Prevalence of tobacco use and effectiveness of physician's brief advice on tobacco cessation in the context of type 2 diabetes mellitus outpatients: A cross-sectional study

N S Javadekar,
N P Ghate[1],
A S Bodas[2],
K M Shelgikar[3],
A P Joshi

Consultant in Medicine at MMFHA Joshi Hospital, Pune, [1]Consultant ENT Surgeon, Dr Mendadkar Children's Hospital Kurla East, Mumbai, Maharashtra, [2]Research Officer-MMRS (Maharashtra Medical Research Society) MMFHA Joshi Hospital, [3]Consultant Physician and Diabetologist MMFHA Joshi and Ratna Hospital, Pune, Maharashtra, India

Address for correspondence:
Dr. N S Javadekar,
778, Shivajinagar, Opp Kamala Nehru Park, Pune - 411 004, Maharashtra, India.
E-mail: narendrajavadekar@gmail.com

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ABSTRACT

Background: Tobacco use is the largest preventable risk of non-communicable diseases (NCDs). Moreover, tobacco use interferes with glycaemic control, and there is a proven link between smoking and diabetes complications. **Aim:** This cross-sectional study investigates the prevalence of tobacco use and the effect of advice about quitting and its impact at one-month and one-year follow-ups in outpatient type 2 diabetics. **Materials and Methods:** Type 2 diabetes patients attending physician OPD in tertiary care hospitals were interviewed using a questionnaire based on Global Adult Tobacco Survey (GATS) 2, India. They also received the National Toll-Free Quitline Number 1800112356 and the M Cessation no. 011-22901701. The free tobacco cessation clinic details at the government hospital in Pune were also shared, in case patients wanted to attend these facilities. **Results:** The prevalence of tobacco use was 19% (present and former tobacco usage), wherein smoking contributed 9.0%, smokeless tobacco (SLT) contributed 7.5%, and dual use contributed 2.5%. The highest use was observed in the seventh decade. More women than men used smokeless tobacco. Poly SLT use and dual tobacco use – smoking and smokeless tobacco products, use of areca nut with SLT was also observed. Following brief physician advice, 27.2% quit tobacco usage at one-year follow-up. **Conclusion:** A history of tobacco use needs to be asked to all type 2 diabetes mellitus (DM) patients in each visit, documenting it, explaining the importance of quitting tobacco in the context of diabetes, and advising to quit tobacco, even to elderly patients. If all the physicians in the health system offer quit advice to all the tobacco users, many patients are likely to quit tobacco.

Keywords: Smokeless tobacco, type 2 diabetes, tobacco, tobacco cessation

Noncommunicable diseases (NCDs) kill 41 million people each year, equivalent to 74% of all deaths globally. Cardiovascular diseases, cancers, chronic respiratory diseases, and diabetes are four groups of diseases that contribute majorly to this bracket. Tobacco use, physical inactivity, the harmful use of alcohol,

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unhealthy diets, and air pollution all increase the risk of dying from an NCD.[1]

There is a steadily growing amount of evidence from clinical and epidemiological studies, highlighting the role of tobacco in the development and exacerbation of type 2 diabetes and diabetes-related health complications.[2] Evidence suggests that nicotine induces insulin resistance through activation of oxidative stress.[3] Tobacco use accelerates and aggravates micro and macrovascular complications with type 2 diabetes mellitus (DM) in the background. Hence, addressing tobacco, a modifiable risk of diabetes assumes an urgency.[4]

In India, nearly 65 million people have type 2 diabetes,[5] and nearly, 266.8 million use tobacco,[6] smokeless tobacco users (21.4%) being twice the number of smokers (10.7%). Various surveys such as the Global Youth Tobacco Survey,[7] Global Adult Tobacco Survey (GATS), and the Longitudinal Ageing Survey of India (LASI)[8] provide data regarding tobacco consumption in various age groups.[7,8] A systematic and meta-analysis review found that globally one in five type 2 DM patients use tobacco.[3] A study conducted in Ballalgarh, India, had a prevalence of tobacco use of 20% in diabetic and hypertensives.[4] Despite this more than 90% of the global smokeless tobacco users live in South-East Asia,[9] there is a paucity of data on the prevalence of smokeless tobacco use, in addition to smoking, in diabetes alone.

Tobacco cessation guidelines from WHO suggest a role of behavioral support in the form of brief advice by an healthcare provider (HCP) in addition to pharmacological intervention. Behavioral support in the form of brief advice by an HCP from 30 sec to 3 min is a routine practice in tobacco users.[10] Studies on very brief advice in family practice regarding smoking cessation have shown positive effects.[11] However, formative research by Project Quit Tobacco International observed that during medical consultation, most health professionals in India did not ask patients about their tobacco history and did not ask to quit.[12] The likelihood that tobacco users will quit can be more than double with the use of behavioral therapy, counseling, and medication. However, the data on the effects of tobacco cessation advice in type 2 DM is scarce.

MATERIALS AND METHODS

After, this study received approval from the Institutional Ethics Committee of the Maharashtra Medical Research Society (MMRS), Joshi Hospital, Pune, Maharashtra – Protocol – 1.02(30/12/21). The study was conducted according to the ethical standards laid down by the Declaration of Helsinki 1964. Each participant signed the written informed consent before commencing the data collection.

Study design

Hospital-Based Cross-Sectional Study.

Sampling Technique: – Convenience Sampling Method.

Sample size calculation

The sample size was determined by using the effect size from the previously published study[13] and with the help of the following formula:

$$n = z^2 \frac{pq}{(me)^2}$$

Thus, the minimum sample size required according to this formula is 160.

Study sample

All type 2 diabetes patients attending the medical outpatients department of a hospital in Pune, during a six-month period from 1st March to 30th September 2022 were included in this study, as per the following inclusion and exclusion criteria. The one-year follow-up was up to September 2023.

Inclusion criteria

Age – 18 years and above, both men and women outpatients with type 2 DM.

Exclusion criteria

Cancers, pregnancy

Refusal to participate in the study.

Procedure

All type 2 diabetes patients attending physician OPD in tertiary care hospitals were interviewed using a questionnaire based on the GATS 2, India. The patients who were using tobacco were given information about the increased risk of diabetic complications and advised to quit tobacco. They also received a tobacco quit helpline number (The National Toll-free Quitline Number 1800112356 and the M Cessation no. 011-22901701). The Free Tobacco Cessation clinic details at the government hospital in Pune were also shared, in case patients wanted to attend these facilities. These patients were followed up after one month and one year, telephonically, for tobacco cessation. Development of any complications of diabetes was also enquired.

Statistical data analysis

The data on categorical variables was shown as *n* (% of cases), and the data on continuous variables was presented as mean and standard deviation (SD). The inter-group statistical comparison of the distribution of categorical

variables was tested using the Chi-Square test or Fisher's exact probability test if more than 20% of cells have an expected frequency of less than 5.

In the entire study, the *P* values less than 0.05 were statistically significant. Statistical Package for Social Sciences (SPSS Ver 24.0, IBM Corporation, USA, 2016) for MS Windows was used.

RESULTS

Out of the total 200 patients studied, the prevalence of tobacco use was higher in the elderly population, particularly in the seventh decade with 62 patients [Table 1] The total prevalence of tobacco use was 19%. Out of a total 38 tobacco users, 16 were past tobacco users, and 22 were current tobacco users [Table 2]. Smokers were found to be 9%, 7.5% smokeless tobacco (SLT) users, and dual tobacco use was noted in 2.5% of patients [Table 3]. The study revealed that chewable tobacco was the most used SLT product (55%). Poly SLT use (use of more than one SLT product) included chewable tobacco and mishri in 20% and chewable tobacco and gutkha in 10%. Areca nut use with tobacco was noted in 15% of patients [Table 4]. Other findings are females used only smokeless tobacco, whereas dual use was common in males. The distribution of prevalence of diabetes-related complications did not differ significantly between groups of type 2 diabetes with and without tobacco users ($P > 0.05$) At one-month follow-up, three out of 22 current tobacco users had quit, while at the end of one year, five had quit tobacco completely. No statistically significant difference was noted among men and women at one month ($P = 0.609$) and one-year follow-up ($P = 0.233$).

Table 1: Age and gender distribution of cases studied

A. Baseline data					
	Male		Female		Total *n*
	n	%	*n*	%	
Age group (years)					
<40	5	83.3	1	16.7	6
41–50	15	65.2	8	34.8	23
51–60	19	52.8	17	47.2	36
61–70	25	44.6	31	55.4	56
71–80	27	43.5	35	56.5	62
>80	10	58.8	7	41.2	17
Total	101	50.5	99	49.5	200

Table 2: The status of past and present tobacco users according to gender

	Status of tobacco use						Total *n*
	Never		Past		Present		
	n	%	*n*	%	*n*	%	
Gender							
Male	68	34%	15	7.5%	18	9%	101
Female	94	47%	1	0.5%	4	2%	99
Total	162	81	16	8.0	22	11	200

Table 3: Overall type of tobacco use

Type of tobacco use	No. of patients	% of patients
Nil	162	81.0
Smoking	18	9.0
Smokeless	15	7.5
Dual	5	2.5
Total	200	100.0

Table 4: Distribution of commonly used smokeless tobacco (SLT) products

SLT product	No. of cases	% of cases
Chewable tobacco	11	55.0
Chewable tobacco + Mishri	4	20.0
Chewable tobacco + Supari	3	15.0
Chewable tobacco + Gutkha	2	10.0
Total	20	100.0

DISCUSSION

Nearly, a fifth of the patients (19%) had a past or present history of tobacco use in this study, which was more pronounced among those in the seventh decade. Prevalence of smoking was 9.0%, SLT use was 7.5%, and dual tobacco use was 2.5%. Tobacco use was observed in women only in the smokeless form as seen in earlier studies.[14] The use of multiple SLT products by the SLT users was observed. At one-year follow-up, 27.2% had quit the tobacco habit completely.

For every state in India from 1990 to 2016, a rising burden of NCDs has been noted.[15] With an increasing life expectancy, there are implications on the quality of life for the additional years lived, whether spent healthy or diseased. In a study of the temporal patterns of NCDs in India, the specific morbidity rates for diabetes increased while the median age of onset declined from 2004 to 2018.[16] Hence, addressing tobacco use, a preventable risk factor, in diabetes, is important. The high prevalence of tobacco use among DM patients highlights the urgency of incorporating tobacco use history and its documentation, in all diabetes patients.

The elderly age group has been neglected in many of the tobacco control initiatives. Quitting tobacco at any age is beneficial. In a study of elderly patients, above 60 years, 31% were found to be diabetic.[17] So, enquiring about a

history of tobacco use in all age groups, especially the elderly assumes importance, and they must be advised to quit tobacco. This assumes special significance for tobacco use as 30.4% of people aged 45 years and above currently use tobacco in any form.[3]

Tobacco is used mainly in two forms – smoking (common in most of the countries and a lot of awareness on its hazards exists) and smokeless tobacco (SLT), the commonest form of tobacco used in India. The term smokeless tobacco is defined as tobacco that is consumed in unburnt form,[18] SLT products include plain chewing tobacco, tobacco mixed with slaked lime, placed between the lips and gums, tobacco containing betel quid, which is areca nut, tobacco, slaked lime, and condiments, wrapped in a fresh betel leaf.[19]

GATS is a global standard for systematically monitoring adult tobacco use (smoking and smokeless) and tracking key tobacco control indicators. The second round of GATS, India (2016–17) showed 28.6% tobacco users – 10.7% smokers and 21.4% smokeless tobacco users.[6] Though the prevalence of tobacco use in GATS 2 shows a 6% decline from GATS 1 (2009–2010), it is still alarmingly high.

The few studies of smokeless tobacco use in diabetics have reported a prevalence of 18.2% of smoking and 13.5% of smokeless tobacco use among diabetes patients,[20] and in another study, a 21.1% prevalence of SLT use was observed risk factor for diabetic foot syndrome.[21]

Smokeless tobacco is cheap and easily accessible, and many times, its use by Indian women is acceptable, unlike smoking.[22] In addition to all the health hazards of tobacco, women are at a high risk of reproductive complications.[23,24] Tobacco use is a risk factor for cancer of the cervix. The relative risk of oral cancers among women SLT users is 8 times higher than men, and the relative risk of cardiovascular diseases is 2–4 times higher than men.[22] Of the all-cause mortality attributable to SLT use in India, nearly three-fifths of these deaths occur among women.[25]

An important observation of this study was the use of multiple SLT products by the SLT users. Such use of more than one SLT product has been referred to as poly SLT use.[15] Such patients need urgent tobacco quitting advice and may require referrals for tobacco cessation. High levels of the carcinogens tobacco specific nitrosamines (TSNAs) and tobacco alkaloids were observed in SLT products in India, with tobacco species used for SLT having higher TSNAs than smoked forms.[26] Areca nut use, in addition to SLT use, was also observed in three patients. Areca nut is also a Group I carcinogen, and a study in Taiwanese type 2 DM patients was associated with subclinical ischemic heart disease.[27]

The use of poly SLT in women of reproductive age group has been reported, and it was noted that for poly SLT users, quitting one form of tobacco may lead to an increased form of other tobacco products.[16]

At the start of this study, no statistically significant difference in the presence of diabetes complications was observed between the patients using tobacco and those not having any history of tobacco use. This can be attributed to this study population being outpatients of a hospital, our center being a referral center. However, one patient, who did not quit tobacco use, developed hypertension at one-year follow-up. Further primary clinic-based studies, in addition to hospital outpatient's studies, of tobacco use in type 2 DM patients are essential to determine the prevalence of diabetes complications among tobacco users.

There is a well-established association between smoking and diabetes complications. Smoking increases the risk of coronary artery disease, peripheral vascular disease, and stroke in type 2 diabetes patients. It has been reported that smoking and diabetes interact to increase the risk of cardiovascular disease 14 times more than either smoking or diabetes alone. This interaction appears to be much higher than their additive effect.[7] In a community-based study of diabetes patients of a rural area of India, the prevalence of diabetic foot syndrome and its associated risk factors was undertaken. The most commonly used substance was SLT (21.1%), followed by alcohol (18.1%) and smoking (6.5%).[23]

Effective tobacco cessation interventions include behavioral counseling and pharmacological treatment given singly or as a combination. Brief advice by healthcare professionals to stop tobacco use[28] and tele counseling are some types of behavioral interventions. Diabetes patients using tobacco are advised to quit, this is given, many times with other advice such as diet and lifestyle changes, and hence, patients may not heed to it.[2] The quit rate of 18% in this study can be attributed to the physician personally explaining the importance of disease-specific – increased chances of diabetes complications and difficulty in glycaemic control in case of continued tobacco use by the diabetic patient, in addition to routine care. In this study, the patients who quit tobacco were the result of the Physician's advice.

In a study of changes in the age of onset and duration of NCDs, the median age of onset declined and morbidity increased for diabetes, raising the possibility of 'expansion of disease' – earlier onset and longer duration as against the 'morbidity compression' hypothesis-late onset and

reduced duration of disease, suggested for high-income countries.[18]

In addition to the existing government initiatives to tackle the tobacco disease burden, tobacco use must be documented for all diabetes patients, whether manually or in hospital electronic records. History of tobacco use must be asked at each visit and a brief diabetes-specific relevance and advice, including tobacco quitline information and further referrals, if necessary to quitting tobacco must be a part of the care by physicians for diabetes patients, using any form of tobacco. This easy-to-implement activity can be undertaken at all levels of healthcare. The advantages of the brief advice by the Physician are that it takes 2–3 minutes, requires no additional resources, and can be integrated into diabetes management. At each visit to the healthcare facility, tobacco use history can be made a part of the documentation of patient records like pulse and blood pressure.[29]

Limitations

Biochemical validation such as urine cotinine estimation, to confirm if the patient has quit, was not possible due to resource constraints. However, we plan to undertake such studies in the future. Longer follow-ups are necessary, and we plan to undertake such studies.

CONCLUSIONS

A 19.0% prevalence of past or present history of tobacco use in any form was observed with poly SLT use, and dual forms of tobacco use were also observed. The prevalence of tobacco users was found significant in the elderly age group. At one-month follow-up, 19.05% of current users had quit, and at the one-year follow-up, 27.2% had quit. This is encouraging in view of ease of advice. This study highlights the need for the physician for asking about tobacco use history to all type 2 DM patients in each visit, documenting it, and explaining the importance of quitting tobacco in the context of diabetes.

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Authors' contributions

Conceptualization, Methodology, Project administration, Supervision, Visualization ,Writing, review & editing NSJ, NG Writing original draft: NSJ Design, Investigation , Data Curation, Data acquisition, Supervision: AB Design ,Manuscript review and editing: APJ, KS.

Data availability statement

Data will be made available on reasonable request.

Ethical statement

The study received approval from Institutional Ethics Committee of the Maharashtra Medical Research Society (MMRS), Joshi hospital, Pune, Maharashtra- Protocol - 1.02(30/12/21). The study was conducted according to the ethical standards laid down by the declaration of Helsinki 1964. Each participant signed the written informed consent before commencing the data collection.

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Conflicts of interest

There are no conflicts of interest.

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