

Smoking, work and family stress in an open population aged 45–69 years in Siberia, Russia

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Abstract

Objective. *To study the association between smoking and work and family stress in an open population aged 45–69 years in Novosibirsk, Russia.*

Materials and methods. *This prospective cohort study HAPIEE (№ AAAA-A17-117112850280-2) was carried out in 2013–2016 and included a random representative cohort of 4171 Novosibirsk citizens aged 25–69 years. Of those, 1770 (42.4%) were men and 2401 (57.6%) were women who lived in Novosibirsk permanently. We used*

the WHO questionnaires "Knowledge and Attitude towards Health" to assess attitude towards smoking. The level of work-related and family-related stress was assessed with the Karasek scale. The scales were adjusted during the large epidemiological study that was conducted as a part of the WHO-MONICA psychosocial program in 1988–1994.

Results. *Among people aged 45–69 25% were smokers (53% men and 17% women). Men made more attempts to quit smoking compared with women. Smoking prevalence is lower among older adults. Of all the participants, 14% indicated that they had high levels of family-related stress (11.8% men and 15.9% women). The level of family-related stress was not associated with age. 16.4% of respondents indicated that they had high levels of work-related stress (15.8 men and 16.8 women). The level of work-related stress was higher in the younger age groups both in men and women. Among people with low level of family-related stress 22.1% are smokers and among those with high level of family-related stress — 22.7%. Of those with high level of work-related stress 26.7% are smokers and with low levels of work-related stress — 12.4%. Individuals who indicated that they had low level of work-related stress tend to quit smoking more often and those who have high level of work-related stress try to change their attitude towards smoking more often. The participants with high level of family-related stress tend to quit smoking or change their attitude more often.*

Conclusion. *Our study showed that the prevalence of smoking among people aged 45–69 years was 24.8%. There was no difference in the amount of smoking depending on the levels of family-related stress. At the same time, there were twice as many smokers among the participants with high level of work-related stress compared with those with low work-related stress. The participants with high level of family-related stress tend to quit smoking more often compared with those with the same level of work-related stress. The results of our study indicate that the preventive measures are needed in order to lower the prevalence of smoking and the levels of stress in people aged 45–69 years.*

Keywords: *epidemiology, work-related stress, family-related stress, smoking.*

Conflicts of interest: none declared.

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Introduction

The major health risk factors in Russia are psychosocial and behavioral factors. They play a major role in the development of cardiovascular disease (CVD) and mortality rate. Smoking is one of the most important behavioral factors [1, 2]. According to the World Health Organization (WHO) report on the global tobacco epidemic 2009, tobacco is one of the leading causes of preventable death cases and annually causes deaths of more than 5 million people worldwide. Tobacco smoking causes lung cancer and CVD that eventually lead to death. These cases are mostly seen in the middle- and low-income countries. If the smoking rate stays the same, then by 2030 over 8 million people will be dying from smoking-associated diseases annually and by the end of the decade smoking will cause up to 1 billion deaths worldwide [3, 4]. People with psychosocial and behavioral risk factors have the highest risk of CVD (arterial hypertension, myocardial infarction, stroke) development [5].

As such, the objective of this study was to evaluate the association between smoking and work and fam-

ily stress in an open population aged 45–69 years in Novosibirsk, Russia.

Materials and methods

The HAPIEE (Health, Alcohol and Psychosocial Factors In Eastern Europe) [6] study was carried out in 2003–2005 and included a random representative cohort of Novosibirsk citizens aged 45–69 years ($n=4171$). Of those, 1770 (42.4%) were men and 2401 (57.6%) were women who lived in two districts of Novosibirsk permanently. The mean age was 56.5 ± 7.01 years in men and 56.3 ± 7.07 years in women. The response rate was 61%. We used the WHO questionnaires "Knowledge and Attitude towards Health" to assess attitude towards smoking. The level of work-related and family-related stress was assessed with the Karasek scale. The scales were adjusted during the large epidemiological study that was conducted as a part of the WHO "MONICA" (Multinational Monitoring of Trends and Determinants of Cardiovascular Disease) study and MONICA-Psychosocial Optional Study (MOPSY) in 1988–1994 [7–11]. The questionnaires were filled in by

the participants. Statistical analysis was performed using IBM SPSS Statistics version 11.5. Kruskal-Wallis One Way Analysis of Variance, Kruskal-Wallis H — equivalent to Chi square were used to assess the difference between groups. $p \leq 0.05$ was considered statistically significant.

The study was approved by the local biomedical ethics committee (Protocol № 4, 15.10.2009).

Results

Smoking rate among young people aged 25–44 was 31.8%, among people aged 45–69 years — 24.7%. Of those, 27.3% and 20.2% respectively would like to change their attitude towards smoking, quit smoking or decrease the amount of cigarettes they smoke ($\chi^2=53.953$ df=5; $p < 0.001$).

Both in the younger age group (25–44 years) and in the older age group (45–69 years) most people face family conflicts (35.3% and 45.2% [$\chi^2=42.412$ df=3; $p < 0.001$]), death or disease of a close relative (23.1% and 38.9% [$\chi^2= 81.592$ df=3 $p < 0.001$]), and changes in the family status (20.5% and 21% [$\chi^2=6.363$ df=2 $p < 0.05$]), respectively.

The most common workplace-associated stressful situations in the two age groups are listed in the Table 3 and are, as follows: high level of responsibility at work — 60.1% and 42.5% [$\chi^2=92.559$ df=2; $p < 0.001$], inability to relax after work — 34.3% and 41.4% [$\chi^2=58.901$ df=4; $p < 0.001$], change of specialty — 47% and 38.9% [$\chi^2=20.538$ df=1; $p < 0.001$], increased workload — 36.6% and 30.2% [$\chi^2=23.832$ df=2; $p < 0.001$], unsatisfying job — 8.1 and 14.9% [$\chi^2=79.406$ df=4; $p < 0.001$], respectively.

We also assessed attitude towards smoking in people aged 25–69 years depending on sex. In the younger age group 43.7% of men and 22.8% of women are smokers. More men than women tried to change their smoking status (11.7% vs 4%, respectively). In the older age group 35% and 17.2% of women are smokers, and more men than women never tried to quit smoking (6.6% vs 3%, respectively). It is clear that in the both age groups there are more male smokers than female; however, there are more smokers among

younger people (25–44 years) compared with older people (45–69 years) [$\chi^2=481.543$ df=15; $p < 0.001$ (total); $\chi^2=16.682$ df=5; $p < 0.001$ (men); $\chi^2=46.674$ df=5; $p < 0.001$ (women)].

Moreover, we assessed attitude towards smoking in three additional subgroups divided by age: 1st group (45–54 years), 2nd group (55–64 years) and 3^d group (65–69 years). There are 29.2% of smokers in the 1st age group, 23.2% of smoker in the 2nd age group and 16% in the 3^d age group. More individuals in the 1st and 2nd age groups tried to quit smoking compared with the participants from the 3^d group. The number of participants who never tried to change their attitude towards smoking decreases by half with age. In the older age groups there were statistically significantly more non-smokers (Kruskal-Wallis One Way Analysis of Variance Kruskal-Wallis H (equivalent to Chi square)= 54.389, Degrees of freedom= 5, P value= 0.00000).

When we analyzed attitude towards smoking among men of different age, we determined that in the 1st age group 43% of men are smokers, in the 2nd group — 33% and in the 3^d group — 21%. Compared with the 3^d group, more men in the 1st and 2nd age groups wanted to quit smoking (34% and 27% vs 18%). The proportion of men who smoke and have never tried to quit is three times smaller in the 3^d age group — 2.2% compared with 8.6% in the 1st age group [(Kruskal-Wallis One Way Analysis of Variance Kruskal-Wallis H (equivalent to Chi square)= 49.515, Degrees of freedom= 5, P value= 0.0000000).

We also analyzed attitude towards smoking among women of different age and determined that in the 1st age group 30% of women are smokers, in the 2nd group — 26% and in the 3^d group — 21%. More women in the 1st (16%) and 2nd (14%) age group were interested in quitting smoking than in the 3^d age group (10%). The proportion of women who smoke and have never tried to quit is higher in the 1st age group compared with the 2nd and 3^d groups (Kruskal-Wallis One Way Analysis of Variance Kruskal-Wallis H (equivalent to Chi square)= 16.736, Degrees of freedom= 5, P value= 0.0050281).

Table 1. Stress levels distribution in Novosibirsk population aged 45–69 years

	Men		Women		Both	
Family-related stress	N	%	N	%	N	%
Low	108	6,1	141	5,9	249	6,0
Medium	1453	82,1	1879	78,3	3332	79,9
High	209	11,8	381	15,9	590	14,1
Total	1770	100,0	2401	100	4171	100,0

Family stress levels are similar among participants of all ages. High family stress level varies from 14 to 14.7%. As such, it can be assumed that family stress level in people aged 45–69 years is not associated with age (Kruskal-Wallis One Way Analysis of Variance Kruskal-Wallis H (equivalent to Chi square)= 0.385, Degrees of freedom=2, P value=0.824968).

Family stress level distribution in male participants is similar in all age groups and reaches maximal levels in the 2nd age group (12.5%), but these results don't reach statistical significance (Kruskal-Wallis One Way Analysis of Variance Kruskal-Wallis H (equivalent to Chi square)= 0.640, Degrees of freedom= 2, P value= 0.726310).

Family stress level distribution in female participants is also similar in all age groups — 15.7% in the 1st age group and 17.7% in the 3^d age group (Kruskal-Wallis One Way Analysis of Variance Kruskal-Wallis H (equivalent to Chi square)= 0.126, Degrees of freedom= 2, P value= 0.938927).

High workplace-associated stress levels were noted in 16.4% of all the participants. Stress levels were statistically significantly higher in women compared with men (16.8% vs 15.8% respectively). The proportion of individuals with medium workplace-associated stress levels was higher in men (69.4%) than in women (65.2%).

We also analyzed workplace-stress level among both men and women of the three age groups and the analysis showed that there were more individuals with high workplace-associated stress levels in the 1st age group (18.3%) compared with the 3^d age group (12.3%). At the same time, the proportion of individuals with low workplace-associated stress was

higher in the 3^d age group — 22.3% compared with the 1st age group (12.2%) [(Kruskal-Wallis One Way Analysis of Variance Kruskal-Wallis H (equivalent to Chi square)= 46.622, Degrees of freedom= 2, P value= 0.00000).

Analysis of workplace-associated stress distribution in male participants showed that men in the 1st and 2nd age groups had higher levels of stress (17% and 16.7%) compared with the participants in the 3^d group (11.3%), and the differences are statistically significant. There were more men with low workplace-associated stress levels in the 3^d group (19.2%) compared with the 1st group (11%) (Kruskal-Wallis One Way Analysis of Variance Kruskal-Wallis H (equivalent to Chi square)= 13.712, Degrees of freedom= 2, P value= 0.001053).

Analysis of workplace-associated stress distribution in female participants showed that the proportion of women with high stress level was higher in the 1st age group (19.5%) compared with the 3^d age group (13.1%). The proportion of women with low workplace-associated stress level was higher in the 3^d group (24.6%) compared with the 1st age group (13.2%) (Kruskal-Wallis One Way Analysis of Variance Kruskal-Wallis H (equivalent to Chi square)= 34.910, Degrees of freedom= 2, P value= 0.00000).

Among the participants with high family-related stress level 22.7% are smokers and with low family-related stress level — 22.1% (Table 2). The participants with high family-related stress more often were able to successfully quit smoking (23.1% vs 10.8%) or reduce the number of cigarettes they smoke daily. The participants with medium family stress level were usually unsuccessful in quitting smoking. Almost

Table 2. Family-related stress levels distribution in Novosibirsk population aged 45–69 years depending on attitude towards smoking

Attitude towards smoking	Stress level					
	(men and women 45–69 years)					
	Low		Medium		High	
	N	%	N	%	N	%
Have you ever tried to change your attitude towards smoking?						
1. I have never smoked	167	67,1	1715	51,5	302	51,2
2. I have stopped smoking	27	10,8	772	23,2	154	26,1
3. I have reduced the number of cigarettes I smoke	6	2,4	214	6,4	49	8,3
4. I have stopped smoking for some time, but now I smoke again	21	8,4	227	6,8	47	8,0
5. I tried to quit smoking, but failed	9	3,6	247	7,4	25	4,2
6. I smoke and I have never tried quitting	19	7,6	157	4,7	13	2,2
Total	249	100%	3332	100%	590	100%

twice as many participants with high family stress level tried to change their attitude towards smoking (20.5%) as with low family stress (14.5%).

Analysis of family stress distribution in male participants depending on the attitude towards smoking showed that more men with high family stress level were smokers (35.9%) than with low family stress (33.4%). Among men with high family stress only 31.1% never smoked, and among men with low family stress — 51%. More men with high family stress used to smoke, but quit (33%), compared with men with low family stress (14.8%). More men with low family stress currently smoke and have never tried to quit (10.2%) compared with those with high family stress — 2.4% (Kruskal-Wallis One Way Analysis of Variance Kruskal-Wallis H (equivalent to Chi square)= 26.845, Degrees of freedom= 5, Pvalue= 0.000061).

Analysis of family stress distribution in female participants depending on the attitude towards smoking showed that 14.2% of women with low family stress and 15.5% of women with high family stress are smokers. 22.3% of women with high family stress were able to quit smoking compared with women with low family stress (6.4%). More women with low family stress never smoked (79.4%) compared with women with high family stress (62.2%). At the same time, more women with low family stress smoke and never tried to quit — 5.7% compared with 2.1% (Kruskal-Wallis One Way Analysis of Variance Kruskal-Wallis H (equivalent to Chi square)= 20.550, Degrees of freedom= 5, P value=0.000985).

Currently, 26.7% of the participants with high workplace-related stress and 12.4% of the participants with low workplace-related stress smoke (Table 3).

More individuals with low workplace-related stress used to smoke but were able to quit compared with individuals with high workplace-related stress. Also, more individuals with low workplace-related stress smoke less than they used to, quit smoking for some time or tried to change their attitude towards smoking but didn't succeed.

Analysis of workplace stress distribution in male participants depending on the attitude towards smoking showed that 36.8% of men with high workplace stress and 26.1% of men with low workplace stress. At the same time, more men with high level of workplace related stress (40%) compared with men with low level of workplace stress (26.8%) have never smoked. More men with low workplace-related stress used to smoke but were able to quit (47.1%) compared with men with high workplace-related stress (23.2%). More men with low workplace-related stress smoke and have never tried to quit (8.8%) compared with those with high workplace-related stress level (5.4%). More men with high workplace-related stress smoke less than they used to, quit smoking for some time or tried to change their attitude towards smoking but didn't succeed. (Kruskal-Wallis One Way Analysis of Variance Kruskal-Wallis H (equivalent to Chi square)= 44.518 Degrees of freedom= 5, P value= 0.00000).

Analysis of workplace stress distribution in female participants depending on the attitude towards smoking showed that 19.6% of women with high workplace stress and only 4.2% of women with low workplace stress. More women with low workplace stress (47.9%) compared with women with high workplace stress (13.4%) used to smoke but were able to quit. More women with high workplace stress (17.4%) compared with women with low workplace stress (3.7%)

Table 3. Workplace-related stress levels distribution in Novosibirsk population aged 45–69 years depending on attitude towards smoking

Attitude towards smoking	Stress level					
	(men and women 45–69 years)					
	Low		Medium		High	
	N	%	N	%	N	%
Have you ever tried to change your attitude towards smoking?						
1. I have never smoked	277	40,0	1525	54,6	382	55,9
2. I have stopped smoking	330	47,6	504	18,0	119	17,4
3. I have reduced the number of cigarettes I smoke	28	4,0	187	6,7	54	7,9
4. I have stopped smoking for some time, but now I smoke again	19	2,7	207	7,4	69	10,1
5. I tried to quit smoking, but failed	14	2,0	232	8,3	35	5,1
6. I smoke and I have never tried quitting	25	3,6	140	5,0	24	3,5
Total	693	100	2795	100,0	683	100,0

smoke less than they used to, quit smoking for some time or tried to change their attitude towards smoking but didn't succeed [Kruskal-Wallis One Way Analysis of Variance Kruskal-Wallis H (equivalent to Chi square)= 195.047, Degrees of freedom= 5, P value= 0.00000].

Discussion

According to the Tobacco Research and Intervention Program everyone gets exposed to some kind of stress during their life and cope with it differently. Many people believe that stress can be reduced by smoking a cigarette. There are several reasons why people use smoking as a coping mechanism: they can relax and socialize during smoking and later helps to manage symptoms of nicotine withdrawal symptoms [14].

However, there are no evidence that nicotine helps to relieve stress and at the same time, there are no studies that showed that smokers have higher levels of stress compared to non-smokers [15–17].

During the observation period in 1984–2003 in Novosibirsk we have carried out four population screenings in 1984, 1988, 1994 (25–64 years) and 2003–2005 (45–69 years) and studied attitude towards smoking. According to the results of these screening programs, the number of smokers has increased, especially among women. In 1984–1989 55% of men and 4% of women smoked, and by 1994 the number of smokers increased — 61% of men and 11% of women [18–21]. The problem of smoking control has only worsened over the described period of time, as the prevalence of tobacco use has increased [2]. The results of the current study are similar to the previous findings and tendencies. We analyzed the prevalence of family stress, workplace-associated stress and their association with smoking in men and women aged 45–69 years. According to our results, 35% of men and 17% of women smoke (24.8% of all population). There are many people who wish to change their attitude towards smoking and quit or reduce smoking (72%). There are more male smokers than female smokers; men tended to change their attitude towards smoking more often compared with women, but at the same time, there are more individuals who never tried to quit among men compared with women. Prevalence of smokers decrease with age.

Analysis of workplace stress in different age groups showed that the level of stress is similar among people of different age both in men and in women and, therefore, is not associated with age.

Analysis of family stress in different age groups showed that individuals with high level of family

stress usually tended to quit smoking or change their attitude towards smoking more often compared with individuals with low level of family stress.

There were more smokers and those who were able to quit smoking among men and women with high level of family stress. Men and women with low level of family stress have even never smoked or are smokers who are not ready to change their attitude towards tobacco use.

Analysis of workplace-related stress showed that people with low level of workplace-related stress tended to quit smoking more often, and those with high level of workplace-related stress tended to change their attitude towards smoking more often.

Men and women with high workplace-related stress smoke more often but also try to change their attitude towards smoking more often. Men and women with low workplace-related stress quit smoking more often, but at the same time the proportion of individuals who smoke and have never tried to quit is higher in this cohort.

It can be assumed that stimulation and relaxation is often needed at the workplace, and according to some studies, adult smokers have periods of high stress between smoking and only smoking can relieve this stress [22–24]. However, when some time passes, people develop stress associated with nicotine withdrawal and need to smoke again. We agree with the authors who state that smoking doesn't relieve stress and can only cause its development [24].

Conclusion

1. Our study showed that the prevalence of smoking among people aged 45–69 years was 24.8% (35% men and 17% women). There are many people who wish to change their attitude towards smoking and quit or reduce smoking (72%). Men tended to change their attitude towards smoking more often compared with women.

2. There was no difference in the amount of smoking depending on the levels of family-related stress. Both men and women with high level of family-related stress are often smokers but try to quit more often. Men and women with low level of family stress have even never smoked or are smokers who are not ready to change their attitude towards tobacco use.

3. There were twice as many smokers among the participants with high level of work-related stress as among those with low work-related stress. The participants with high level of workplace-related stress tend to quit smoking more often and the

participants with low levels of workplace-related stress try to change their attitude towards smoking more often.

4. The participants with high level of family-related stress tend to quit smoking more often compared with those with the same level of work-related stress.

Conflict of interest: none declared

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