

SMOKING: HISTORICAL, MEDICAL AND SOCIAL ASPECTS

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ABSTRACT

The comparative analysis of tobacco smoking in USA, Great Britain, Japan, and Ukraine is given. The principal aspects of hazardous habit to smoke such as chemical contents of tobacco smoke, health effects, history of prevention and minimization of smoking in civilised countries are discussed. Author try to understand why there is much less smoking in civilized countries in contrast to the Ukraine where it is widespread and provokes serious health problems.



Introduction

I first visited the United States as Fulbright scholar in 1996. Then and subsequently I obtained a number of impressions with this country – polite and smiling people, modern research equipment and an excellent science library at the University of Georgia, a perfect ecological situation – flowers, squirrels, chipmunks and singing birds, fresh and clean air, green and clean surroundings. One thing that very much impressed me, and even now, during my third visit to the USA, I remain astonished that relatively few people smoke! I have met the similar situation with smoking in Japan, where there are special places for smokers and it is impossible to see a Japanese on the street with cigarette.

My visit to the USA in 2008 involves research in the area of phytoremediation of indoor air. Professor Stanley Kays, my supervisor, who organized my visit to the University of Georgia, introduced me to this interesting ecological problem, explaining that over 300 volatile organic compounds have been identified as indoor pollutants and many cause a diverse cross-section of illnesses – such as allergy, asthma, frequent fatigue, sick building syndrome. One major source of indoor pollution is smoking. This lead me to search the literature using the library's data bases and Internet sources to try and understand why there is much less smoking in civilised countries in contrast to the Ukraine where it is widespread and a provokes serious health problems, where it is easy to meet a lot of young smokers, where the streets are covered with plenty of cigarette-ends?

History of smoking

Tobacco smoking according to the Online Medical Dictionary is "the direct inhalation of tobacco smoke, the basis of major health hazards". The origin of this habit is related to the smoking of burned leaves of the plant *Nicotiana tabacum* by the American Indians since 2000 BC.

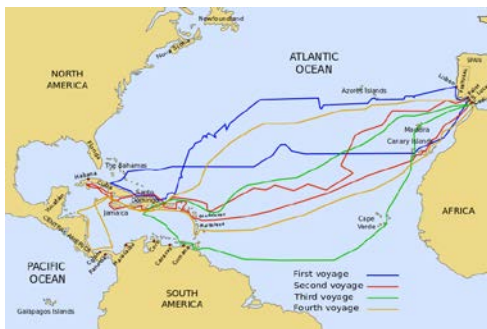


Nicotiana tabacum, or cultivated tobacco, is a perennial herbaceous plant



Aztec women are handed flowers and smoking tubes before eating at a banquet, Florentine Codex, 1500

After discovering America by Christopher Columbus in 1492 tobacco has been transferred to Europe where its triumphal invasion began. The same influence of tobacco smoking was observed in Asia continent.



12 October 1492 – Christopher Columbus discovers The Americas for Spain



The rulers of many countries impeded the penetration of smoking. So, Chinese emperor Wan-li banned tobacco smoking in 1612; the sultan Murad IV (r.1623-1640) did so in Ottoman Empire; he cut off the hands of smokers. Russian tsar Alexis whipped the smokers and slit their noses for the first offence and executed for the second one [1]. Pope Urban VIII imposed excommunication for smoking [2]. The habit of smoking tobacco penetrated into Japan in the 16th century with Portuguese sailors and traders. In spite of laws which prohibited smoking, penalties, arrests, confiscation property of tobacco sellers the system of prohibition of smoking in Japan of those time didn't work. The ban was revoked in 1625 and since then tobacco had been recognized as a legal drug [3]. So, mankind has been smoking since ancient times and the habit undergoes periodic increases during times of war or stress.

The composition of tobacco smoke

Tobacco smoke contains about **4,700** chemicals (full list of tobacco smoke constituents can be found in [4]), including nicotine, tar, polycyclic aromatic hydrocarbons, vinyl chloride, phenols, and cadmium.

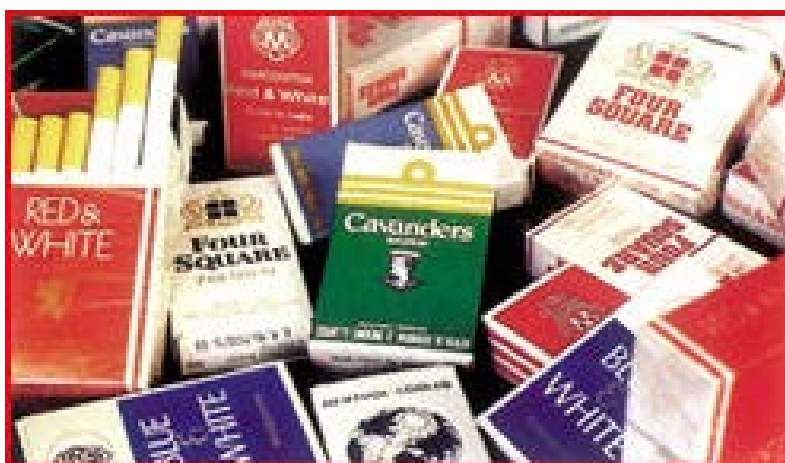
The toxic effects are produced by such tobacco compounds as carbon monoxide, nitrogen oxides (NO_x), hydrogen cyanide, ammonia; the following tobacco smoke chemicals are carcinogens: hydrazine, vinyl chloride, urethane, 2-nitropropane, quinoline, benzo[a]pyrene, dibenz[a,h]anthracene, benzo[b]fluoranthene, benzo[j] fluoranthene, dibenzo[a,h]pyrene, dibenzo[a,i]pyrene, dibenz[a,j]acridine, indeno[1,2,3-cd]pyrene, benzo[c]phenanthrene, benz[a] anthracene, benzo[e]pyrene, chrysene, methylchrysene, methylfluoranthene, dibenz[a,c] anthracene, dibenz[a,h]acridine, dibenzo[c,g]carbazole, nitrosodimethylamine, nitrosoethylmethylamine, nitrosodiethylamine, nitrosodi-n-propylamine, nitrosodi-n-butylamine, nitrosopyrrolidine, nitrosopiperidine, nitrosomorpholine, N'-nitrosornicotine, 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanol, N'-Nitrosoanabasine, N¹-N nitrosoanatabine, aromatic amines, aromatic nitrohydrocarbons, polonium-210, nickel, arsenic, cadmium [5].

The smoke can be separated into gas and particulate phases. Gaseous phase of tobacco smoke consists of carbon monoxide, carbon dioxide, nitrogen oxides, ammonia, volatile nitrosamines, hydrogen cyanide, volatile sulfur containing compounds, volatile hydrocarbons, alcohols and aldehydes and ketones [6].

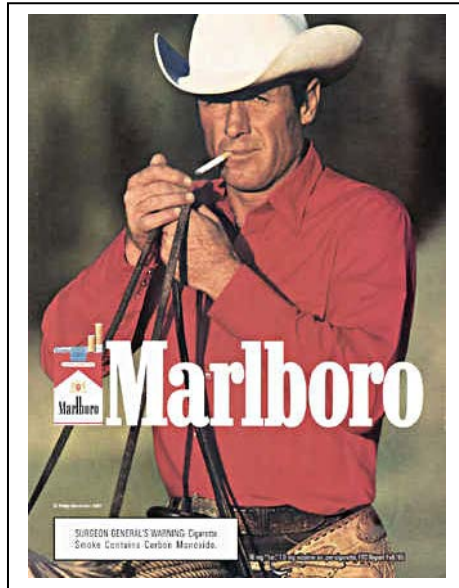
Particulate phase contains mainly nicotine, moisture and tar – the compound in tobacco that remains after the moisture and nicotine are subtracted.

Reasons why smoking

Smoking is contributed by such factors as the state of euphoria that smoker feels during the first attempts to smoke, advertising, examples of prominent figures - representatives of politics, science, culture and literary heroes, war and stress.



The role of advertising in the prevalence of smoking



By the way, Wayne McLaren, an American model, actor, and rodeo performer, famous with his promotional work for the Marlboro cigarette advertising campaign as the "Marlboro Man", has died from the lung cancer in 1992.



Examples of prominent figures - representatives from politics, science, culture, literature heroes and artistic images to promote smoking

Effect of smoking on human health

Nicotine is an alkaloid that constitutes approximately 0.6-3.0% of dry weight of tobacco. This compound is synthesized in the roots and accumulated in the leaves of tobacco plant. Nicotine enters the brain during smoking within 15 seconds and remains there at high concentration during 2 hours [7]. In low concentrations nicotine induces stimulating effect and state of euphoria.

Cigarettes and other forms of tobacco are addicting; nicotine is the drug that causes addiction; pharmacologic and behavioural characteristics that determine tobacco addiction are similar to those that determine addiction to drugs such as heroin and cocaine [8]. According to the American Heart Association, "Nicotine addiction has historically been one of the hardest addictions to break."

Tar is purportedly the most destructive component in habitual tobacco smoking, accumulating in the smoker's lungs over time and damaging them through various biochemical and mechanical processes. Tar includes the majority of mutagenic and carcinogenic agents in tobacco smoke. Polycyclic aromatic hydrocarbons (PAH), for example, are genotoxic via epoxidation [9].

The composition of the smoke that produced by the smoker depends on the composition of tobacco, its package, type and size of the column of tobacco, the parameters of the filter system and the temperature of tobacco burning.

The systematic tobacco smoking is accompanied with the whole bouquet of health problems and dangerous diseases such as nausea and appetite suppression, irritation of eyes, nose, throat, ailments of respiratory system, increased heart rate and blood pressure, various forms of cancer, asthma and allergy, impotence [10].

It is interesting that one does not actually have to smoke to suffer the consequences of smoking. Second-hand smoke is the combination of direct tobacco smoke given off by the burning end of the cigarette and the smoke exhaled by the smoker. The 2006 Surgeon General's report informs that nearly half of all non-smoking Americans are still regularly exposed to second-hand smoke; the only way to protect non-smokers from the dangerous chemicals in second-hand smoke is to eliminate smoking indoors. Exposure to second-hand smoke can cause similar health problems, including cancer, in otherwise healthy adults.



Tobacco smoke exhaled by smokers (passive smoking) is dangerous for people who do not smoke, especially for children

Second-hand smoke is hazardous source for children health, provoking respiratory tract illness such as pneumonia, bronchitis, middle ear infection, severe asthma induction, and sudden infant death syndrome (SIDS) [11].

The U.S. Environmental Protection Agency (EPA), the U.S. National Toxicology Program (NTP), the U.S. Surgeon General, and the International Agency for Research on Cancer (IARC) have classified second-hand smoke as a carcinogenic agent. In the United States, second-hand smoke is responsible for about 46,000 annual heart disease deaths [12-15].

The U.S. Food and Drug Administration has asserted nicotine can penetrate into the bloodstream where it releases of *epinephrine* into the blood. This hormone and neurotransmitter (which is widely called *adrenaline*) provokes the narrowing the arteries, increasing blood pressure and heart rate [16].

In the United States as soon as cigarettes became popular, the incidence of lung cancer reached epidemic levels; at the end of the twentieth century 124,813 smokers died during 1995-1999 from lung cancer [17].

Measures against smoking

On January 11, 1964, Luther L. Terry, Surgeon General of the U.S. Public Health Service, summarized more than 7,000 articles relating to smoking and disease already available at that time in the biomedical literature and released the first report of the Surgeon General's Advisory Committee on Smoking and Health. Surgeon General concluded that cigarette smoking is a cause of lung cancer and laryngeal cancer in men, a probable cause of lung cancer in women, the most important cause of chronic bronchitis [18].

The 1994 Surgeon General's report was dedicated to global problems of the health consequences of tobacco use by young people, epidemiology of tobacco use among young people in the United States, psychosocial risk factors for initiating tobacco use, tobacco advertising and promotional activities, efforts to prevent tobacco use among young people. It was shown that "tobacco use primarily begins in early adolescence, typically by age 16; almost all first use occurs before the time of high school graduation" [19].

The 2004 Surgeon General's report reviewed more recent data showing that "smoking harms nearly every organ of the body, causing many diseases and reducing the health of smokers in general". Smoking causes many additional diseases including abdominal aortic aneurysm, acute myeloid leukaemia, stomach cancer, pancreatic cancer, cervical cancer, periodontosis, and pneumonia [20].

Along with the human misery caused by smoking, the cost of smoking to the healthcare system and in reduced productivity of workers is astronomical.

Significant measures were subsequently taken to protect against smoke mediated health problems. Informational, educational, clinical, legislative, regulatory and other strategies were developed reduce smoking in the U.S. For example, smoking is now-banned in public places and all forms of public transport (e.g., airlines, trains, buses). Smoking was also been reduced via the Nonsmokers' Right Movement, and increase in the federal cigarette tax (effectively doubling it), TV and radio programs on the health hazards of smoking, conferences on smoking and health and so on. The results of these

actions were significant. Cigarette smoking had begun increasing rapidly among high school students in the early 1990s, peaking in the 1996-97, and then began a decline by the end of decade. By the year 2000, smoking among high school seniors was 31% of the level in 1980, and since 2000 teenage smoking rates have fallen further [21]-[22].



Place for Smoking (State of Georgia, USA). Photo by author

The 2006 Surgeon General's report informs that "The good news is that, unlike some public health hazards, second-hand smoke exposure is easily prevented" – said Surgeon General Richard H. Carmona. Application of biological marker for second-hand smoke exposure made it possible to establish that the proportion of non-smokers has been halved from 88 percent in 1988-91 to 43 percent in 2001-2002 [23].



Posters that prohibit smoking

Cigarette production in United States decreased by about 34 %, export decreased by about 34%, and consumption dropped by about 31 % (from 525.0 in 1990 to 360.0 billions cigarettes in 2007) during period of time from 1990 till 2007 [24].

Similar situation with smoking control takes place in Great Britain. The Royal College of Physicians of London has published in 1962 First Report "Smoking and Health" [25] which concluded that smoking causes lung cancer, the Second Report "Smoking and Health Now" in 1971 [26], and Third Report

“Smoking or Health” in 1977 [27] which developed a global strategy of smoking control in Great Britain. Recent investigations demonstrated that during 30 years there was a decline in adult smoking from 45 % in 1974 till 25 % in 2004. The younger people demonstrate the prevalence of smoking by age groups: age 16-19 from 34 % in 1978 till 24 % in 2004 [28].

About 50-60 % of Japanese men were smokers in 1996; one third of the Japanese population that smoked buy 900 million cigarettes every day, making Japan the third largest tobacco market in the world after China and the US; a pack of 20 cigarettes still only costed 230-260 yen, the lowest price among major industrialized countries.



Measures against smoking in Japan.
Photo by author

According to the information of Japanese Ministry of Health and Welfare 18 million Japanese are drug-dependent on nicotine, 54% of all Japanese smokers. It was reported in 1997 by the Japanese Health and Welfare Ministry that the smoking related costs was about ¥ 4 trillion a year [29].

Japan antismoking policy is characterized with the following facts and data [30]: the highest smoking rate was reached in 1965: 47.1 % of adult men and 15.7 % of adult women; in 1977 Japanese newspaper *Mainichi shinbun* has published yearlong series on the hazards of smoking; in 1985 government of Japan privatizes the tobacco monopoly, creating *Japan Tobacco* and allotting 100 % of the stock to the Finance ministry; Women’s Action on Smoking created in 1987; Sixth World Conference on Smoking and Health was organized this year also; as result of abovementioned measures smoking rates declined in Japan to 34.6 %.

The situation in Ukraine

What about Ukraine? What is current situation with smoking among the Ukrainian population and in particularly, Ukrainian youth?

Cigarette smoking is a major cause of morbidity and mortality in the former Soviet countries. The prevalence of individuals that regularly smoked throughout their lifetime was 80.5% in men and 18.7% in women, with the median ages for starting to smoke 17 and 18, respectively. The youngest female

cohorts (born 1965-1984) were 26 times more likely to start smoking than the oldest [31].



Women with education, especially young girls and those who are living in big cities are the most active tobacco consumers

It was shown that 57 % of men and 10% of women were current smokers and an additional 21 and 7%, respectively, were ex-smokers [32]. Smoking behaviour has changed considerably over successive generations, with an increase in the proportion of women smoking and a reduction in the mean age at which smoking is taken up. Factors associated with smoking include young age, urban residence (among women), and material hardship, in particular unemployment.

As a whole, 41 % of Ukrainians smoke [33]; 100,000 Ukrainians die each year from smoking diseases [34].

Recent data [35] indicate that the risk of starting to smoke at a young age was related to the age of the individual, exposure to tobacco advertising and related information, exposure to second-hand smoke and having no household smoking restrictions. The prevalence of current smoking among Ukrainian men (standardized for age) was 54.8% in 2001 but had increased to 66.8% in 2005. Among Ukrainian women, the incidence increased from 11.5% in 2001 to 20.0% in 2005. In the Ukraine, smoking prevalence is increasing in most population groups. Men with limited education had the highest smoking prevalence. Among women, the most educated, youngest and those living in larger cities are the most frequent tobacco users; other groups are also increasing their tobacco use. The decline in real cigarette prices in Ukraine in 2001-5 could be the main factor explaining the recent increasing prevalence of smoking [36].

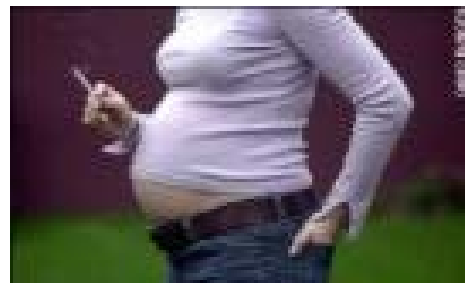


The relatively early attempt to start smoking among the younger generation is observed in Ukraine

One impediment to changing this disastrous increasing frequency of smoking in the Ukraine is that many Ukrainian physicians, who should be implementing an anti-tobacco policy among their patients, actively use tobacco themselves. In all, 13.9% of physicians were current smokers and 21.6% reported being past smokers, with significantly more men than women in either category [37].

Data from a survey of 536 current smokers who completed a stages-of-change questionnaire in a public square in the centre of Kiev's business district, in 2000 indicated that the majority (56.1%) had not thought about stopping smoking. Less than 20% of the subjects intended to change their smoking behaviour. A progressively later age for the beginning to smoke was associated with fewer cigarettes smoked per day. Females were more likely than males to seriously consider cutting down the number of cigarettes they smoked. However, males were more likely to have intentionally quit smoking for at least one day within the past year [38].

About 700 women of Ukraine were examined from the point of view of possible effects of smoking during pregnancy [39]. It is shown that smoking during pregnancy is associated with placental insufficiency, low birth weight, fetus hypotrophy, hip joint dysphasia. The father smoking is related to decreased fertility, late toxicosis, miscarriage threat, small baby, lower infant functional status.



Smoking during pregnancy causes a number of diseases and problems

From the first site, there are attempts of Parliament and Government to eliminate this hazardous habit – it is possible to mention, for example, the

Directive N 131 from June 24, 2005, concerning the approval of Complex Plan “Prophylaxis and overcoming smoking in Ukraine in 2005-2010” [40]. Parliament of Ukraine has approved the Law of Ukraine “About Prevention of Using Tobacco Products and its Ruinous Effect on Population Health” [41]. Ukraine’s parliament ratified in 2006 the Framework Convention on Tobacco Control (FCTC) and voted to ban smoking in public areas such as bars and restaurants [42].

There is a statement that a significant number of Ukrainian men and women have stopped smoking since 2005, two-thirds of current smokers would like to quit smoking [43]. After the abovementioned legislative acts Ukraine observes decline in smoking prevalence. Between June 2005 and May 2009 prevalence of daily smoking among adults changed from 37% to 27%, in men from 62% to 49%, in women from 17% to 9% [44].

Serhiy Kvit, the President of the National University of “Kyiv-Mohyla Academy”, informed that a full ban of smoking was established in the university campus in autumn 2008 [45].

Everything is all right in these declarations, but unfortunately Ukraine continues to possess the advanced position in tobacco smoking.

It is a pity, but some of the best and brightest representatives of our youth population – students and scholars, are smoking and either do not understand or chose to ignore the future consequences of their actions. Based on this evidence, I readily concur with the conclusions of the scientists at National University “Kyiv-Mohyla Academy” [35] that “tobacco promotion efforts appear to have been significantly more effective in the Ukraine than those for smoking control”.

We must remember always that tobacco prematurely kills more than 100,000 people in Ukraine annually and is some 13 percent of the country’s disease burden [42].



Tobacco prematurely kills more than 100,000 people in Ukraine annually

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КУРІННЯ: ІСТОРИЧНІ, НАУКОВІ, МЕДИЧНІ ТА СОЦІАЛЬНІ АСПЕКТИ

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Анотація

Пропонується порівняльний аналіз куріння тютюну в США, Великобританії, Японії та Україні. Розглядаються основні аспекти пагубної звички палити, а саме історія виникнення куріння, небезпечні хімічні сполуки, що містяться у тютюновому диму, вплив куріння на здоров'я людини, засоби захисту та мінімізації куріння у цивілізованих країнах. Автор прагне зрозуміти, чому кількість курців зменшується у розвинених країнах, тоді як в Україні ця звичка поширюється з кожним роком, в тому числі серед молоді та жінок, і викликає серйозні проблеми для населення.

КУРЕНИЕ: ИСТОРИЧЕСКИЕ, МЕДИЦИНСКИЕ И СОЦИАЛЬНЫЕ АСПЕКТЫ

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Проводится сравнительный анализ курения табака в США, Великобритании, Японии и Украине. Обсуждаются принципиальные аспекты пагубной привычки курения – такие как химический состав табачного дыма, влияние курения на здоровье, история попыток предотвратить и минимизировать курение в цивилизованных странах. Автор пытается понять, почему в цивилизованных странах количество курящих существенно меньше по сравнению с Украиной, где курение широко распространено и приводит к серьезным проблемам для здоровья.