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Patterns of smoked and smokeless tobacco use among multimorbid and non-multimorbid middle-aged and older-aged adults in Karachi, Pakistan: a cross-sectional survey

Salima Khowaja [ID] , Shahkamal Hashmi, Sidra Zaheer, Kashif Shafique

School of Public Health, Dow University of Health Sciences, Karachi, Pakistan

Correspondence to
Ms. Salima Khowaja;
sohanisalima@gmail.com

ABSTRACT

Objectives The objective of this study was to compare the patterns of smoked and smokeless tobacco use among multimorbid and non-multimorbid middle-aged and older-aged individuals in Karachi, Pakistan.

Study design This was an observational cross-sectional study conducted during 2015–2016.

Study setting and participants A total of 3250 participants aged 30 years and above, residing in the Gulshan-e-Iqbal town, Karachi, Pakistan were enrolled in the study through systematic random sampling. The selected area of residence represents diverse socioeconomic and ethnic groups of the city. People who could speak and write English or Urdu, and those who provided written informed consent were included in the study.

Outcome measures The primary outcome measure of the study was to determine the differences in patterns of tobacco consumption among multimorbid and non-multimorbid adult individuals.

Results We found no difference in patterns of smoked (adjusted OR (aOR) 1.15, 95% CI 0.88 to 1.50, p=0.289) or smokeless tobacco (aOR 1.13, 95% CI 0.86 to 1.48, p= 0.379) use among multimorbid and non-multimorbid individuals. Individuals who perceived tobacco as a risk were less likely to consume smokeless tobacco products.

Conclusion There was no difference in tobacco consumption among individuals with and without multimorbidity. Evidenced-based guidelines are required to implement mental and behavioural interventions in patients with multiple chronic diseases to help them modify their behaviours.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ This study had a large sample size using a representative sampling technique.
⇒ The study contributes to novel findings about tobacco consumption in the presence of more than two chronic diseases (multimorbidity).
⇒ As this study was cross-sectional, the temporal relationship between multimorbidity and tobacco consumption cannot be established.
⇒ A participant was said to have multimorbidity on the basis of self-report and not on the basis of diagnosis by a physician.

INTRODUCTION

Every year around 41 million deaths globally are attributed to non-communicable diseases (NCDs) with more than 15 million deaths occurring in the ages between 30 years and 69 years. Major NCDs include cardiovascular diseases (CVDs), cancers, diabetes and chronic respiratory diseases.[1] Chronic diseases are contributing to more than half of the burden of the diseases in developing countries and have been the major cause of morbidity and mortality worldwide. Twenty-five per cent of the adult population (>18 years) in Pakistan suffers from at least one chronic disease.[2] Annually, tobacco consumption results in around 8 million deaths throughout the world.[3] WHO reports that tobacco use accounts for 1 death in every 10 adults[4] with around 1 million annual deaths attributable to passive smoking only.[3] Tobacco consumption is one of the major behavioural factors leading to multimorbidity.[5] Wikstrom *et al* found smoking a significant predictor of multimorbidity in the Finnish population.[6] Eighty per cent of CVDs are attributed to tobacco use while 71% of lung cancer and 42% of chronic respiratory diseases are attributed to smoking only.[2] According to Global adult tobacco survey, 19% of adult Pakistani population currently consume tobacco, with 12% using smoked tobacco and 8% using smokeless tobacco).[4]

Tobacco consumption worsens comorbid chronic conditions including chronic obstructive pulmonary disease, cardiac conditions, hypertension and diabetes.[7] Thus, the presence of multimorbidity requires dietary behaviour change. A longitudinal Canadian

National Population Health Survey indicated smoking cessation as the most commonly reported behaviour change following the diagnosis of cardiac diseases, diabetes, cancers and stroke.[8]

Prediagnostic healthy lifestyles were found to be associated with long-term and better survival in patients diagnosed with cancers.[9] Smoking cessation lowers the risk of developing pulmonary and cardiac diseases, and results in favourable prognosis in multiple chronic conditions.[9] Many tobacco smokers reduce smoking after the diagnosis of chronic diseases including cardiac diseases, diabetes, cancer and stroke, which improves their disease outcomes and quality of life.[6 8 10–12] The Framingham Heart Study found that the development of heart diseases and recent hospitalisations were the predictors for smoking cessation.[13] Evidence shows the positive effect of smoking cessation on prevention of recurrent CVDs,[14] re-infarction rates and deaths regardless of gender, time period, duration of follow-up and the study setting.[13] Numerous studies have been conducted on prevalence, patterns and association of tobacco with multimorbidity, however limited research has been conducted in lower-income and middle-income countries including South Asian countries. Also, there is scarce literature examining the behavioural change in the general population, in Pakistan, after developing multimorbidity. Further, there are diverse forms of tobacco consumed in Pakistan as compared with the other parts of the world, which would be worth studying in context of multimorbidity. Therefore, there is a need to investigate the tobacco consumption behaviour and determine its relationship with multimorbidity. The aim of this study is to compare the patterns of tobacco use among multimorbid and non-multimorbid individuals aged 30 years and above, residing in Karachi.

METHODS

Study design

This was an analytical cross-sectional study. This manuscript was written from data collected for the IMPACT (The Burden of Multimorbidity, Its Patterns and Consequences on Health and Well-Being) Study in Karachi, Pakistan, conducted during 2015–2016.

Study setting

Individuals aged 30 years and above residing in Gulshan-e-Iqbal town, Karachi, were enrolled from February 2015 to April 2015. Populationwise, Karachi is the largest city of Pakistan at a latitude of 24.946218 and longitude of 67.005615.[15] Gulshan-e-Iqbal town was one of the populous towns of Karachi with a representation of diverse socioeconomic and ethnic groups.

Eligibility criteria

All participants aged 30 years and above who can read/understand verbal communication in English or Urdu and those who provided written informed consent were enrolled in the study. People with known cognitive impairment and unable to answer the interview questions were excluded from the study.

Sampling technique

A sample of 3250 participants was recruited through a systematic random sampling technique. We selected all 13 Union Councils of Gulshan-e-Iqbal town. Proportionate allocation method was used to calculate proportionate estimates of number of individuals from each Union Council. Within each Union Council, houses were selected through systematic random sampling with a random start and then every 109th (kth interval) household was selected (see online supplemental file 1). To achieve the desired sample in each Union Council, a number of camps were set up in different areas of the Union Council. Invitations to participate were sent to all selected households. In addition, invitation banners were also placed at selected areas a few days before the camps were arranged. The response rate for our study was 73%.

Sample size

The sample size was calculated with OpenEpi software[16] through $n = [DEFF*Np(1\,p)]/[(d^2/Z^2_{1-\alpha/2}*(N-1)+p*(1\,p)]$. To the best of our literature search, no local or regional study on multimorbidity was found, hence 50% prevalence was assumed with ±2% confidence limits. A sample size of 2935 was determined as per the confidence level of 97%. A total of 3250 study participants were enrolled in this study.

Ethical consideration

The data were kept confidential and anonymous.

Data collection

After obtaining written informed consent, eligible participants were interviewed by trained data collectors with the help of a structured questionnaire. The principal investigator of the IMPACT Study trained the interviewers over two sessions. Further, consensus over the technique of asking each question was drawn in advance in order to reduce interviewer bias.

The questionnaire was designed to collect information on sociodemographic variables including age, gender, marital status, educational status, occupation, family monthly income, information about tobacco, presence of one or more chronic health conditions diagnosed by the healthcare professional and detailed history of medicines taken. Data regarding height, weight, body mass index (BMI), blood pressure and blood glucose level were also collected.

Dependent variable

Tobacco use was the outcome variable. Use of smoked tobacco was defined as use of manufactured cigarettes, hand-rolled cigarettes, pipes, cigars, sheesha; however, smokeless tobacco was defined as snuffing by mouth or nose, and chewing tobacco, betel nut or quid. The participants were asked whether they are current users, ex-users or non-users of tobacco; the form of tobacco they used (smokeless or smoked); and frequency (daily/weekly)

Table 1 Baseline characteristics of the study participants (n=2843)

Participants' characteristics	N (%)
Multimorbidity	
No multimorbidity	1233 (43.4)
Multimorbidity	1610 (56.6)
Any form of tobacco	
Non-users	2235 (78.6)
Current users	537 (18.9)
Ex-users	71 (2.5)
Smoked tobacco use	
Non-users	2575 (90.6)
Users	268 (9.4)
Smokeless tobacco use	
Non-users	2596 (91.3)
Users	247 (8.7)
Gender	
Male	1456 (51.2)
Female	1387 (48.8)
Age groups (years)	
30–39	1056 (37.1)
40–49	809 (28.5)
50–59	568 (20.0)
60–69	284 (10.0)
≥70	126 (4.4)
Socioeconomic Status Index	
Lower	118 (4.2)
Upper-lower	712 (25.0)
Middle	748 (26.3)
Upper-middle	885 (31.1)
Upper	380 (13.4)
Marital status	
Never married	264 (9.3)
Currently married	2410 (84.8)
Separated/divorced/widowed	169 (5.9)
Ethnicity	
Sindhi	392 (13.8)
Punjabi	317 (11.2)
Balochi	96 (3.4)
Pashtu	176 (6.2)
Urdu	1520 (53.5)
Others	342 (12.0)

of tobacco used. Current use of tobacco was asked as: 'Do you currently smoke tobacco products daily? (Yes/No)'. If the participant responded 'yes', he was asked, 'On an average, how many of the following products do you smoke/chew/snuff each day/week?'. Use of tobacco products in the past was asked as, 'In the past, did you ever use any smoked tobacco product? (Yes/No)'.

Independent variables

Independent variables included age, gender, socioeconomic status, marital status and risk perception about smoking and substance abuse, and multimorbidity. We assessed socioeconomic status by using Kuppuswamy's Socioeconomic Status Scale after customising it according to the Pakistani population[17] using information from our questionnaire. Socioeconomic status was categorised on the basis of monthly household income. Multimorbidity was defined as the participant's self-report about being diagnosed with two or more chronic health conditions, along with medication use and laboratory findings for reported disease. Data were recorded for diseases including hypertension, obesity, dyslipidaemia, diabetes, heart diseases (myocardial infarction and chronic ischaemic heart diseases), stroke, migraine, asthma and chronic obstructive pulmonary disease (COPD), anaemia, thyroid disease, diseases of bones and joints, dyspepsia/peptic ulcer, hepatitis B and C, chronic kidney diseases including stones, cancer, disability and mental illness. A person was labelled as obese if they had a BMI ≥30 kg/m². A person was said to have dyspepsia if they reported four or more symptoms for 6 months, based on the 'Leeds Dyspepsia Questionnaire'.

Data management and analysis

Variables were precoded and data were entered and analysed in SPSS V.26 (SPSS, Chicago, Illinois, USA). Monthly household income was recorded as a continuous variable in Pakistani rupees and then categorised (<16 000, 16 001–24 999, 25 000–39 999, 40 000–54 999 and≥55 000) for the purpose of analysis. Binary logistic regression was used to calculate crude and adjusted OR to examine the effect of independent variables on outcome variables. Variables such as age, gender, socioeconomic status and marital status were adjusted to account for their potential confounding effects as these variables are reported to be associated with both multimorbidity and tobacco use. A value of $p \leq 0.05$ was considered statistically significant.

This manuscript follows the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) reporting guidelines for cross-sectional studies .[18]

Patient and public involvement

Patients or the public were not involved in the design, or conduct, or reporting, or dissemination plans of our research.

RESULTS

Data were collected from 3250 individuals; however, due to missing information, we finally constructed our data set with the information from 2843 participants. Out of 3250 participants, some were excluded due to missing data (age=06), (gender=08), (marital status=05), (education=48), (occupation=72), (household monthly income=81), (any form of tobacco use=66). Descriptive analysis revealed that more than half of the individuals

Table 2 Bivariate analysis of relationship of multimorbidity with smoked and smokeless tobacco use (n=2843)

Characteristics	Smoked tobacco			Smokeless tobacco		
	Non-users	Users		Non-users	Users	
	n (%)	n (%)	P value	n (%)	n (%)	P value
Multimorbidity						
Apparently healthy	1118 (90.7)	115 (9.3)	0.897	1129 (91.6)	104 (8.4)	0.687
Multimorbid	1457 (90.5)	153 (9.5)		1467 (91.1)	143 (8.9)	
Gender						
Male	1225 (84.1)	231 (15.9)	<0.001	1310 (90.0)	146 (10.0)	0.009
Female	1350 (97.3)	37 (2.7)		1286 (92.7)	101 (7.3)	
Socioeconomic Status Index						
Upper	1158 (91.5)	107 (8.5)	0.323	1167 (92.3)	98 (7.7)	0.003
Middle	666 (89.0)	82 (11.0)		697 (93.2)	51 (6.8)	
Lower	751 (90.5)	79 (9.5)		732 (88.2)	98 (11.8)	
Age groups (years)						
30–39	957 (90.6)	99 (9.4)	0.536	947 (89.7)	109 (10.3)	0.116
40–49	727 (89.9)	82 (10.1)		740 (91.5)	69 (8.5)	
50–59	516 (90.8)	52 (9.2)		528 (93.0)	40 (7.0)	
60–69	258 (90.8)	26 (9.2)		262 (92.3)	22 (7.7)	
≥ 70	117 (92.9)	9 (7.1)		119 (94.4)	7 (5.6)	
Marital status						
Never married/refused	247 (93.6)	17 (6.4)	0.192	236 (89.4)	28 (10.6)	0.002
Currently married	2173 (90.2)	237 (9.8)		2218 (92.0)	192 (8.0)	
Separated/divorced/widowed	146 (91.3)	14 (8.8)		135 (84.4)	25 (15.6)	
Risk perception about smoking						
Yes	2216 (90.3)	237 (9.7)	0.349	2236 (91.2)	217 (8.8)	0.560
No	355 (92.0)	31 (8.0)		356 (92.2)	30 (7.8)	
Risk perception about substance abuse						
Yes	2200 (90.3)	236 (9.7)	0.402	2231 (91.6)	205 (8.4)	0.177
No	359 (91.8)	32 (8.2)		350 (89.5)	41 (10.5)	

P value was calculated using the χ^2 test; p≤0.05 was considered statistically significant.

(56.6%) had multimorbidity, 18.9% reported currently using any form of tobacco, 9.4% individuals reported using smoked tobacco, while 8.7% were users of smokeless tobacco. Very few individuals reported use of some form of tobacco in the past. Majority of the participants were middle-aged (30–59 years), currently married (84.8%) and belonged to upper-lower class, middle class and upper-middle class socioeconomic status (25.0%, 26.3% and 31.1%, respectively) (table 1).

Bivariate analysis showed that percentages of smoked tobacco users and non-users were almost similar among both multimorbid and apparently healthy individuals (p=0.897). Similarly, proportion of smokeless tobacco users and non-users among multimorbid and non-multimorbid individuals was almost equal (p=0.687) (table 2).

On multivariate analysis, we did not find any difference in behaviour in smoked (p=0.289) or smokeless tobacco (p=0.379) consumption among individuals with multimorbidity and those without multimorbidity after adjusting for effects of age, gender, marital status, socioeconomic status and risk perception. Men, individuals aged 30–39 years, currently married or those separated/divorced/widowed were significantly more likely to consume smoked tobacco (table 3).

Men belonging to the middle or upper socioeconomic status, aged between 30 years and 49 years, and separated/divorced were significantly more likely to consume smokeless tobacco products than others. Individuals perceiving smoked or smokeless tobacco use as a risk to their health were 30% less likely to consume smokeless tobacco. However the association was not significant (table 4).

DISCUSSION

More than half of the participants were found to be multimorbid. Overall, a considerable percentage of individuals was currently using any form of tobacco. However, we found no difference in the patterns of tobacco

Table 3 Relationship of multimorbidity with smoked tobacco use (n=2843)

	Smoked tobacco use			
	cOR (95% CI)	P value	aOR (95% CI)	P value*
Multiorbidity				
Apparently healthy	Ref.		Ref.	
Multimorbid	1.02 (0.79 to 1.32)	0.873	1.16 (0.89 to 1.51)	0.289
Gender				
Female	Ref.		Ref.	
Male	6.88 (4.82 to 9.82)	<0.001	7.36 (5.13 to 10.56)	<0.001
Socioeconomic Status Index				
Lower	Ref.		Ref.	
Middle	0.88 (0.65 to 1.19)	0.405	1.19 (0.85 to 1.67)	0.309
Upper	1.17 (0.85 to 1.62)	0.344	0.92 (0.67 to 1.26)	0.588
Age group (years)				
≥70	Ref.		Ref.	
30–39	1.35 (0.66 to 2.73)	0.413	2.11 (1.00 to 4.44)	0.049
40–49	1.47 (0.72 to 2.99)	0.294	2.02 (0.96 to 4.27)	0.064
50–59	1.31 (0.63 to 2.73)	0.472	1.88 (0.88 to 4.03)	0.103
60–69	1.31 (0.60 to 2.88)	0.502	1.68 (0.75 to 3.77)	0.210
Marital status				
Never married	Ref.		Ref.	
Currently married	1.59 (0.95 to 2.64)	0.077	1.83 (1.07 to 3.12)	0.027
Separated/divorced/widowed	1.39 (0.67 to 2.91)	0.377	2.84 (1.28 to 6.31)	0.010
Risk perception about smoking				
No	Ref.		Ref.	
Yes	1.23 (0.83 to 1.81)	0.309	1.03 (0.65 to 1.63)	0.905
Risk perception about substance abuse				
No	Ref.		Ref.	
Yes	1.20 (0.82 to 1.77)	0.347	1.28 (0.81 to 2.01)	0.290

*P value was obtained by binary logistic regression; p≤0.05 was considered statistically significant.
aOR, adjusted OR; cOR, crude OR; Ref., reference category.

consumption (smoked and smokeless tobacco) among multimorbid and non-multimorbid individuals even after adjusting for age, gender, socioeconomic status, marital status and risk perception.

In our study, we found similar patterns of tobacco consumption in those who had multimorbidity and in those who had not. A few studies support the findings that individuals do not reduce their tobacco consumption even after the diagnosis of cancer or CVDs.[19] Bassett *et al* did not find a significant difference between those who were diagnosed with bladder cancer and those who were not. However, 68% of the sample attempted to quit while less than 50% were able to quit successfully.[20] A population-based longitudinal study in the UK reported similar behaviour of smokers followed by cancer diagnosis.[21] Similarly, a study on 18 456 patients with coronary heart disease (CHD) with 23 physical and 8 mental health conditions in Scotland revealed that individuals with CHD and one or more mental health comorbidities were more likely to be current smokers than those without; it also

concluded that there is more need for interventions to target the group with multimorbidity in order to modify their behaviours. We did not find any difference in the patterns of tobacco consumption among multimorbid individuals.[22] On the other hand, a study conducted in north-east Melbourne by Gall reported that only 37% of the smokers quit smoking even after 5 years of being diagnosed with stroke.[23] The majority of the smokers believed that quitting tobacco smoking would help them reduce its detrimental effects.[24] Health problems, either for oneself or for a close relation, were found to be one of the major motivations for smoking cessation.[25] Studies have also reported that the individuals who attempted to quit smoking after the diagnosis of CVD gradually restarted after certain period.[26] Similar findings were reported by Kim *et al*, that patients diagnosed with CVD quit smoking right after the diagnosis but restarted gradually after a specific time.[27] This may also explain our findings of no difference in both groups; individuals who have multimorbidty may have attempted to quit or may have successfully

Table 4 Relationship of multimorbidity with smokeless tobacco use (n=2843)

	Smokeless tobacco use			
	cOR (95% CI)	P value	aOR (95% CI)	P value*
Multiorbidity				
Apparently healthy	Ref.		Ref.	
Multimorbid	1.06 (0.81 to 1.38)	0.675	1.13 (0.86 to 1.49)	0.379
Gender				
Female	Ref.		Ref.	
Male	1.42 (1.09 to 1.85)	0.010	1.55 (1.18 to 2.04)	0.002
Socioeconomic Status Index				
Lower	Ref.		Ref.	
Middle	0.55 (0.38 to 0.77)	0.001	0.52 (0.36 to 0.75)	<0.001
Upper	0.63 (0.47 to 0.84)	0.002	0.64 (0.47 to 0.86)	0.003
Age group (years)				
≥70	Ref.		Ref.	
30–39	1.96 (0.89 to 4.30)	0.095	3.03 (1.33 to 6.93)	0.008
40–49	1.59 (0.71 to 3.50)	0.260	2.39 (1.04 to 5.47)	0.040
50–59	1.29 (0.56 to 2.95)	0.549	1.85 (0.79 to 4.33)	0.154
60–69	1.43 (0.59 to 3.40)	0.427	1.81 (0.74 to 4.42)	0.192
Marital status				
Never married	Ref.		Ref.	
Currently married	0.73 (0.48 to 1.11)	0.140	0.87 (0.56 to 1.34)	0.518
Separated/divorced/widowed	1.56 (0.88 to 2.79)	0.132	2.54 (1.34 to 4.79)	0.004
Risk perception about smoking				
No	Ref.		Ref.	
Yes	1.15 (0.77 to 1.71)	0.487	1.37 (0.87 to 2.17)	0.175
Risk perception about substance abuse				
No	Ref.		Ref.	
Yes	0.78 (0.55 to 1.12)	0.178	0.67 (0.45 to 1.01)	0.056

p≤0.05 was considered significant.
*P value was obtained by binary logistic regression
aOR, adjusted OR; cOR, crude OR; Ref., reference category.

quit tobacco use soon after the diagnosis but that may have been a temporary change in their behaviour and they may have resumed their tobacco use behaviour after some time.

A study found that smokers who recently quit tobacco, cited their diagnosis of bladder cancer as a reason to quit. They also found that those who never smoked or have quit were more likely to identify tobacco use as a risk factor for lung diseases, lung cancer, head and neck cancers, and heart diseases, than for bladder cancer.[20] We were unable to follow up our study participants hence there is lack of evidence whether they have stopped using for the time being and if they had initiated again. In our study, individuals who perceive smoked and smokeless tobacco as harmful, were less likely to consume smokeless tobacco products. This suggests that an individual's risk perception prevents them from initiating or continuing the smokeless tobacco products however, presence of chronic diseases did not seem to alter their decision. There was no difference in the smoking pattern whether

it is perceived as a risk or not. This finding was similar to a study which concluded that those who continue smoking despite being diagnosed with head and neck or lung cancer, do so due to lower risk perception and less willingness to quit.[20] This might explain the persistent craving or addiction to nicotine present in smoked tobacco products as supported by the evidence.[28] In contrast to these findings, evidence from various studies suggests that a majority of those who were aware of the risks of tobacco use among smokers desired to quit. Further, those who quit smoking perceive smoking as a risk while those who tend to continue their consumption despite being diagnosed with multimorbidity, do not perceive it as a risk.[29 30]

To the best of our knowledge, this study was the first attempt to contribute to the literature about multimorbidity and patterns of tobacco consumption in multimorbid individuals in the Pakistani population. This study had a large sample size using a probability sampling technique. Previous studies have examined the effect of separate chronic diseases on tobacco consumption,

however this study adds to the existing pool of knowledge by reporting the tobacco consumption behaviour of a large number of adults diagnosed with multimorbidity.

Limitations

This study has a few limitations. First, we collected information at a single point in time and did not follow up, so we could not establish a temporal relationship between multimorbidity and tobacco use. Second, data regarding the extent of smoke and smokeless tobacco was not available so we could not draw the inference if smokers have not quit but decreased it in quantity. Third, diagnosis of chronic illness was subjective and self-reported and was not diagnosed by the physician in the study. The study was done on the residents of Gulshan-e-Iqbal town in Pakistan, thus the findings cannot be generalised.

There is a need to target individuals to modify their behaviour at the time of diagnosis of a chronic disease and they should be routinely counselled about the potential hazards of continuing tobacco use on the progression of their disease and impact on their quality of life. There is a need to integrate counselling to promote behavioural change at the primary care level through clinical psychologists or primary physicians. Evidence shows that physicians have an integral role in facilitating smoking cessation through counselling, being one of the motivating factors.[24] In future prospective studies are required to address some of the limitations of this particular study design and analysis.

CONCLUSION

This study found no difference in the patterns of tobacco use among multimorbid and healthy individuals. Future research studies are needed to explore the change in behaviour among individuals with multimorbidity prospectively. Evidenced-based behavioural interventions need to be implemented at the primary care level and individuals with multimorbidity should be routinely counselled to motivate behaviour change among them.

ORCID iD
Salima Khowaja http://orcid.org/0000-0002-7569-2342

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