

Cigarette Smoking and Smokeless Tobacco Use among Male South Asian Migrants in the United Arab Emirates: a cross-sectional study

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Abstract

Background

The prevalence of tobacco use among South Asian migrants in the United Arab Emirates (UAE) has not been evaluated. We examined the prevalence of cigarette smoking and smokeless tobacco use along with their associated factors among male South Asian migrants in the UAE.

Methods

A representative sample of South Asian adult migrant males was recruited in Al Ain, UAE in 2012. The sample included Indian (n=433), Pakistani (n=383) and Bangladeshi (n=559) nationalities. Prevalence and measures of association using bi-variable and multi-variable logistic regression models were used to identify correlates of tobacco use.

Results

A total of 1,375 South Asian migrant males participated in the study (response rate 76%) with a mean age of 34 years (SD ± 10). The prevalence of current cigarette smoking was 21%, 23% and 37% among participants from India, Pakistan and Bangladesh, respectively. The prevalence of current smokeless tobacco use was 6%, 12%, and 16% for Indian, Pakistani, and Bangladeshi participants, respectively. Bangladeshi nationality, hypertension, and alcohol use were significant correlates of current cigarette smoking. Increase in age, less than college level education, alcohol use and Pakistani or Bangladeshi nationality were significant correlates of exposure to smokeless tobacco.

Conclusions

The high prevalence of cigarette smoking and smokeless tobacco use in South Asian migrants, highlights the public health burden of tobacco use in migrant populations in the UAE. Public health measures are needed to address tobacco use in migrant population.

Background

Tobacco use is the single most preventable cause of death in the world today leading to over 6 million fatalities each year. More than 5 million of those deaths are the result of direct tobacco use with the remainder fatalities being attributed to indirect causes and to non-smokers being exposed to second-hand smoke. It has been estimated that the number of deaths will rise up to 10 million per year by the year 2030 if appropriate and improved preventive measures are not implemented. Moreover 70% of these projected fatalities are expected to occur in low- and middle-income countries.[1]

Tobacco use is a major risk factor for cardiovascular disease (CVD), most cancers and chronic diseases including mainly chronic respiratory diseases.[2, 3] Manufactured cigarettes are the most common type of tobacco consumed worldwide but other forms of tobacco such as chewing tobacco in South Asia and

shisha smoking (waterpipe) in the Middle East are also quite common in these particular regions.[4, 5] Smokeless tobacco (SLT) is also a major risk factor for oropharyngeal cancer as well as increased risk of heart disease.[6, 7]

South Asians, estimated at one quarter of the world's population, represent one of the highest proportions of the global population that are affected by current and future disease burden due to tobacco consumption. A high prevalence of tobacco use in this region has been reported with 40% of males and 5% of females in India, 45% of males and 6% of females in Pakistan, and an overall tobacco use prevalence of 21%. Bangladesh has one of the highest reported prevalence of tobacco use with 58% among males and 29% in females, with an overall tobacco use of 43%.[8]

Studies of migrant populations in economically developed countries show that higher tobacco use and exposure to other environmental factors put migrants at a higher risk for CVD and other health problems. [9, 10] The United Arab Emirates (UAE) has one of the highest proportions of a culturally diverse migrant population. Expatriate workers account for almost 80% of the UAE population and about two-thirds of them are South Asian migrant workers from India, Pakistan and Bangladesh.[11]

Research on the prevalence of tobacco use among UAE nationals (Emiratis) has been previously reported (24.3% in males and 0.8% in females),[12] however, there have been no studies on tobacco use among South Asian migrants in the UAE or any Gulf countries. In the current study we aimed to estimate the prevalence of, and factors associated with cigarette smoking and smokeless tobacco use among South Asian migrants in the United Arab Emirates who originated from India, Pakistan and Bangladesh.

Methods

Study Design and Ethics

The study used a cross-sectional design. Ethical approval was obtained from the Al Ain Medical District Human Research Ethics Committee (AAMDHREC 10/21)

Study sample

The study population consisted of all male South Asian migrant workers aged 18 years and older from India, Pakistan and Bangladesh who were screened at the Disease Prevention and Screening Center (DPSC) in Al Ain, during the process of obtaining a new or renewing their visa in 2012.[13] Our study sample included every third South Asian migrant worker from India, Pakistan and Bangladesh who attended the DPSC for screening and was invited to participate. Further details of the study design, selection process and data collection methods are described elsewhere.[14] Ethical approval was obtained from both the Al Ain Medical District Human Research Ethics Committee and the Abu Dhabi Health Services Company's Research Committee.

Sample size calculations were based on the intention to explore differences among subgroups. Assuming a 12% prevalence of cigarette smoking, a level of significance of 5% and a power of 80%, we would need

200 participants per each group in a two-equal group comparison.

Data collection – Study questionnaire

Using an adapted version of the “STEPS Methodology” questionnaire, developed by the World Health Organization (WHO) for the measurement of non-communicable disease (NCD) risk factors,[15] we collected information on demographics lifestyle factors, family and personal disease history, home country residence setting (rural, urban, semi-urban), occupation, monthly salary (UAE dirhams, AED), years lived in the UAE, current type of accommodation, history of current and past cigarette smoking and tobacco chewing and history of exposure to second-hand tobacco smoke and alcohol consumption.

Subjects were classified as current smokers if they answered yes to the question, "Do you currently smoke any tobacco products such as cigarettes, cigars or pipes?". Subjects were classified as current users of smokeless tobacco if they answered yes to the question, "Do you currently use any smokeless tobacco such as [masher, oral snuff (zarda), gutka, mawa, paan masala, betel nut?]. Body mass index (BMI) was calculated as weight in kilograms divided by the square of the height in meters and BMI categorization was based on World Health Organization recommendations [being overweight (BMI 25 to 29.99 kg/m²), obesity class I (BMI 30–34.99 kg/m²), obesity class II (BMI 35–39.99 kg/m²) and obesity class III (\geq 40 kg/m²)]. History of diabetes mellitus, high cholesterol as well as prescription medications for hypertension, diabetes and high cholesterol was collected using the above questionnaire. Hypertension (HTN) was defined as being on anti-hypertensive medications or having a systolic blood pressure \geq 140 mmHg or a diastolic blood pressure \geq 90 mmHg. Blood pressure readings were also categorized based on the following blood pressure distribution: normal blood pressure (SBP < 140 and DBP < 90 mmHg), grade 1 HTN (SBP 140–159 or DBP 90–99 mm Hg), grade 2 HTN (SBP 160–179 or DBP 100–109 mm Hg), and grade 3 HTN (SBP \geq 180 or DBP \geq 110 mm Hg). Further details on the study methods are reported elsewhere.[14]

Statistical Analysis

Data were entered into Microsoft Access and then imported into Stata version 11.0 (StataCorp LP, College Station, TX) for analysis. Demographic characteristics and CVD risk factors were evaluated in association with both smoking cigarettes and/or smokeless tobacco use. Continuous and categorical variables were assessed using t-test and/or chi-square tests, respectively. Univariable and multi-variable adjusted logistic regression models were used to examine the association of different demographic and clinical parameters with cigarette smoking and/or smokeless tobacco use. Being a current cigarette smoker and/or being a current smokeless tobacco user were the outcomes of interest in our logistic regression models. Statistical significance was assessed based on a p-value \leq 0.05 (both sided for all tests) and the corresponding 95% confidence interval (CI).

Results

Out of 1,800 eligible males, 1,375 (76%) participated in our study (433 from India, 383 from Pakistan, and 559 from Bangladesh). In Table 1 we delineate the characteristics of the study population along with their association with smoking status. The mean age of participants was 34 years (± 10) with 58% being younger than 35 years of age and about half of them (53%) having higher than secondary level education. Of the study participants, 69% had migrated from a rural/village in their home country. The majority (70%) of the participants were married, and almost half of them (44%) were residing in the UAE for more than 5 years. Half of migrants (52%) were living in a labor camp. The most common occupational categories were driver (23%), laborer (17%), agricultural worker (17%), and construction worker (12%). The monthly income of study participants was relatively low with almost half of them (48%) earning less than 1000 AED (~ USD 270). Nationality and income were significantly associated with cigarette smoking, whereas age, nationality, and education were significantly associated with smokeless tobacco use.

The overall prevalence of cigarette smoking was 28% (95%CI 25% – 30%) and overall smokeless tobacco use was 11% (95%CI 10% – 13%) among South Asian migrants. The prevalence of cigarettes smoking was 21% (95%CI 17% – 25%), 23% (95%CI 19% – 27%), and 37% (95%CI 33% – 41%) for participants from India, Pakistan and Bangladesh, while the prevalence of smokeless tobacco use was 6% (95%CI 4% – 9%), 12% (95%CI 9% – 15%), and 16% (95%CI 13% – 19%) for the three nationalities, respectively. Of the total current smokeless tobacco users, the majority were chewing tobacco or using paan masala (65%), followed by zarda (14%), betel nut (12%), mawa (7%) and Gutka (3%). Combined tobacco use was relatively low and was found to be 2%, 3% and 8% for India, Pakistani and Bangladeshi study participants, respectively. The mean (\pm SD) age of smoking initiation in our population was 21 (± 7) years of age. A total of 4% of South Asian migrants initiated smoking below the age of 10 years old, while 8%, 20% and 68% initiated smoking between the ages of 11–14, 15–18 and 18 + years, respectively. Migrants smoked an average of 9 (± 6) cigarettes per day. A total of 44% of migrants smoked fewer than 6 cigarettes per day, while 32% of the migrants reported smoking between 6–10 cigarettes and 24% smoked 11 or more cigarettes per day.

In Table 2, we present different CVD risk factors in association with cigarette smoking and smokeless tobacco use. All measures of blood pressure and/or hypertension were significantly associated with cigarette smoking. However, using smokeless tobacco was not significantly associated with any CVD risk factors in this relatively young migrant population with the exception of alcohol consumption, which was significantly associated with both cigarette smoking and smokeless tobacco use. In addition, we explored the combined clustering of CVD risk factors in association with cigarette smoking and smokeless tobacco use and we did not find a significant pattern.

Odds ratios and 95% confidence intervals for the association of different parameters with cigarette smoking are presented in Table 3. Migrants from Pakistan were more likely to smoke cigarettes and/or use smokeless tobacco in comparison with migrants from India. In addition, migrants from Bangladesh were 2 to 3 times more likely to smoke cigarettes and/or use smokeless tobacco compared to counterparts from India. Furthermore, migrants drinking alcohol were 3.3 times more likely to also smoke

cigarettes, and 2.6 times more likely to use smokeless tobacco. Finally, those who had secondary education were 2 times more likely to use smokeless tobacco compared to migrants with higher than secondary education even after adjusting for all the other variables in the model.

Discussion

To our knowledge, this is the first study to examine the prevalence of tobacco use amongst South Asian migrants living in the UAE; and report migrant smoking prevalence in the Gulf. We found a relatively high prevalence of cigarette smoking among Indian and Pakistani migrants and an even higher prevalence among Bangladeshi migrants. We found strong and significant association between alcohol consumption and cigarette smoking and smokeless tobacco use in this migrant population. Furthermore, despite this population being relatively young, we found a clustering of CVD risk factors among smokers albeit not statistically significant.

A study from India based on the Global Adult Tobacco Survey (GATS) reported a prevalence of cigarette smoking of 15% and smokeless tobacco use of 28% among males aged 25–44 years.[16] Another study from India reported an overall prevalence of cigarette smoking of 14% and smokeless tobacco use of 8%. [17] Indian migrants in our study had a much higher prevalence of cigarette smoking (21%) and a lower smokeless tobacco use (6%), a finding that may suggest an adverse impact of migration on cigarette smoking among Indian migrants. The GATS, a nationally representative household-based survey, reported that the prevalence of cigarette smoking among male Pakistanis was 19% and 11% for smokeless tobacco use.[18] In the same study, the average number of cigarettes smoked per day was 13, compared to 9 cigarettes per day in our study. Similarly, the prevalence of cigarette smoking among Bangladeshis was 43%[19] and 17% smokeless tobacco use.[20] We have observed a relatively lower smokeless tobacco use among migrants in our study compared to studies in their home countries. Reasons for the lower smokeless tobacco use are not clear. We postulate that this result may be associated with barriers in accessing such products in the UAE compared to India, Pakistan and Bangladesh.

South Asian migrants are also living in many other countries of Europe and in the United States. The United Kingdom, home to a large migrant population from India, Pakistan and Bangladesh, has reported figures for smoking by country of origin over time. Cigarette smoking prevalence among Indians, Pakistanis and Bangladeshis living in the UK was reported as 20%, 29% and 40%, respectively. Smokeless tobacco use among the same migrant population in the UK was 4%, 2% and 9%, respectively.[21] Tobacco use prevalence among South Asian migrants in the United States was reported in two different parts of the country. In New Jersey, cigarette smoking among South Asian migrants was 12% and smokeless tobacco use was 3%. In the Northeast of the US, cigarette smoking was 9% and smokeless tobacco use was 1%.[22] The considerably lower levels of cigarette smoking and smokeless tobacco use among South Asian migrants in the US may reflect the social and contextual effect of living in a more stringent societal environment with respect to tobacco control efforts. It also re-emphasizes the need to disaggregate smoking prevalence by different ethnicities and immigrant status in order to inform relevant policies as well as preventive and smoking cessation programs for specific target populations.[23]

The prevalence of cigarette smoking in our study showed an inverse association with age. On the contrary, a positive association with age was observed for smokeless tobacco use. The association between smoking prevalence and age is usually attributed to a “cohort effect”; namely the higher prevalence of cigarette smoking in younger age groups may be associated with current societal trends in the country of residence (UAE) as opposed to smokeless tobacco use, which may represent a stronger habitual effect among older migrants being influenced in a more significant fashion from their country of origin. We also found an inverse association between educational level and tobacco use both for cigarette smoking and smokeless tobacco. This observation may be associated with a lack of awareness about health risks among those with lower educational attainment although this explanation has recently been questioned.[24]

We found an average age of smoking initiation of 21 years in our study, which may suggest that more migrants may have initiated smoking during migration at an older age, given the different age of smoking initiation seen among different ethnic groups.[25] Other studies have also reported on the different age of smoking initiation among migrant populations.[26] Aggressive marketing of cigarettes to young people by tobacco companies may account for this observation. Furthermore, the slightly older age of smoking initiation in the migrant population of our study may suggest an adverse effect of migration itself. In addition to a high prevalence of smoking, we also found a strong and significant association of smoking and alcohol use in this population. Our finding is quite important with respect to planned efforts of smoking cessation. It appears that a more comprehensive approach to unhealthy behaviors combining messages for smoking cessation and moderate alcohol use may be more effective.

It is well known that migrants are “selected” and therefore differ from their home population.[27] Usually they have higher levels of overall health (the healthy migrant effect) but initially it is to be expected that they will share similar levels of biological and behavioral risk factors with their non-migrant peers. However, the levels of these risk factors will change during the migrants’ stay in their new environment through a process of “acculturation”.[28] Some risk factors may be reduced but others such as energy-dense diets, low activity levels and tobacco and alcohol use may increase. In our study, there were positive associations between smoking prevalence and CVD risk factors particularly among those who smoke cigarettes. The clustering of CVD risk factors is of concern and requires a comprehensive public health response. Although the UAE has taken a number of steps to reduce tobacco consumption, including ratification of the Framework Convention on Tobacco Control, with a smoking ban in public places and health warnings including text and pictorial messaging on tobacco products, smoking prevalence remains high in all these nationalities. Prices remain extremely low and a further challenge is that smoking cessation services are not available through insurance for migrants in the UAE. Besides, the economic and health effects of smokeless tobacco use appear to be different from that of cigarette smoking and policymakers should consider specific interventions for smokeless tobacco use and address this issue in a combined effort along with smoking cessation and other programs.

Strengths of this study include the large representative sample and the use of standardized questions to classify respondents as cigarette smokers or users of smokeless tobacco. There are some limitations in

the estimates presented in this study. First, from the adapted WHO STEPS questionnaire used in this study, we only had estimates of current smoking and average number of cigarettes smoked during the last 24 hours. Secondly, we were not able to assess the use of tobacco products prior and after migration, which would have provided useful information on the impact of migration. This could be important since a high proportion of migrants live in shared accommodation and therefore may be influenced by peer pressure and behavior. Our study is also limited to male migrants. Because this was a cross-sectional study, we could not draw any conclusions on potential causal associations between cigarette smoking and the demographic, socio-economic, and CVD risk factor variables examined. Finally, it is possible that tobacco use based on self-reported questionnaires will be under-reported and we did not validate self-reports with other objective measures of smoking such as cotinine levels.

Conclusions

Although the overall prevalence of tobacco smoking in the UAE is lower than many other countries in the Middle East, this hides important variations – especially the very high rates seen in South Asian migrants, and particularly in Bangladeshis. Concerted public health action is therefore required to develop tobacco prevention and control strategies for this specific population group, which accounts for the largest proportion of the expatriate population. Being the first study of tobacco use amongst South Asian migrants in the Gulf, it provides important population-based data on the prevalence of tobacco use. There is an alarmingly high level of cigarette smoking and a sizeable amount of smokeless tobacco use in these migrants originating from India, Pakistan, and Bangladesh. Given the very large number of South Asian migrants in the UAE and Gulf, smoking cessation and prevention programs should be a public health priority for the Ministries of Health in the region. In addition, the strong association of cigarette smoking and smokeless tobacco use with alcohol drinking calls for concerted efforts in addressing multiple unhealthful behaviors with comprehensive preventive programs among migrants in this region.

Abbreviations

UAE

United Arab Emirates; CVD:cardiovascular disease; SLT:smokeless tobacco;

HTN

hypertension; GATS:Global Adult Tobacco Survey.

Declarations

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Authors' contributions

RA and SMS substantially contributed by developing the conceptual framework and design of the study. MA made significant contribution as tobacco content expert. FA substantially contributed in data management and analysis of the data. SAD, IEB and ESS were involved in drafting and critically revising the article. All authors read and approved the final version of the manuscript.

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Availability of data and materials

The materials described in the manuscript and data sets generated and analysed during the current study are available from the corresponding author on reasonable request.

Ethics approval and consent to participate.

Ethical approval was obtained from the Al Ain Medical District Human Research Ethics Committee (AAMDHREC 10/21). Signed informed consent was obtained from each participant.

Consent for Publication

Not applicable.

Competing interests.

Raghib Ali is an Editorial Board Member. The authors declare that they have no competing interest.

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Tables

Table 1: Characteristics of Male South East Asian Migrants in Al Ain, Abu Dhabi, UAE (N=1375)							
Characteristics	Total N (%)	Cigarette Smoking		p- value	Smokeless Tobacco Use		p- value
		No n (%)	Yes n (%)		No n (%)	Yes n (%)	
Age -mean (SD)	34.0 (9.9)	34.1 (9.1)	33.7 (9.1)	0.53	33.7 (9.8)	35.3 (10.1)	0.06
Age							
18-34	764 (58)	535 (71)	221 (29)		667 (90)	71 (10)	
35-44	333 (25)	232 (71)	97 (29)		269 (86)	43 (14)	
45-54	176 (13)	133 (76)	41 (24)		146 (86)	24 (14)	
>=55	44 (4)	35 (81)	8 (19)	0.22	33 (85)	6 (15)	0.12
Nationality							
India	433 (31)	337 (79)	98 (21)		385 (94)	24 (6)	
Pakistan	383 (28)	294 (77)	86 (23)		322 (88)	42 (12)	
Bangladesh	559 (41)	348 (63)	202 (37)	<0.01	455 (84)	84 (16)	<0.01
Education							
<Secondary	173 (13)	117 (69)	53 (31)		127 (78)	35 (22)	
Secondary	473 (34)	326 (70)	142 (30)		395 (87)	61 (13)	
College or higher	725 (53)	532 (75)	182 (25)	0.11	636 (92)	54 (8)	<0.01
Marital Status							
Single	412 (30)	299 (74)	107 (26)		357 (90)	38 (10)	
Married	963 (70)	680 (72)	270 (28)	0.43	805 (88)	112 (12)	0.18
Home country setting							
Rural	932 (69)	660 (72)	259 (28)		781 (88)	111 (12)	
Urban	426 (31)	305 (73)	115 (27)	0.76	368 (91)	38 (9)	0.11
Income (AED)							
Mean (SD)	1828 (± 2130)	1905 (± 2298)	1667 (± 1667)	0.06	1849 (± 2153)	1602 (± 1360)	0.18
Median (IQR)	1100 (800-	800	1100	0.02	1200	1100	0.64

	1100)						
Income (AED)							
<500	371 (27)	247 (68)	117 (32)		310 (87)	45 (13)	
500-999	290 (21)	199 (69)	88 (31)		240 (88)	33 (12)	
>=2000	714 (52)	533 (76)	172 (24)	0.01	612 (89)	72 (11)	0.54
Years in United Arab Emirates							
<=1	239 (19)	177 (76)	56 (24)		209 (91)	21 (9)	
2-5 years	470 (37)	323 (70)	140 (30)		395 (89)	50 (11)	
6-9 years	198 (16)	124 (64)	71 (36)		172 (90)	20 (10)	
>=10 years	363 (28)	277 (77)	83 (23)	0.01	301 (86)	47 (14)	0.41
Type of accommodation							
At a labor camp	717 (52)	508 (72)	200 (28)		607 (87)	88 (13)	
Living with Sponsor	152 (11)	114 (77)	34 (23)		131 (88)	17 (12)	
Single accommodation	153 (11)	109 (71)	44 (29)		127 (88)	18 (12)	
Shared with relatives	184 (14)	125 (69)	56 (31)		157 (95)	9 (5)	
Shared with non-relatives	168 (12)	123 (74)	43 (26)	0.55	140 (89)	18 (11)	0.13
Occupation							
Driver	317 (23)	223 (71)	90 (29)		253 (84)	47 (16)	
Laborer	234 (17)	159 (68)	73 (32)		201 (89)	25 (11)	
Construction worker	172 (12)	125 (74)	44 (26)		154 (92)	13 (8)	
Agriculture worker	236 (17)	160 (68)	74 (32)		190 (85)	34 (15)	
Professional office worker	95 (7)	72 (78)	20 (22)		86 (96)	4 (4)	
Salesperson	79 (6)	57 (75)	19 (25)		73 (96)	3 (4)	
Business shop keeper	60 (4)	45 (75)	15 (25)		51 (89)	7 (11)	
Hospitality worker	71 (5)	53 (75)	18 (25)		59 (89)	7 (11)	

Tailor	70 (5)	55 (80)	14 (20)	0.52	58 (87)	9 (13)	0.01
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SD – Standard deviation

IQR – Inter quartile range

Table 2: Cardiovascular Disease Risk Factors by Smoking Status in Male South East Asian Migrants (N=1375)							
CVD Risk Factors	Total N (%)	Cigarette Smoking		p- value	Smokeless Tobacco Use		p- value
		No	Yes		No	Yes	
		n (%)	n (%)		n (%)	n (%)	
Systolic blood pressure - mean (±SD)	130.9 (±17.2)	128.2 (±15.8)	132.1 (±17.6)	0.01	131.0 (±17.3)	130.6 (±16.0)	0.78
Diastolic blood pressure - mean (±SD)	78.3 (±12.4)	77.1 (±12.0)	78.8 (±12.5)	0.02	78.1 (±12.4)	79.5 (±12.6)	0.21
Blood Pressure							
Normal	972 (71)	677 (71)	280 (29)	0.09	827 (89)	102 (11)	0.41
Grade 1	297 (21)	215 (73)	78 (27)		245 (88)	35 (12)	
Grade 2	80 (6)	66 (82)	14 (18)		67 (85)	12 (15)	
Grade 3	26 (2)	21 (81)	5 (19)		23 (96)	4 (4)	
Hypertension							
No	956 (73)	662 (70)	279 (30)	0.02	816 (89)	97 (11)	0.16
Yes	419 (27)	317 (76)	98 (24)		346 (87)	53 (13)	
Diabetes Mellitus							
No	1261 (92)	892 (72)	352 (28)	0.18	1071 (89)	135 (11)	0.36
Yes	114 (8)	87 (78)	25 (22)		91 (86)	15 (14)	
High cholesterol							
No	1257 (95)	909 (72)	348 (28)	0.66	1078 (86)	140 (14)	0.67
Yes	94 (5)	66 (70)	28 (30)		81 (86)	9 (14)	
Body mass index - mean (±SD)	25 (4)	25 (4)	24 (5)	0.68	25 (5)	24 (4)	0.53
Body Mass Index							
≤ 24.99	531 (39)	366 (70)	154 (30)	0.23	448 (88)	58 (12)	0.78

25 – 29.99	539 (39)	398 (75)	134 (25)		459 (89)	56 (11)	
≥30.0	302 (22)	213 (71)	88 (29)		252 (87)	36 (13)	
Waist circumference (cm) - mean (±SD)	89 (11)	89 (11)	88 (11)	0.29	89 (12)	89 (13)	0.91
Abdominal obesity							
No	503 (37)	354 (72)	140 (28)	0.74	427 (89)	53 (11)	0.73
Yes	872 (63)	625 (73)	237 (27)		735 (88)	97 (12)	
Moderate exercise							
No	1006 (75)	735 (74)	263 (26)	0.08	862 (89)	103 (11)	0.78
1 – 4 days per week	73 (5)	49 (69)	22 (31)		59 (89)	7 (11)	
≥ 5 days per week	269 (20)	177 (67)	87 (33)		226 (87)	34 (13)	
Alcohol consumption							
No	1236 (9.6)	906 (74.3)	313 (25.7)	<0.01	1051 (89.3)	126 (10.7)	0.02
1 – 3 days per week	44 (3.2)	19 (43.2)	25 (56.8)		35 (79.5)	9 (20.5)	
≥ 4 days per week	85 (6.2)	47 (55.9)	37 (44.1)		67 (81.7)	15 (18.3)	
Cardiovascular disease risk factor cluster	697 (69.8)		203 (69.8)	0.31	605 (70.6)	76 (67.9)	0.35
No risk factors	178 (17.8)	494 (69.9)	60 (20.6)		154 (17.0)	17 (15.2)	
1 CVD risk factor		118 (16.7)	25 (8.6)		82 (9.6)	17 (15.2)	
2 CVD risk factors	104 (10.4)	79 (11.2)	3 (1.0)		16 (1.9)		
3+ CVD risk factors	19 (1.9)	16 (2.3)				2 (1.8)	

Table 3: Odds Ratios and 95% CI for different Characteristics of Male South East Asian Migrants in UAE in association with cigarette smoking and smokeless tobacco use (N=1375)

Risk Factor	Multi-variable Adjusted OR (95% CI)			
	Cigarette Smoking	p-value	Smokeless Tobacco Use	p-value
Age	1.01 (1.00, 1.03)	0.10	1.02 (1.00 – 1.04)	0.05
Nationality				
Indian	ref		ref	
Pakistani	1.38 (0.94 – 2.03)	0.10	2.29 (1.26 – 4.16)	0.01
Bangladeshi	2.49 (1.76 – 3.53)	0.00	3.04 (1.74 – 5.32)	0.00
Education				
Secondary	1.07 (0.81 – 1.42)		2.00 (1.32 – 3.04)	
College or higher	ref	0.63	ref	0.00
Monthly income	1.00 (0.99, 1.00)	0.24	1.00 (1.00 – 1.00)	0.81
Hypertension				
No	ref		ref	
Yes	0.68 (0.51 – 0.92)	0.01	1.24 (0.82 – 1.86)	0.30
Diabetes Mellitus †				
No	ref		ref	
Yes	0.69 (0.40 – 1.18)	0.17	1.13 (0.57 – 2.24)	0.73
High Cholesterol ‡				
No	ref		ref	
Yes	1.50 (0.88 – 2.56)	0.13	0.84 (0.37 – 1.88)	0.66
Moderate exercise †				
No	ref		ref	
Yes	1.11 (0.95 – 1.31)	0.19	0.97 (0.79 – 1.25)	0.97
Alcohol consumption †				
No	ref		ref	

Yes	3.27 (2.17 – 4.94)	0.00	2.57 (1.46 – 4.52)	0.00
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† Based on self reports through an interviewer-administered questionnaire.

‡ Based on self-reports through an interviewer-administered questionnaire. Respondents who did not know their lipid status were categorized into the normal lipid category.