

# Characteristics of tobacco consumption among cancer patients at a tertiary cancer hospital in South India—A cross-sectional study

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## ABSTRACT

**INTRODUCTION:** Cancer patients commonly present with antecedent addiction to tobacco consumption. Our study describes the characteristics of this substance use. Following the diagnosis of cancer, continued consumption of tobacco results in reduced tolerance to treatment, failure of treatment, tumor progression, other primary tumors, secondary cancers, and poor quality of life. The aim of our study is to enumerate the clinico-social aspects of tobacco consumption among cancer patients.

**METHODS:** This cross-sectional study includes 100 cancer patients admitted to Healthcare Global cancer hospital, Bangalore, India. The study subjects were assessed for tobacco consumption, as well as other substance use such as intake of alcohol. We assessed various dimensions of exposure to tobacco consumption such as duration, intensity, and cumulative dose as independent risk factors for cancer.

**RESULTS:** Among the study subjects, 46.2% were found to smoke filter cigarettes. The mean duration of tobacco consumption among beedi users was found to be longer (25.9 years, SD: 14.4). When stratified for exclusive consumption, the mean durations were as follows: beedis (29 ± 14.4 years), cigarettes (23.8 ± 13.3 years), and chewing (15.9 ± 9.6 years). Along with tobacco, a large proportion (59.3%) of patients consumed alcohol as well. After attempts to quit, 89.01% patients had reversal of tobacco substance use. The data did not show significance for duration, intensity, and cumulative dose of tobacco consumption.

**CONCLUSION:** The diagnosis of cancer is a life-altering event, which results in higher motivation to quit the use of tobacco. Smoking cessation initiatives can reduce the risk of developing tobacco-related malignancies.

**KEYWORDS:** Smoking, tobacco, smokeless tobacco, smoking prevention, counseling

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## Key Messages

- There is a need for profiling the pattern of tobacco use among cancer patients and providing appropriate interventions. Our study enumerates the clinical aspects of tobacco consumption among cancer patients,
- This cross-sectional study includes 100 cancer patients admitted to Healthcare Global cancer hospital, Bangalore, India. The pattern of tobacco consumption was assessed in terms of frequency, duration, type of tobacco (smoke or smokeless), and other associated habits,
- Smoking substance use when continued following a diagnosis of cancer can result in reduced tolerance to treatment, failure of treatment, tumor progression, other primary tumors, secondary cancers, and poor quality of life, and

- The diagnosis of cancer is a life-altering event, which results in higher motivation to quit the use of tobacco. Smoking cessation initiatives can reduce the risk of developing tobacco-related malignancies.

## Introduction

Tobacco consumption accounts for at least 30% of all cancer deaths and ~90% of lung cancer deaths.<sup>1</sup> Cancer patients commonly present with antecedent addiction to tobacco consumption. Our study describes the characteristics of this substance use. Dependence on tobacco is currently recognized by the International Classification of Diseases.<sup>2</sup> Cancer of the following organs is strongly attributable to smoking: lung, head and neck, bladder, and esophagus. Nicotine dependence is known to be a chronic remitting and relapsing addictive



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disorder.<sup>3</sup> The American Psychiatric Association recognizes this medical condition in the Diagnostic and Statistical Manual (DSM),<sup>2</sup> with the diagnostic criteria being recently revised from DSM-IV nicotine dependence to DSM-5 tobacco use disorder. Among smokers, nicotine addiction has been found to be more among cancer patients than those without cancer.<sup>4</sup> The pharmacological effects of betel quid chewing include euphoria, alertness, appetite suppression, and improved digestion.<sup>5</sup> Among the commonly consumed psychoactive substances, betel quid occupies the fourth position behind alcohol, nicotine, and caffeine.<sup>6</sup>

Smoking substance use when continued following a diagnosis of cancer can result in reduced tolerance to treatment, failure of treatment, tumor progression, other primary tumors, secondary cancers, and poor quality of life. Heavy smokers (>2 packs/day for 20 years) tend to have a 4.7-fold risk for secondary cancers of head and neck, and heavy alcohol consumption (>15 beers/week) is associated with a 3.8-fold risk.<sup>7</sup> The interaction of two carcinogenic agents such as tobacco and alcohol can increase the risk of cancer on a multiplicative scale.<sup>8</sup> The risk of head and neck cancer is increased by 40-fold following concurrent heavy exposure to tobacco and alcohol.<sup>9</sup>

“Field cancerization”<sup>10</sup> is the term used to describe the accumulation of carcinogenic alterations at the mucosal surface due to repeated exposure of risk factors over a long period of time, which in-turn has the potential to cause multiple primary and secondary tumors. Warren G.W et al.<sup>11</sup> quote the 2014 United States Surgeon General’s Report regarding improving the overall outcome of cancer treatment by preventing tobacco use, where-in the pathways include the following: reduced treatment related toxicity, incidence of treatment failure, and impact of co-morbid disease. Warren G.W et al.<sup>12</sup> study shows that only 40% of oncologists in the United States discuss tobacco-related medications with their patients who use this substance, and only 38% actively treat the cancer patients for tobacco dependence.

The other adverse outcomes of continuing the substance use among cancer patients include possibility of second primary tumors, shorter duration of survival, and poor quality of life.<sup>1</sup> Regardless of the primary site of cancer, second primary sites attributed to continued smoking include oral/pharyngeal, esophageal, stomach, hematological, and lung cancers. The Retinoid Head and Neck Second Primary (HNSP) Trial which includes 1384 patients reports an annual rate of second primary cancers related to tobacco among current, former, and never smokers as 4.2, 3.2, and 1.9%, respectively, (current vs former smokers:  $P=.03$ , current vs never smokers:  $P=.02$ ).<sup>1</sup>

Smoking cessation initiatives can reduce the risk of developing tobacco-related malignancies. The diagnosis of cancer is a life-altering event, which results in higher motivation to quit the use of tobacco.<sup>13</sup> However when the quit rates are compared with the general population, it is reported that half of the cancer patients continue to smoke even after the diagnosis.<sup>14</sup> There is a need for profiling the pattern of tobacco use among cancer

patients and providing appropriate interventions. The aim of our study is to enumerate the clinico-social aspects of tobacco consumption among cancer patients.

## Methods

This cross-sectional study includes 100 cancer patients admitted to Healthcare Global cancer hospital, Bangalore, India. During the period January to March 2021, the study subjects were assessed for tobacco consumption as well as other substance use such as alcohol. They were interviewed regarding the pattern of smoking which includes assessment of frequency, duration, and type of tobacco (smoke or smokeless) consumed. The subjects were categorized based on their socio-demographic and clinical characteristics. Further data regarding tobacco use such as quit attempts in the past and other variables such as alcohol consumption and co-morbidities were gathered.

The various dimensions of tobacco exposure which were assessed as independent risk factors for cancer include duration, intensity, and cumulative dose. For patients with current tobacco consumption, duration was defined as the difference between the age of initiation and the reference age (date of study participation), after deducting the cumulative episodes of temporarily quitting the substance use. Intensity includes the average number of cigarettes or beedis or sachets of smokeless tobacco consumed per day. The patient’s lifetime cumulative quantity of tobacco consumed (dose) in pack-years was calculated as a product of smoking duration and intensity. Intensity for this composite measure was calculated as number of packs of cigarettes or beedis or sachets of chew form consumed, with one pack-year computed as (total packs or sachets/day) for a duration of 1 year divided by 365. In the Indian context, one pack of cigarettes consists of ten units and one pack of beedis comprises 20 units. In the analysis, we quantified the association between key exposure measures of tobacco consumption and the risk of various cancers.

Nicotine dependence was measured using the Heaviness of Smoking Index (HSI),<sup>15</sup> which includes two questions from the Fagerstrom Test for Nicotine Dependence (FTND). FTND is a six item scale, and HSI is calculated from the number of cigarettes smoked per day (1–10, 11–20, 21–30, 31+) and the time to first cigarette after waking ( $\leq 5$ , 6–30, 31–60, 61+ min). Dependence of nicotine was considered high when HSI score  $>4$  (out of an overall score of 6). The FTND scale is used ahead of DSM-IV criteria due to its superior predictive ability of important outcomes.<sup>2</sup> The following interventions were planned based on HSI: counseling for low (0–1), nicotine replacement therapy for medium (2–4), and pharmacotherapy for high (5–6) dependence. Patients were either counseled to quit the habit of tobacco consumption, or were placed on nicotine replacement therapy or other pharmacotherapy (bupropion and baclofen). The investigating author provided appropriate counseling intervention based on

the patient’s stage of readiness to change: pre-contemplation, contemplation, preparation, action, and maintenance.

Data were analyzed using SPSS version 20. Descriptive data were presented as means and proportions, and associations were studied using Fischer’s exact test. “P-value” <.05 was considered as significant.

### Results

Table 1 shows the pattern of tobacco consumption among the patients. Tobacco was consumed in any form (cigarette, beedi, or

**Table 1.** Pattern of tobacco consumption among the study subjects

TYPE OF TOBACCO USER	NO (%)
Beedi users (n = 11)	
Only beedi	8 (8.79%)
Beedi and cigarette	3 (3.3%)
Cigarette users (n = 49)	
Cigarettes (filter and non-filter)	1 (1.1%)
Cigarettes (filter)	42 (46.2%)
Cigarettes (non-filter)	6 (6.6%)
Chewing product (n = 51)	
Chewing only	34 (37.4%)
Chewing and smoking	17 (18.7%)

There was an overlap of tobacco consumption among study subjects. Hence, the total number of users cumulates to >91 cases (“91” is e the actual number of patients who consumed tobacco among the study subjects).

**Table 2.** Epidemiological characteristics of cancer patients included in the study.

S. NO	CHARACTERISTIC	NO. (%)	TOBACCO USERS (%)
1	Sex		
	Male	94 (94%)	85 (93.4%)
	Female	6 (6%)	6 (6.6%)
2	Family h/o cancer		
	Yes	6 (6%)	6 (6.6%)
	No	94 (94%)	85 (93.4%)
3	Reason for tobacco consumption		
	Habit	69 (75.8%)	
	Social norm	15 (16.5%)	
	To relieve pain	2 (2.2%)	
	Others	5 (5.5%)	
	<i>Mean ± SD</i>		
4	Age	54.9 ± 12.5	
5	Mean duration of smoking (in years)		
	Beedi use	25.9 ± 14.4	
	Cigarette use	21.01 ± 12.7	
	Chew (smokeless tobacco) use	15.5 ± 9.7	

This table includes data of variables which are both discrete count and continuous in nature. The variable “mean duration” does not quantify exclusive use of particular type of tobacco, but there exists overlapping of the types due to combined usage.

chew) by 91% of our study subjects. Among them, a large proportion (46.2%) was found to smoke filter cigarettes.

Table 2 depicts the epidemiological characteristics of cancer patients. The mean duration of smoking includes aggregate data for each of the type of tobacco use (beedi, cigarette, and smokeless tobacco). In this table, the types have not been analyzed exclusively. Subjects consuming beedis were found to use the substance for a longer duration (mean: 25.68 years, SD: 14.35).

The clinical characteristics of patients are shown in Table 3. The mean consumption of tobacco has been computed by analyzing exclusive consumption of each of the type of tobacco (beedis, cigarette, chewing, and beedis and cigarettes). Along with tobacco, a large proportion (59.3%) of patients consumed alcohol as well. After attempts to quit, ~89% of subjects had reversal of tobacco use.

As seen from Table 4, increasing the duration of each strata of exposure does not significantly influence the incidence of various types of cancer. Similarly, the intensity of exposure measured in units of consumption/day does not show a significant association with the type of cancer. The cumulative dose in terms of pack-years of exposure also did not show a significant association with any of the cancer types. The column totals may not add up to the frequency of cancer types, due to the overlapping nature of data where exposure could be any combination of cigarette or beedi smoking with/without chewing.

As depicted in Figure 1, patients admitted to Head and Neck department comprised 58% of the study group, and 42% were from the Medical Oncology department. From the medical

oncology group of patients, the organ system most involved includes gastro-intestinal tract (GIT) (18%) and lungs (17%).

## Discussion

The diagnosis of cancer provides healthcare providers the best opportunity to advise patients regarding quitting the consumption of tobacco use. The diagnostic measure for tobacco dependence used in the clinic should allow effective assessment of patient's ability to quit smoking, heaviness of present use, earlier response to smoking cessation treatment, and costs (social, health, and occupational) incurred by its use.<sup>2</sup> There is a distinct possibility that ~50% of cancer survivors still persist with their earlier use of substance.<sup>1</sup> Some of the following factors tend to influence the rate of smoking cessation among cancer survivors: type of tumor, tobacco consumption as an antecedent cause, therapeutic regimen, behavior change interventions, and co-morbid conditions such as depression, anxiety, and drug or alcohol abuse. Some triggering factors for relapse of the habit include

nicotine withdrawal symptoms, fatigue, nausea, pain, depression, and anxiety.<sup>1</sup>

Our study reports the clinico-epidemiological characteristics of tobacco consumption among cancer patients. The results from our study can be compared with Mony P.K et al.<sup>3</sup> study where in the proportion of tobacco consumption includes the following: beedis only (8.8 vs 22%), cigarettes only (53.8 vs 49%), beedis and cigarettes (3.3 vs 18%), chewing only (37.4 vs 2%), and smoking and chewing (18.7 vs 9%). These data could be compared with GATS (Global Adult Tobacco Survey) 2009–10<sup>16</sup> India statistics for use of tobacco: 20% as cigarette smoking, 30% as beedi smoking, and ~50% in the form of smokeless tobacco. Our study results for other dimensions of exposure were compared with Mony P.K et al.<sup>3</sup> study: alcohol use (59.3 vs 52%), beedis smoked/day (12.8 ± 10.3 vs 20 ± 10), cigarettes smoked/day (5.3 ± 5.7 vs 15 ± 11), chewing sachets/day (5.2 ± 4.6 vs 12 ± 24), and earlier attempt to quit the use of tobacco (89.01 vs 43%). GATS<sup>16</sup> reports a 38.4% overall quit rate among smokers who made an attempt to quit in the past

**Table 3.** Clinical characteristics of cancer patients included in the study.

S. NO	CHARACTERISTIC	NO. (%)	TOBACCO USERS IN THIS GROUP (%)
1	Clinical department		
	Medical oncology	42 (42%)	35 (38.5%)
	Head and neck	58 (58%)	56 (61.5%)
2	History of other chronic disease <sup>a</sup>		
	Yes	20 (20%)	17 (18.7%)
	No	80 (80%)	74 (81.3%)
3	Previous history of attempt to quit tobacco		
	Yes	81 (89.01%)	
	No	10 (10.99%)	
4	Use of alcohol		
	Absent	35 (35%)	35 (38.5%)
	Present	63 (63%)	54 (59.3%)
	Occasional	2 (2%)	2 (2.2%)
5	Treatment regimen initiated		
	NRT therapy	7 (7.7%)	
	Other pharmacotherapy	9 (9.9%)	
		<i>Mean ± SD</i>	
6	Mean duration of tobacco use (years)		
	Exclusive beedis	29 ± 14.4	
	Exclusive cigarettes	23.8 ± 13.3	
	Beedis and cigarettes	17.5 ± 12.8	
	Exclusive chewers	15.9 ± 9.6	
	Smoking and chewing (mixed users)		
	Chew sachets per day	5.2 ± 4.6	
	Beedis per day	12.8 ± 10.3	
	Cigarettes per day	5.3 ± 5.7	

a: chronic disease = chronic obstructive pulmonary disease, myocardial infarction, stroke, and tuberculosis.

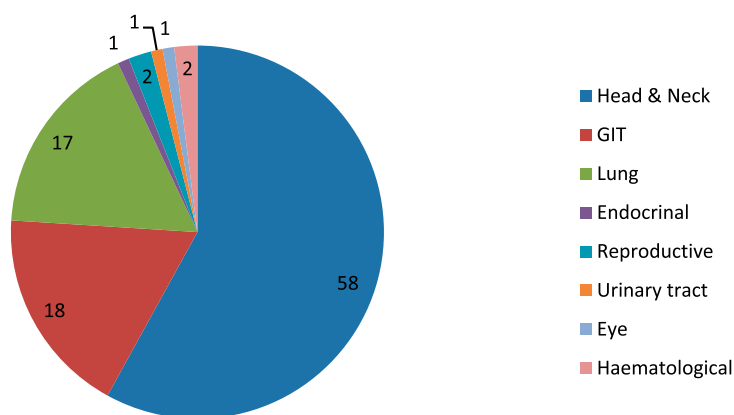
The clinical characteristics are described both for cancer patients as well as for the tobacco consumers among them. The variable "mean duration" in this table lists exclusive consumption of each type of tobacco along with a combination type.

**Table 4.** Association of each exposure and its effect estimate with specific cancer sites (outcome).

S. NO	EXPOSURE	OUTCOME				FISHER'S EXACT TEST P value
		HEAD AND NECK (N = 58)	LUNG (N = 18)	GIT (N = 17)	OTHER CANCERS (N = 7)	
1	Duration (yrs) of smoking/consumption					
Cigarette	0–20	19	4	6	0	.184
	21–50	7	6	6	3	
Beedis	0–20	1	0	0	0	.928
	21–50	6	3	1	0	
Chewing	0–20	29	2	2	2	.1128
	≥21	10	1	5	0	
2	Intensity of smoking/consumption (per day: Cigarettes or beedis or sachets separately)					
Cigarette	0–9	16	5	4	1	.386
	>10	10	5	8	2	
Beedis	0–9	4	0	0	0	.220
	>10	3	3	1	0	
Chewing	0–9	31	3	6	2	.912
	>10	8	0	1	0	
3	Cumulative dose (pack years)					
Cigarette	0–4	11	3	3	0	.373
	≥5	15	7	9	3	
Beedis	0–4	0	0	0	0	—
	≥5	7	3	1	0	
Chewing	0–4	21	3	5	2	.274
	≥5	18	0	2	0	

<sup>a</sup>Other includes endocrinal, reproductive, urinary tract, eye, and hematological. This includes bivariate analysis and is not adjusted for variables.

**Proportion of cancers among study subjects (%)**



**Figure 1.** Proportion of cancers among the study subjects, as per the organ system. Proportion was calculated from the total of 100 cancer patients included in our study.

12 months. Among the combined tobacco and alcohol users (59.3%) in our study, cancers of head and neck comprised 51.8% ( $n = 29$ ) followed by GIT (23.2%,  $n = 13$ ), lungs (16.1%,  $n = 9$ ), and others (8.9%,  $n = 5$ ).

Our study did not show a significant association between the type of cancer (Head and Neck, Lung, GIT, and Others) and each of the type of exposure (cigarettes, beedis, and chew form), stratified in-terms of duration, intensity, and cumulative dose. Pandeya N et al.<sup>17</sup> study addressed the complexity of multidimensional nature of tobacco exposure by fitting the statistical model to include both the indicator terms for ever smoking and transformed variables for the continuous dimensions of smoking. Such an approach enabled the following analysis: duration of smoking is significantly (OR:1.2, 95% CI:1.06,1.36) associated with the risk of esophageal adenocarcinoma (EAC), whereas intensity and duration together determine the risk of squamous cell carcinoma (ESAC). The authors<sup>17</sup> conclude from this evidence that there exists a difference in mechanism by which smoking induces EAC and ESAC. Similarly, Lubin J.H et al.<sup>18</sup> study on lung cancer patients shows an overall stronger effect of smoking for squamous cell carcinoma when compared with adenocarcinoma. We can infer from such non-linear associations that the reduced risk of cancer associated with intensity of smoking may reflect an increased capacity of the individual for repairing the damaged DNA (due to tobacco smoke), and an unlikely effect due to misclassification or error.

In the recent past, the pattern of increase in the ratio of adenocarcinoma to squamous cell carcinoma is seen both among lung cancers and esophageal cancers.<sup>18</sup> This has been attributed to the availability of low-tar and filter tipped cigarettes. Li X et al.<sup>19</sup> report that such types of cigarettes alter the exposure of respiratory epithelium to the tobacco carcinogens. Results from Djordjovic MV et al.<sup>20</sup> study on tobacco smoke attributed lung carcinoma show that the pathology at the cellular level shows difference in clustering of chromosomal aberrations for adeno and squamous cell carcinomas. Host factors including the constitutional genotype (polymorphism of DNA repair genes) not only influences the overall risk of cancer but also the type and site of smoking-related cancers.<sup>21</sup>

The risk of developing new cancer due to continued smoking is not confined to tobacco-related malignancies, as Jassem J<sup>1</sup> report the increased risk of lung cancer among breast cancer patients undergoing radiotherapy, or in patients with Hodgkin's lymphoma managed with chemo and/or radiotherapy and among patients with testicular cancer.<sup>1</sup> In the Danish randomized study on 120 lung cancer patients, the overall complication rate in the smoking intervention (counseling and nicotine replacement therapy) and control groups was 18 and 52%, respectively, ( $P < .01$ ). Sorensen L.T et al.<sup>22</sup> meta-analysis comprising 140 cohort studies and 479,150 patients reports the following post-operative complications due to tobacco smoking: Necrosis (Pooled OR<sub>a</sub>: 3.6, 95% CI: 2.62–4.93), healing delay and dehiscence (Pooled OR<sub>a</sub>: 2.07, 95% CI: 1.53–2.81), surgical site infection (Pooled OR<sub>a</sub>: 1.79, 95% CI: 1.57–2.04), wound

complications (Pooled OR<sub>a</sub>: 2.27, 95% CI: 1.82–2.84), hernia (Pooled OR<sub>a</sub>: 2.07, 95% CI: 1.23–3.47), and lack of fistula or bone healing (Pooled OR<sub>a</sub>: 2.44, 95% CI: 1.66–3.58).

Among patients with head and neck cancer, continued smoking after cancer diagnosis increases the complications induced due to radiotherapy. These include fatigue, oral mucositis, weight loss, xerostomia, loss of taste, and issues with eliciting voice.<sup>1</sup> Among patients with prostate cancer, current smokers (when compared with never smokers) experienced an increased risk of radiotherapy-induced issues such as urgency for defecation, sensation for incomplete emptying, and abdominal cramps. Continued usage of tobacco induces the clearance of cytochrome P450 enzymes (through its content polycyclic aromatic hydrocarbons), which otherwise are involved with the metabolism of several systemic anti-cancer compounds. In Hughes et al.<sup>23</sup> study, the pharmacokinetic and toxicity profile of erlotinib at a dosage of 300 mg/day among smokers was similar to 150 mg/day among non-smokers.

Results from Ditre et al.<sup>24</sup> study show that cancer patients who continued smoking after diagnosis experienced a greater severity of pain and decrease of normal activities. Daniel et al.<sup>25</sup> study shows that among lung cancer patients, 60% of persistent smokers reported moderate-to-severe pain when compared with 37% among non-smokers ( $P < .001$ ). The study<sup>24</sup> reports a higher level of fatigue, shortness of breath, and difficulty in eating among persistent smokers. These studies<sup>24,25</sup> indicate that cancer patients with lesions in lung, head, and neck who quit smoking before the diagnosis of cancer have better indices of quality of life than continued smokers. This analogy is also applicable for poor physical health, vitality, emotional, and social functioning.

In our study, all the tobacco users received behavior counseling, 7.7% received nicotine replacement therapy, and 9.9% were prescribed other pharmacotherapy (bupropion and baclofen). 82.4% of patients quit the habit soon after the diagnosis of cancer or after receiving behavior counseling. GATS 2009–10<sup>16</sup> reports a 5.3% overall quit rate for daily tobacco users. Aveyard P et al.<sup>26</sup> report the likelihood of quit attempt as 24% for physician advice among smokers, 68% for medication use, and 117% for behavioral support, all of these when compared with no intervention. However when compared with physician advice, the use of medication results in a 39% increase in the quit attempt, and behavioral support increases it by 69%.<sup>26</sup> In such scenarios, relapse could still be a possibility. Long-term cessation needs to be enabled through a combination of medication use and behavioral support.

The benefit of smoking cessation around the time of cancer diagnosis includes lowering the risk of cancer progression and reducing deaths due to cardiorespiratory pathology. The radiation therapy oncology group 9003 trial investigated the effects of continued smoking among oropharyngeal cancer patients who are on radiotherapy (HR: 2.48, 95% CI: 1.7–3.6,  $P < .001$ ). An absolute 5-year survival difference of 24.6% was observed between both the groups.<sup>27</sup> The National Surgical Adjuvant Breast

and Bowel Project (NSABP) Breast Cancer Prevention Trial (BCPT)<sup>28</sup> which investigated the role of adjuvant tamoxifen found that tobacco smoking was significantly associated with reduced adherence to protocol (OR: .75,  $P < .0003$ ).

All cancer centers should incorporate smoking cessation as a standard component of treatment, and the same is recommended by the National Comprehensive Cancer Network (NCCN) guidelines for comprehensive oncology care.<sup>29</sup> During clinical encounters, physicians need to estimate the severity of tobacco use disorder (TUD) of cancer patients as per DSM-5. These criteria which address the behavioral, psychosocial, and biological aspects have important clinical implications regarding patient's adherence to tobacco cessation interventions and prevention of relapse. Patients with psychological symptoms might need customized therapeutic strategies including intensive cessation regimens. The National Cancer Grid in India should implement relevant initiatives toward changing the approach of the cancer care community, from treating smoking cessation as an extra step to considering it as an integral component of treatment strategy.

#### Limitations of the study

1. A larger sample size would enable us to study the varying severity of TUD among cancer patients. Patients and relatives self-reported the quantity of tobacco consumption, which may cause underestimation as individuals tend to minimize their risk/problem.
2. Our study did not compare the results with controls such as smoking healthy individuals (relatives of cancer patients). The sample could be biased as the severity of TUD could be higher among cancer patients using tobacco.
3. We did not assess the TUD among tobacco users under DSM-5 criteria. The proposed threshold defines TUD as endorsement of  $\geq 2$  out of 11 DSM-5 TUD criteria.<sup>30</sup> In this context, we could not differentiate psychological symptoms or any other functional impairment from the physiological dependence,
4. Although we used HSI for assessing and treating nicotine dependence, this scale is applicable for a large sample size.<sup>31</sup> HSI includes items 1 and 4 of FTND (not 5) which only assess the physiological dependence. We could not assess the behavioral manifestations as measured by items 2,3, and 6 of FTND.

#### Conclusion

Our study was conducted exclusively on cancer patients, and they were interviewed in-person with validation from the attending relative. However, studies with larger sample size can yield profound associations. There is a compelling need to address the use of tobacco among cancer patients through

screening, counseling, and treatment. It is necessary to assess the role of various components of tobacco exposure in the risk of cancer, including the psychosocial, behavioral, and biological aspects. Tobacco dependence, although a chronic condition, is a treatable disorder which needs optimizing evidence-based health advisories for preventing the possibility of relapse. For patients who find it hard to quit the substance use, a multidisciplinary cancer care approach should integrate evidence-based tobacco cessation therapies. Following the diagnosis of cancer, quitting the consumption of tobacco provides opportunities for decreasing the risk of secondary cancers, reducing the complications following cancer treatment, improving the quality of life, and decreasing mortality from non-cancer diseases related to tobacco.

#### Author Contributions

VR conducted the literature review and drafted the manuscript, GV provided inputs regarding the biological associations to be studied, NB performed the statistical analysis, and RN conceived the design of the work, revised the draft, and provided final approval.

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