: 13.96; 95% CI: 5.78-33.70, $p < 0.0001$) (Table 3, model II).

DISCUSSION

The aims of these investigations were to describe the patterns of smoking habits and examine the association between smoking and socioeconomic, factors describing sports career, and LTPA among randomly selected FA. It was surprising to find that about 26% of female and 27% of male FA reported being smokers during their sports careers. In the Polish population surveyed in 2004, above 33% of women and 50% of men at the age of 20-60 were smokers.

TABLE 3. Relationship between smoking (vs. non-smoking) and age, education level, variables characterizing participation in competitive sports, smoking during sports career, and level of LTPA among female and male former athletes.

Variables	Categories	Women		Men	
		Model I COR (95% CI) ^a	Model II OR (95% CI) ^b	Model I COR (95% CI) ^a	Model II OR (95% CI) ^b
Age categories (years)	18-34	1		1	1
	35-50	0.44 (0.14-1.40)		0.43 (0.19-0.97)	0.43 (0.19-0.95)
	51-66	0.20 (0.02-1.96)		0.18 (0.04-0.94) ^c	0.18 (0.04-0.90) ^c
Education level	Vocational/elementary	1		1	
	Secondary	0.44 (0.19-1.00)		1.40 (0.76-2.57)	
	Higher	0.19 (0.04-1.01) ^c		1.96 (0.58-6.60)	
Competitive sports training 1 - 6 experience (years)	1	1	1		
	7 - 12	0.37 (0.17-0.79)	0.41 (0.21-0.79)	0.64 (0.36-1.12)	
	13 - 19	0.14 (0.03-0.62)	0.17 (0.05-0.63)	0.41 (0.13-1.26)	
	20 and more	0.05 (0.01-0.49) ^f	0.07 (0.01-0.50) ^f	0.26 (0.05-1.42)	
Sports class	I and II	1		1	
	NM c and IM ^d	2.43 (0.65-9.02)		2.26 (0.77-6.66)	
Period of time since the end 1-5 of sports career (years)	1		1		
	6-10	1.31 (0.78-2.20)		1.37 (0.93-2.01)	
	11-15	1.71 (0.61-4.86)		1.86 (0.86-4.05)	
	16-20	2.25 (0.47-10.71)		2.54 (0.79-8.15)	
	more than 20	2.95 (0.37-23.62)		3.47 (0.74-16.40)	
Did you smoke during sports career?	No	1	1	1	1
	Yes	24.64 (7.60-79.83) ^g	22.41 (7.63-65.85) ^g	18.43 (6.90-49.21) ^g	13.96 (5.78-33.70) ^g
Level of LTPA	Inactive	1		1	
	Insufficiently active	0.82 (0.33-2.00)		0.61 (0.31-1.21)	
	Sufficiently active	0.67 (0.11-3.99)		0.37 (0.10-1.46)	

^a all variables in the model, ^b adjusted for all variables in the table, ^c national master, ^d international master, ^e statistical significance at $p < 0.05$, ^f statistical significance at $p < 0.01$, ^g statistical significance at $p < 0.000$

Moreover, 31% of smoking women and 60% of smoking men were heavy smokers (smoking at least 20 cigarettes/day) [10]. The prevalence and intensity of smoking retrospectively reported by FA from their sports careers were considerably lower than in the Polish population.

After finishing sports career, the percentages of smokers among both men and women FA increased statistically significant. However, the prevalence and intensity of smoking among male FA and intensity of smoking among female FA were lower than among Polish men and women [10]. Presumably, these tendencies could be modified by socioeconomic differences between compared populations.

Previous studies of relationships between smoking and demographic, and socioeconomic factors show that the high-risk smoking population groups are males, people of young age, and with low education status [11, 12]. The present study clearly replicates and reinforces earlier findings on the negative correlates of smoking and age among men. The level of education was differently associated with smoking status in male and female FA groups. In study conducted in Bulgaria education is also no clear associated with smoking among adults [13].

The results of this study reinforced the impression from previously published reports that smoking is associated with low level of LTPA [14, 15]; however this relationship was not statistically significant in our study. As far as we know, the association between FA' smoking status and level of LTPA has not been yet conducted, so the comparisons of our results have been confined to non-athletes. According these studies an inverse, moderately strong or weak relationship between the smoking status and LTPA was found in representative sample, ages 25-69, in Germany [14], and in representative sample, ages 20-69, in England [15].

The analysis of risk factors of smoking among FA showed smoking during sports career as predictor of tobacco consumption in later life. High risks of smoking among men and women after finishing their sports career leads to the conclusion that FA need support to create their health-related behaviours.

Both men and women FA who achieved master class in the past were most likely to smoke after finishing their sports career than FA with the lower sports class. To explain these relationships we calculated associations between achieved sports class and smoking during sports career (not shown here). We observed that FA with master class achieved in the past were more frequently smokers during sports career than the rest of athletes (males $\lambda = 13.96$, $df = 4$, $p = 0.007$, and females $\lambda = 17.22$, $df = 4$, $p = 0.004$). Close relationship between smoking during sports career and current smoking was earlier shown in our study (Table 3).

The logistic regression analyses showed similar patterns of associations between smoking habits and variables characterising both men and women FA' sports career. Decrease in risk of smoking was associated with long time of competitive sports experience, relatively lower sports level, and short time that has passed since the end of sports career.

From the public health perspective, the most important finding of our study was statistically significant association between long time of practicing competitive sports and non-smoking among female FA. This result suggests that promoting females' long sports careers can contribute to reduction of smoking among women.

A few limitations of the present study deserve mentioning. We were not able to collect any information about non-respondents. Furthermore, the disadvantages of these analyses are retrospective nature of the data collection on smoking status during sports career and using self-reported data. All these causes might introduce a bias. In the logistic regression analysis one category for all smokers (occasionally and regularly) was used. As a result, we were not able to estimate how independent variables are associated with the intensity of smoking among FA.

CONCLUSIONS

The present study shows similar patterns of smoking among male and female former athletes. During the participation in competitive sports the prevalence and intensity of smoking among both men and women are lower compared to the Polish population. Although after finishing sports career the percentage of smokers increases, but the intensity of smoking is still low. The non-smoking habit during sports career and long time participation in competitive sports promote non-smoking in later life.

Our results suggest that promotion of participation in competitive sports among young people, supporting long sports careers, and creating non smoking habit among athletes can be a part of strategies against smoking in later lives.

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REFERENCES

1. CDC. Cigarette smoking among adults – United States, 2002. *MMWR*. 2004;53(20):427-31.
2. World Health Organization. Health for all database. Copenhagen, Denmark: WHO, 1998.
3. Marcus BH, Albrecht AE, Niaura RS, Taylor ER, Simkin LR, Feder SI, Abrams DB, Thompson PD. Exercise enhances the maintenance of smoking cessation in women. *Addict Behav*. 1995;20:87-92.
4. Kaczyński AT, Manske SR, Mannell RC, Grawel K. Smoking and physical activity: a systematic review. *Am J Health Behav*. 2008;32(1):93-110.
5. Pate RR, Heath GW, Dowda M, Trost SG. Associations between physical activity and other health behaviors in a representative sample of US adolescents. *Am J Public Health*. 1996;86:1577-81.
6. Wojtas-Ślubowska D. Behavioral patterns promoting health in women practicing professional sport now and in the past. *Wych Fiz Sport*. 2000;1:13-27.
7. Telama R, Laakso L, Yang X. Physical activity and participation in sports of young people in Finland. *Scand J Med Sci Sports*. 1994;4:65-74.
8. Sallis JF, Saelens BE. Assessment of physical activity by self-report: status, limitations, and future directions. *Res Quart Exerc Sport*. 2000;71(2):1-14.
9. United States Department of Health and Human Services. Healthy people 2010: understanding and improving health. 2nd ed. Washington, DC: U.S. Government Printing Office, 2000.
10. Central Statistical Office. Statistical Yearbook 2004. Warsaw 2006.
11. Laaksonen M, Mcalister AL, Laatikainen T, Drygas W, Morava E, Nussel E, Oganov R, Pardell H, Uhanov M, Puska P. Do health behaviour and psychosocial risk factors explain the European East West gap in health status? *Eur J Public Health*. 2001;11:65-73.
12. Helasoja VV, Lahelma E, Prättälä RS, Patja KM, Klumbiene J, Pudule I, Kasmel A. Determinants of daily smoking in Estonia, Latvia, Lithuania, and Finland in 1994-2002. *Scand J Public Health* 2006;34:353-62.

13. Balabanowa D, Bobak M, McKee M. Patterns of smoking in Bulgaria. Tobacco Control 1998; 7:383-5.
14. Mensink GBM, Loose N, Oomen CM. Physical activity and its association with other lifestyle factors. Eur J Epidemiol 1997;13:771-8.
15. Johnson NA, Boyle CA, Heller RF. Leisure-time physical activity and other health behaviours: are they related? Aust J Public Health 1995;19(1):69-75.

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