

# Tobacco Use Among Bangladeshi Immigrants and Greek Patients with Diabetes

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## Abstract

**Background:** Cigarette smoking is a risk factor for cardiovascular diseases. We investigated a cohort of Greek Caucasian and Bangladeshi immigrant patients with diabetes mellitus.

**Methods:** 166 patients from Bangladesh and 123 patients from Greece with diabetes were assessed for tobacco use status.

**Results:** Immigrants smoked at a much lower rate than Greeks. ( $5.61 \pm 11.91$  vs  $24.77 \pm 24.20$  pack-years,  $p < 0.001$ ). A total of 40 (24.1%) patients from Bangladesh vs 58 (47.2%) patients from Greece were currently cigarette smokers, whereas 18 (10.8%) patients from Bangladesh and 37 (30.1%) patients from Greece reported that they were ex-smokers and 108 (65.1%) patients from Bangladesh and 28 (22.8%) patients from Greece never smoked ( $p < 0.001$ ). Smokers had higher mean glucose and HbA1c values in both ethnic groups independently. Higher education level and living with spouse were associated with less smoking.

**Discussion:** Ethnicity may play important role in affecting the smoking habits of individuals.

**Keywords:** Immigrants; Diabetes; Smoking; Cardiovascular risk

## Introduction

Smoking tobacco is a risk factor for several diseases and has been increasing in many developing countries. Apart from a global public health concern, it is also an economic problem for individuals, societies, and the country as a whole. The widespread use of tobacco is observed also in developing countries, especially in Asia [1]. The risks of cancer, cardiovascular disease, respiratory disease, and a range of other health problems are increased with tobacco smoking; as a result, smokers are at higher risk than nonsmokers of dying prematurely [2]. It is reported that 18% of deaths in high-income countries occur due to tobacco use, whereas in middle- and low-income countries it is 11% and 4% respectively [3]. According to American Diabetes Association 2015 guidelines, all patients with diabetes are encouraged not to smoke and smoking cessation counseling should be a routine component of diabetes care [4]. As regards the relation between smoking and diabetes mellitus, active smoking is shown to be associated with increased risk of diabetes mellitus in a dose-dependent manner [5]. Smoking cessation is related to improvement of metabolic parameters in patients with diabetes [6] and to a net cardiovascular benefit of smoking cessation, despite subsequent weight gain [7]. Considering the deleterious effect of smoking on diabetes mellitus, it may be beneficial to clarify the relation between smoking and glycaemia in diabetic patients for prevention of diabetic complications. In this context, the aim of the present study was to examine the association between smoking status in two different groups of patients with diabetes: Immigrants from Bangladesh who live in Greece and Greek-born subjects.

## Materials and Methods

A total of 166 immigrants with diabetes (122 with Type 2 and 44 with Type 1 diabetes mellitus) from Bangladesh were compared with 123 Greek

Caucasian patients (82 with Type 2 and 41 with type 1 diabetes mellitus). Patients from Bangladesh had a mean  $\pm$  SD duration of  $10.34 \pm 6.2$  years of living in Greece. Patients were recruited through community outreach, hospital-based diabetes clinics and immigrant-serving organizations between 2010 and 2013. Only patients who were willing to participate during their visit were recruited and interviewed. Participants with serious health problems were excluded. A questionnaire was formulated and pilot-tested for the comprehensibility of questions by both ethnic groups. All materials were developed in English, translated into Bengali by a certified translator, and all patients from Bangladesh completed the in-person survey with a bilingual research assistant. Interviews were conducted, a physical examination followed and blood samples for plasma glucose and HbA1c were collected. All blood examinations were performed after informed patient consent (all the necessary documents were given to the patients in their native language). The study was approved by the Scientific Committee of Laikon General Hospital, University of Athens Medical School. The blood samples were analyzed at Aeginition Hospital, Laboratory of Biopathology. Demographic characteristics were assessed. These included age, gender, living alone or living with a spouse, level of education, number of years living in Greece and employment status. Diabetes-related information was collected, including the type of diabetes, and the duration of the disease since diagnosis. Obesity risk was determined and calculated based on height, weight, BMI and waist circumference. Based on smoking status, patients were classified as never smokers, past smokers, or current smokers. Never smokers were defined as those who had never smoked. Past smokers were defined as those who smoked before, but did not smoke at the time of study registration. Current smokers were further subdivided by pack-years of cigarette smoking. "Pack-years" is a way to measure the amount a person has

smoked over a long period of time and they are calculated by number of cigarettes per day divided by 20, multiplied by number of years smoked. Data were analyzed using SPSS analytical software 22 (SPSS Inc – IBM Corporation, New York, United States). Chi-square tests (for differences of proportions) and t-tests (for differences in means) were used. Variables with p-values of less than 0.05 were considered significant upon analysis.

## Results

A total of 40 (24.1%) patients from Bangladesh and 58 (47.2%) patients from Greece were smokers, 18 (10.8%) patients from Bangladesh and 37 (30.1%) patients from Greece reported that they were ex-smokers at the time of examination and interview, whereas 108 (65.1%) patients from Bangladesh and 28 (22.8%) patients from Greece never smoked ( $p < 0.001$ ). Patients from Bangladesh reported less tobacco use than Greek patients ( $5.61 \pm 11.91$  vs  $24.77 \pm 24.20$  pack-years,  $p < 0.001$ ). The comparative data of the patient cohorts from Bangladesh and Greece, within each ethnic group and according to current smoking status, are shown in Table 1.

Patients from BANGLADESH (n=166)			
	Currently smokers N=40	Currently non-smokers N=126	p- value
Mean age (years)	43.25 ± 7.58	44.31 ± 8.37	0.493
Male (n= 150)	38 (25.3%)	112 (74.7%)	0.087
Female (n=16)	1 (6.3%)	15 (93.8%)	
Mean stay in Greece (years)	9.05 ± 4.31	10.75 ± 6.73	0.046
Disease duration (years)	3.95 ± 4.09	5.15 ± 4.61	0.420
Age at onset (years)	39.58 ± 7.04	39.22 ± 7.41	0.664
BMI (kg/m <sup>2</sup> )	23.30 ± 2.80	24.47 ± 3.45	0.209
Waist circumference (cm)	89.29 ± 7.03	93.11 ± 9.33	0.062
Glucose (mg/dl)	213.86 ± 86.37	183.08 ± 70	0.032
HbA1c (%)	7.86 ± 1.49	7.70 ± 1.63	0.582
Illiterate	11 (44%)	14 (56%)	0.005
Elementary school	14 (33.3%)	28 (66.7%)	
High school	12 (14.1%)	73 (85.9%)	
University degree	2 (14.3%)	12 (85.7%)	
Family support/living with spouse	2 (7.4%)	25 (92.6%)	0.031
Currently working	20 (21.5%)	73 (78.5%)	0.464
Patients from GREECE (n=123)			
	Currently smokers N=58	Currently non-smokers N=65	p- value
Mean age ± SD (years)	48.50 ± 8.24	48.97 ± 10	0.430
Male (n=102)	49 (48%)	53 (52%)	0.665
Female (n=21)	9 (42.9%)	12 (57.1%)	
Disease duration ± SD (years)	7.43 ± 6.29	7.26 ± 6.31	0.529
Age at onset	41.52 ± 9.92	41.98 ± 10.36	0.643
BMI (kg/m <sup>2</sup> )	29.48 ± 11.80	28.65 ± 4.62	0.053
Waist circumference (cm)	102.20 ± 18.74	103.95 ± 12.56	0.048
Glucose (mg/dl)	178.79 ± 94.48	144.89 ± 64.24	0.035
HbA1c (%)	7.71 ± 1.77	7.41 ± 1.67	0.049
Illiterate	3 (75%)	1 (25%)	0.259
Elementary school	12 (60%)	8 (40%)	
High school	35 (46.1%)	41 (53.9%)	
University degree	58 (34.8%)	15 (65.2%)	
Family support/ living with spouse	54 (45.4%)	65 (52.8%)	0.031
Currently working	24 (33.8%)	47 (66.2%)	0.001

**Table 1:** Clinical and epidemiological characteristics of patients to current smoking status, expressed in Mean Value ± Standard Deviation (mean ± SD) or Count and Percentage (N (%)).

## Discussion

In our study, most immigrants reported less tobacco use than native Greeks. This lower risk could be partially explained by country-of-origin contextual factors, lower level of income and religious or cultural factors. From Islamic perspective, smoking is considered forbidden because of the harm it causes to individuals and society [8]. Nevertheless, the smoking prevalence in Bangladesh is reported between 33.40% and 41.0% [9]. Tobacco use has increased recently and smokings, as well as passive smoking are a major cause of death in Bangladesh, with major public health burden of morbidity, disability, mortality and community expenditures [10]. While the health behavior of immigrant populations in some respects seems to be better than that of the indigenous population, there are indications that smoking prevalence is relatively high in some immigrant groups [11] and tobacco use remains a public health concern also for immigrant populations. Generally, in our study, immigrants smoked less than Greek patients. In Bangladesh smokeless tobacco products are also common and restaurants and indoor workplaces have now been included among the public places that are to be completely smoke-free; also, fines for non-compliance with smoke-free regulations have increased. Sales of tobacco to and by minors have been banned. On the contrary, cigarette smoking is the most usual form of tobacco use and smokeless tobacco use is rare in Greece. National law requires fines for smoking, but these are not always implemented.

In general, smoking behavior is likely shaped by smoking norms in the countries of origin. Acculturation -or the adoption of the behavioral patterns and beliefs of a surrounding culture- may have crucial, but poorly comprehended role in many health behaviors, including smoking. The term “acculturation” refers to changes in beliefs, attitudes, and behaviors experienced by subjects of an ethnic group as a result of continuous exposure to and interaction with individuals of a different ethnic origin. Immigrants in our study had a mean stay in Greece of  $10.34 \pm 6.2$  years. It is highly likely that they might have already adopted partially or will adopt in the future, the smoking norms and practices of the Greek society. Acculturation is associated with smoking status of immigrants in some studies [12,13]. The trends discovered in this study revealed that immigrants had lower smoking rates than Greeks but we should take into account that there is a possibility that the immigrant’s smoking rates will equal those of the indigenous group as the years of stay in Greece increase, parallel to acculturation process.

Additionally, educational level, employment, and marital status were frequently reported as related to smoking. Higher education is associated with less smoking prevalence in both ethnic groups. The patterns and magnitudes of educational differences in smoking prevalence observed in this study were similar to those observed in other studies [14,15]. Patients living alone, without a spouse, were more likely to smoke than those who live with families. Moreover, employed persons had a lower smoking prevalence than unemployed persons in both ethnic groups. Gender determines smoking in respect to ethnic groups. Hence, women from Bangladesh traditionally do not smoke, whereas women from Greece smoke as much as men from Greece.

Smoking is associated with higher glucose and HbA1c values in both ethnic groups in our study. There are some possible pathophysiologic mechanisms that associate the effect of smoking on glycemic control. Apparently, tobacco smoking is related to insulin resistance [16-18]. Systemic inflammation [19], oxidative stress biomarkers [20] and sympathetic activity [21] are more common in smokers. Nicotine also increases the cortisol and growth hormone levels and contribute to insulin resistance [22]. Smokers have higher levels of waist circumference [23] and tobacco use is associated with decreased β-cell function [24], chronic pancreatic inflammation [25] and pancreatic fibrosis [26].

Several studies suggested that South Asians have an increased risk of developing coronary heart disease when compared with Caucasian populations [27-29]. Central obesity, which is associated with insulin resistance and diabetes mellitus, is an increasingly important risk factor for Asian populations [30]. Diabetes or glucose intolerance are often related to reduced HDL cholesterol concentration and increased plasma triglyceride levels in South Asians [29-31]. It seems likely that South Asian's enhanced susceptibility to cardiovascular disease results from both genetic and environmental influences [28]. An essential element of any strategy aimed at reducing the incidence and impact of cardiovascular disease in South Asians is the education of both patients and health care professionals. Hence, early recognition of risk factors according to ethnicity, adoption of healthy lifestyle behaviors and smoking cessation are crucial for this population as cigarette smoking is a potentially changeable and eliminated cardiovascular risk factor.

Nowadays, many Bangladeshi immigrants come to Greece. Given the critical impact of tobacco use on health, it is important to understand rates and correlates of smoking in this population. The current study examined associations between ethnicity and current smoking status in patients with diabetes.

Understanding some culturally relevant predictors of tobacco use among different ethnic population might assist health care providers in designing successful smoking control programs, especially for patients with diabetes. Currently, there is not much information available about tobacco use among immigrants in Western host countries and especially for people who suffer from diabetes. Moreover, as this study enrolled immigrant populations, further epidemiological studies are needed to obtain better insight into the process of diffusion of smoking through immigrant populations.

Overall, tobacco use in immigrants is lower than that in Greek groups, and is almost nonexistent among Bangladeshi women. Tobacco control interventions need to develop targeted strategies appropriate to these different ethnic populations. Health professionals should be aware of smoking among native Greeks and immigrants who suffer from diabetes and provide smoking cessation interventions accordingly.

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## Competing Interest

None declared

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