Smoking in Oman: prevalence and characteristics of smokers

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التدخين في عُمان: معدل الانتشار وخصائص المدخنين

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الخلاصة: أجرى الباحثان دراسة مسحية مستعرضة لمعدل انتشار التدخين، وخصائص المدخنين الحاليِّين والسابقين، من البالغين العُمانيِّين. واتضح أن المعدل الخام لانتشار التدخين حالياً 7٪ (13.4٪ ذكور و0.5٪ إناث)، في حين كان 2.3٪ لدى المدخنين السابقين، وقد لوحظ أعلى معدل انتشار إجمالي للتدخين الحالي (11.1٪) فيمن هم في عمر يتراوح بين 40 و49 عاماً (18.7٪ من الذكور و0.9٪ من الإناث). أما في الأعمار الأكثر تقدُّماً (أكبر من 40 عاماً) فإن لكل من المستوى التعليمي والحجم العائلي الكبير دوراً في الوقاية من التدخين. وقد كان العمر الوسطي لبدء التدخين 18.7 عاماً للذكور و24.3 عاماً للإناث. ورغم انخفاض معدل انتشار التدخين في عُمان، فإن الوقاية يجب أن توجَّه عَبْر برامج التثقيف الصحي، مع التركيز على إذكاء الوعي لدى المراهقين. كما يُوصَى باتخاذ إجراءات حكومية مثل زيادة الضرائب على التبغ، وفرض قوانين تضمن نظافة الهواء، وحظر الإعلان عن الدخان.

ABSTRACT We carried out a cross-sectional survey to study the prevalence and the characteristics of current and former smoking among Omani adults. Crude prevalence of current smoking was 7.0% (males 13.4%, females 0.5%); 2.3% were former smokers. The overall highest prevalence of current smoking (11.1%) was observed in those 40–49 years (18.7% of males, 0.9% of females). Older age (≥ 40 years), higher educational level and larger family size were protective against smoking. Mean age for starting smoking was 18.7 years for males and 24.3 years for females. Although smoking prevalence is low in Oman, prevention should be addressed in health education programmes, with the emphasis on heightening awareness in adolescents. Government action, e.g. tobacco taxation, clean air laws and bans on advertising, is also recommended.

Le tabagisme à Oman : prévalence et caractéristiques des fumeurs

RÉSUMÉ Nous avons réalisé une enquête transversale pour étudier la prévalence et les caractéristiques des fumeurs actuels et des anciens fumeurs parmi les Omanais adultes. La prévalence brute du tabagisme actuel était de 7,0 % (hommes : 13,4 %, femmes : 0,5 %) ; 2,3 % étaient des anciens fumeurs. La prévalence globale du tabagisme actuel la plus élevée (11,1 %) était observée chez les personnes de 40 à 49 ans (18,7 % d'hommes, 0,9 % de femmes). Un âge plus avancé (≥ 40 ans), un niveau d'études plus élevé et une famille de plus grande taille représentaient une protection contre le tabagisme. L'entrée dans le tabagisme avait lieu à un âge moyen de 18,7 ans chez les hommes et 24,3 ans chez les femmes. Bien que la prévalence du tabagisme soit faible à Oman, la prévention devrait être envisagée dans le cadre des programmes d'éducation sanitaire, en mettant l'accent sur la sensibilisation chez les adolescents. Une action des pouvoirs publics, par exemple par les taxes sur le tabac, les lois sur la pureté de l'air et l'interdiction de la publicité, est également recommandée.

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Introduction

Worldwide, it is estimated that tobacco causes about 8.8% of deaths (4.9 million) and 4.1% of disability adjusted life years (59.1 million). Attributable mortality is greater in males (13.3%) than in females (3.8%) [*1*]. Tobacco use is a growing health concern in the developing world, particularly in places where disposable income is increasing [*2*]. Smoking prevalence has increased in adolescents since 1991 even though there has been a decline in the overall prevalence of smoking in many industrialized countries [*3*].

According to the most recent estimate by the World Health Organization, 4.9 million people worldwide died in 2000 as a result of their addiction to nicotine, about half of them prematurely [*1*]. Developing countries already account for half of all deaths attributable to tobacco. The proportion will rise to 7 out of 10 by 2025 because smoking prevalence has been increasing in many low-income and middle-income countries while it is falling in richer countries, especially among men [*4*]. Lam et al. concluded that among middle aged men the proportion of deaths caused by smoking was more than twice as great in Hong Kong in 1998 as in mainland China 10 years earlier [*5*]. Another study on smoking and mortality from tuberculosis and other diseases in India showed that the death rates from medical causes of ever-smokers were double those of never smokers [*6*]. In Saudi Arabia, Al Khadra found that smoking was the main risk factor for having acute myocardial infarction at a young age (< 45 years), followed by low high-density lipoprotein cholesterol, high low-density lipoprotein cholesterol and diabetes [*7*].

Oman and other oil-producing countries in the Middle East have experienced rapid economic, sociodemographic and epidemiological transitions over the past 3 decades. The sociocultural and economic patterns of the Omani population do not typically correspond to either the Western community or to the developing countries in Asia. This is why data on smoking in Oman would be valuable and therefore why we conducted our study.

The aim of the study was to estimate prevalence of smoking among adults of both sexes aged 20 years and above, to study the characteristics of current smokers, to identify the age of starting smoking, reasons for smoking and factors related to smoking cessation in a community-based survey as a part of the Omani National Health Survey, 2000.

Methods

Sample

The sample for the survey was selected to be representative of the nation as a whole. The survey adopted a multi-stage, stratified probability-sampling design. In the first stage, all 10 regions of Oman were selected and the sample was distributed according to proportional allocation of the population in each. In each region, 1 or more *wilayat* (districts) were randomly chosen according to the size of the population. The number of *wilayat* selected was 16 out of a total of 59 (27%). Then, each *wilayat* was stratified into 2 strata; the first stratum was the *wilayat* centre, covering the urban area and the second stratum was the villages or remote areas, the rural areas. The urban:rural ratio was 2:1, which is similar to the ratio in the 1993 national census [*8*].

The second stage was the random selection of the population sampling units in each stratum. These population sampling units were the census units which were used during the 1993 population census.

The third stage was the selection of households from these population sampling units. Maps of the selected population sampling units were updated and a complete listing of all Omani households in each unit was made to obtain the sampling frame, then households were systematically randomly selected. All individuals aged 20 years and above in the selected household were invited to participate in the survey. The total number of households selected was 1968 with a total of 7011 people fulfilling the selection criteria. The prevalence of the least expected disorder of the lifestyle risk factors studied (smoking rate among female adults, 0.2%) was used to calculate the sample size of the survey. The response rate varied, according to the type of measurement or completed laboratory investigation, from 83% (for fasting blood sugar) to 91.5% (for blood pressure measurement).

Questionnaire and measurements

The questionnaire covered demographic and socioeconomic data (age, sex, marital status, educational status, work status, family size and place of residence) and included questions related to current smoking, age of starting smoking, number of cigarettes smoked per day, type of tobacco product smoked, reasons for smoking, history of temporarily quitting smoking for a year or more, being a former smoker and the number of years of smoking cessation and reasons for smoking cessation. Measurements of blood pressure, weight, height, waist circumference and hip circumference were registered in the questionnaire. World Health Organization procedures were used for taking the measurements [*9*]. The questionnaire also included items for the laboratory investigations for fasting blood sugar and serum cholesterol.

Specimen collection and analysis

The survey was carried out by 25 teams. Each consisted of a nurse to take the measurements, a laboratory technician to draw the blood samples, a health educator to interview the subjects, a health inspector to transport the samples to the laboratory and a field supervisor (statistician) to supervise and review the questionnaires during field operations. They were all trained on the methodology of the survey for 2 weeks.

The eligible members of the selected households were asked to start fasting 1–2 hours before midnight the night before they were due a visit by the survey team. The following morning at 07.00 the participants were interviewed, measurements were taken, and venous fasting blood samples were collected. Fasting blood samples for glucose were collected in sodium fluoride potassium oxalate tubes, labelled and transferred immediately with laboratory forms to the laboratory in the *wilayat* hospital in coldboxes. Samples were then immediately centrifuged, the plasma was separated and fasting plasma glucose was determined by a glucose oxidase method on the same day using the Hitachi 911 automated clinical chemistry analyser (Boehringer Mannheim, Germany) [*10*]. The same manufacturer supplied the reagents. The samples for estimation of cholesterol were collected in tubes containing lithium heparin anticoagulants and transferred to the laboratory in the same way. Estimation of serum cholesterol was done by enzymatic colorimetric method using the Hitachi 911 automated clinical chemistry analyser [*11*].

Diagnostic criteria

The World Health Organization criteria (1999) for diagnosis of hypertension, hypercholesterolaemia, anthropometric mea-

surement and glucose intolerance were used [*12*].

Prevalence of hypertension was estimated by adding the number of people self-reporting systolic or diastolic hypertension (whether their blood pressure was normal or not at the screening time) and the number of people with mean of 2 readings ≥ 140 mmHg systolic blood pressure or ≥ 90 mmHg diastolic phase 5 blood pressure i.e. either isolated systolic or diastolic hypertension. Blood pressure was taken in a sitting position at 5-minute intervals; the average of these readings was calculated to the nearest 5 mmHg.

High total cholesterol was defined as ≥ 5.2 mmol/L or ≥ 200 mg/dL.

Participants were considered underweight if their body mass index (BMI) was < 18.5 kg/m^2, normal if their BMI was 18.5–24.9 kg/m^2, overweight if their BMI was 25.0–29.9 kg/m^2, obese if their BMI was 30.0–39.9 kg/m^2, morbid obese if their BMI was ≥ 40.0 kg/m^2.

Abnormal waist:hip ratio [waist circumference (m)/hip circumference (m)] (central obesity) was defined as ≥ 0.85 for females and ≥ 0.95 for males.

Impaired fasting glucose (IFG) was defined as fasting blood glucose 6.1–6.9 mmol/L. Diabetes prevalence was estimated by adding the number of people selfreporting diabetes and the number of people with fasting blood glucose ≥ 7.0 mmol/L. The total number of participants with IFG was the sum of those with IFG and those with diabetes.

Pilot study

A pretest was carried out to test the households and the individual questionnaires and forms to obtain information about operational and organizational procedures and to get an indication of the general response to physical examination and specimen collection. A total of 120 households were selected from different areas in Muscat governorate. All the survey questionnaires and forms were interpolated and were revised by experts. Measurements and specimens were also taken. The questionnaires and forms and some organizational procedures were adjusted after the debriefing session for interviewers and supervisors. The problems, performance rates and general receptivity to the survey were analysed and discussed.

Data processing and analysis

Data entry was done using *Epi-Info*, version 6. The preparation of the data file was completed by July 2000. Respondents were defined as current smokers if they were smoking at the time of the survey and had smoked more than 100 cigarettes in their lifetime; they were defined as former smokers if they had smoked more than 100 cigarettes in their lifetime but no longer smoked; and they were defined as never smokers if they had never smoked or had smoked less than 100 cigarettes in their lifetime.

Analysis of the data was done using *SPSS*, version 5.0. Data were given as counts, means and percentages. Likelihood chi-squared test examined the distribution of data while group means were compared using analysis of variance. Logistic regression was conducted to test the most important independent associated factors (age, level of education, marital status, family size, residence, work status, hypertension, total IFG, hypercholesterolaemia, obesity or central obesity) with the dependent or the outcome variable (current smoking) with and the adjusted odds ratio (OR) was calculated for these factors. Logistic regression determines the independence of the associations observed in bivariate analysis by controlling for potential confound-

ing variables. The OR shows the change in the odds of the dependent variable when the independent changes from 0 to 1. $P < 0.05$ was considered statistically significant.

Results

A total of 7011 respondents aged 20 years and over [mean age 38 years, standard deviation (SD) 15.2] participated in the study, 3506 of them males (50% of the sample, mean age 38.4 years, SD = 16.7) and 3505 females (mean age 37.6 years, SD = 15.6). Overall, 7.0% of the respondents were classified as current smokers, 2.3% as former smokers and 90.7% as never smokers.

The majority of current smokers smoked cigarettes (82.9%), 6.4% smoked *shisha* (water pipe), 7.9% smoked *gadou* (gouza, a differently shaped pipe that uses different tobacco and a more direct burning method), 7.7% smoked a pipe, and 4.5% used other tobacco products e.g. chewing tobacco.

Current smokers constituted 13.4% of males; 4.6% were former smokers and 82.1% were never smokers. Only 0.5% of females were current smokers, 0.1% were former smokers and 90.4% were never smokers. Of current smokers, 16.7% had a history of smoking cessation for 1 year or more then returned to smoking; 41.8% of them stopped smoking for only 1 year.

Table 1 shows the number of current smokers according to age group, marital status, education level, etc. In males and in the overall sample, smoking prevalence was highest in the age group 40–49 years, with 18.7% of males, 1.0% of females, and 11.1% overall in this age group (χ^2 test significant at $P < 0.05$).

For the whole sample, the prevalence of smoking was also significantly associated with marital status, education level, work status and family size. For males, the same pattern was shown except for work status (χ^2 test significant at $P < 0.05$). For females, smoking was only associated with age and education level (Fisher exact test significant at $P < 0.05$). Smoking was not significantly associated with total IFG for the overall sample, males or females, whereas it was significantly associated with hypertension for all 3 groups. We found no association between smoking and hypercholesterolaemia, obesity or central obesity in the overall sample or the male sub-sample.

Using multiple logistic regression, age, level of education, marital status and family size were the strongest determinants of current smoking for males (Table 2). The test was not done for the female group due to the very low prevalence.

The majority of male smokers (58.7%) started smoking before the age of 20 years, while among females the highest percentage (31.6%) started smoking at a later age (20–29 years) (Table 3). The mean age of starting smoking was 18.7 years for males and 24.3 years for females and the difference was significant at $P < 0.05$ by analysis of variance test (data not shown).

Of the current male smokers, 49.7% smoked 10 cigarettes or fewer per day, 38.0% smoked 11–20 cigarettes per day (Table 4), while former smokers smoked fewer cigarettes: 62.3% smoked 1–10 cigarettes per day. The same pattern was noticed for the overall sample.

Of the current smokers, 46.0% said that the reason for smoking was out of habit, while 21.5% of them said smoking helped them to relax. In addition, 13.4% of the sample smoked because their friends smoked and 11.5% looked on smoking as leisure (data not shown in tables).

Table 1 **Prevalence of smoking in males and females for some demographic and health characteristics**

Characteristic	Males (*n* = 3506)			Females (*n* = 3505)			Total (*n* = 7011)		
	n	No.	%	*n*	No.	%	*n*	No.	%
Age group (years)									
20–29	1454	167	11.5	1431	2	0.1	2885	169	5.9
30–39	674	118	17.5	789	5	0.6	1463	123	8.4
40–49	465	87	18.7	344	3	0.9	809	90	11.1
50–59	391	57	14.6	552	4	0.7	943	61	6.5
60–64	189	14	7.4	136	3	2.2	325	17	5.2
≥ 65	329	26	7.9	249	2	0.8	578	28	4.8
Marital status									
Married	2327	337	14.5	2336	14	0.6	4663	351	7.5
Single, divorced, widowed	1168	131	11.2	1156	5	0.4	2324	136	5.9
Education level									
Illiterate/preparatory school	2492	413	16.6	2658	19	0.7	5150	432	8.4
Secondary and above	964	52	5.4	789	0	0.0	1753	52	3.0
Work status									
Working	2348	327	13.9	429	0	0.0	2777	327	11.8
Not working	1141	140	12.3	3044	18	0.6	4185	158	3.8
Residence									
Urban	2592	343	13.2	2548	17	0.7	5140	360	7.0
Rural	910	126	13.8	953	2	0.2	1863	128	6.9
Family size									
≤ 10 members	1818	286	15.7	1870	12	0.6	3688	298	8.1
> 10 members	1684	183	10.9	1631	7	0.4	3315	190	5.7
Total IFG									
Normal	2340	317	13.5	2441	13	0.5	4781	330	6.9
TIFG	531	76	14.3	471	6	1.3	1002	82	8.2
Blood pressure									
Normal	1975	252	12.8	2312	7	0.3	4287	259	6.0
Hypertension	1079	168	15.6	1042	12	1.2	2121	180	8.5
Cholesterol									
Normal	1747	240	13.7	1726	10	0.6	3473	250	7.2
Hypercholesterolaemia	1171	157	13.4	1201	9	0.8	2372	166	7.0
Obesity									
No	1654	253	15.3	1694	10	0.6	3348	263	7.9
Yes	1417	171	12.1	1659	9	0.5	3076	180	5.9
Central obesity									
No	1947	258	13.3	1179	8	0.7	3126	266	8.5
Yes	896	122	13.6	2145	11	0.5	3041	133	4.4

Some categories do not sum to the total sample due to missing data.
TIFG = total impaired fasting glucose.

Table 2 **Multiple logistic regression for variables significantly associated with current smoking among males**

Variable	OR	95% CI	*P*
Age group (years)			
20–39[a]			
≥ 40	0.61	0.47–0.79	< 0.01
Education level			
Illiterate/preparatory school[a]			
Secondary and above	0.26	0.18–0.38	< 0.01
Family size			
< 10 members[a]			
≥ 10 members	0.6	0.48–0.77	< 0.01
Marital status			
Married[a]			
Single, divorced, widowed	0.73	0.55–0.97	0.03

OR = odds ratio.
CI = confidence interval.
[a]Reference category.

Of the current smokers, 17.12% had a history of temporarily stopping smoking for 1 year or more. Of these, 40.7% had stopped for 1 year, 45.1% for 2–5 years and 14.2% for more than 5 years then returned to smoking. As regards former smokers, 21.1% stopped smoking for curative reasons, 33.6% because in the negative effects of smoking and 27.5% realized that there was no benefit in smoking. About 7% of the former smokers had ceased smoking for 1 year, 31.5% for 2–5 years, 24.2% for 6–10 years and the rest for more than 10 years. There was no significant association between the reason for smoking cessation and the number of years of smoking cessation. (χ^2 = 0.01, P = 0.9) (data not shown in tables).

Table 3 **Age when started smoking for current and former smokers among males, females and overall sample**

Age at starting smoking (years)	Males		Females		Total	
	No.	%	No.	%	No.	%
≤ 10	32	5.6	1	5.3	33	5.6
11–14	81	14.3	3	15.8	84	14.3
15–19	221	38.8	4	21.1	225	38.3
20–29	195	34.3	6	31.6	201	34.2
30–39	31	5.4	3	15.8	34	5.8
≥ 40	9	1.6	2	10.5	11	1.9

Discussion

There are few published data on the epidemiology of smoking in Gulf countries, including Oman. Comparable data on the prevalence of smoking are not widely available and are often inaccurate, especially when age-specific data are required. More importantly, current prevalence of smoking is a poor proxy for the cumulative hazards of smoking, which depend on several factors, including the age at which smoking began, duration of smoking, number of cigarettes smoked per day, degree of inhalation, and cigarette characteristics such as tar and nicotine content or type of filter [*1*]. Smoking is related to substantially increased risk of mortality from lung cancer, upper aerodigestive cancer, several other cancers, heart disease, stroke, chronic respiratory disease and a range of other medical conditions. As a result, in populations where smoking has been common for many decades, tobacco use accounts for a considerable proportion of mortality, as illustrated by estimates of smoking-attributable deaths in industrialized countries [*5,13*].

In 1995, the Oman Family Health Survey revealed that an estimated 6.7% of those aged 15 years or over were current

Table 4 **Number of cigarettes smoked per day for former and current smokers**

No. cigarettes per day	Males				Females				Total			
	Current smokers		Former smokers		Current smokers		Former smokers		Current smokers		Former smokers	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
≤ 10	217	49.7	94	62.3	10	62.5	2	66.7	227	50.1	96	62.3
11–20	166	38.0	44	29.1	5	31.3	1	33.3	171	37.8	45	29.2
21–30	33	7.6	6	4.0	1	6.3	0	0.0	34	7.5	6	3.9
31–40	21	4.8	4	2.6	0	0.0	0	0.0	21	4.6	4	2.6
> 40	0	0.0	3	2.0	0	0.0	0	0.0	0	0.0	3	1.9
Mean (SD)	13.8 (9.3)		11.8 (10.3)		10.2 (8.5)		9.7 (9.1)		13.7 (9.3)		11.8 (10.3)	

SD = standard deviation.

smokers, 13.2% for males and 0.2% for the female respondents (A.J.M. Sulaiman, A. Al Riyami, S. Farid, unpublished data, 1995). The results of the 1995 survey were only descriptive in nature and there was, therefore, a need to study the epidemiology and correlates of smoking. The smoking rate in our study did not show any significant rise compared to 1995. The prevalence of smoking in Oman is lower than that in other Gulf or Asian countries. In Kuwait, smoking rate was 38.1% among physicians [*14*], 30% among male students [*15*], 37% among married men and 0.5% among married women [*16*]. In Saudi Arabia, the 1994 smoking rate was 40.0% for males and 8.2% for females [*17*]. In Bahrain, in a study conducted in the year 2000, the prevalence of smoking was high for both sexes: 32.1% among men and 20.7% among women aged 30–79 years [*18*]. In China, the rate was much higher for males, 66.6%, whereas it was low, 1.7%, among females [*19*].

Women in Oman as well as other developing countries tend to have lower rates of smoking than men [*20,* A.J.M. Sulaiman, A. Al Riyami, S. Farid, unpublished data, 1995]. They also start smoking later than men and smoke fewer cigarettes. This is mainly the result of sociocultural, religious or economic factors. In some societies, it may be considered improper or indecent for females to be seen smoking in public; in addition there may be religious or economic arguments against it.

Smoking rates were significantly lower in people having a higher educational level (secondary and above) using bivariate and multivariate analysis. The same results were found by Memon et al. in Kuwait [*20*]. In contrast, Saeed, Khoja and Khan in Saudi Arabia found that smoking rates were significantly higher among literate than illiterate people, which could be explained by smoking being popular in higher social classes as it could denote prestige [*17*]. Older age was a protective factor against smoking; the majority of the current and former smokers in our study, almost 55%, began smoking in adolescence. For this reason, a major effort should be directed towards implementing health education for children and adolescents. Anti-tobacco education should be included as an integral part of the curriculum in schools.

Conclusion and recommendations

Although the study revealed lower rates of smoking in Oman in comparison with other Gulf countries, anti-tobacco programmes should be vigorously implemented to prevent the health consequences of smoking. Tobacco is not cultivated or produced in Oman. A pack of 20 imported cigarettes costs around US$ 1, and the war against tobacco is not easy. Children and adolescents should be targeted, and reasons for smoking cessation and the diseases associated with smoking should be taken into consideration in planning a health education programme.

Because some of the issues concerning tobacco control may be beyond the domain of national policies and legislation, tobacco control policies are not being implemented worldwide at a rate that current scientific knowledge about the dangers of tobacco warrants. International collaboration should be aimed for in order to share policy and programme information and implement tobacco control strategies. Government action in the form of tobacco taxation; clean indoor air laws in public places through legislation and enforcement; comprehensive bans on advertising of tobacco through legislation; dissemination of information through health warning labels, counter-advertising and various consumer information packages; and nicotine replacement therapy targeting current smokers aged 20–60 years are recommended. The benefits of reduction in tobacco use now, although taking longer to materialize than those resulting from reduction of some other risks, are great and long lasting. This is seen in the estimated tens of millions of healthy life years to be saved by 2010 and 2020 as a result of preventing and reducing tobacco use [*1*].

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