Tobacco consumption and its relation to time taken to death among COVID-19 patients died in an intensive care unit. A retrospective and descriptive study from Mizoram, India

Lalnun Diki[1], Joseph C Vanlalsanga[2], Lalrin Fela[3], Ganesh Shanmugasundaram Anusuya[4], Jane R Ralte[5], Rebecca Lalruatfeli Hnamte[6], Laldinsangi C[7]

[1]Assistant Professor, Department of Anaesthesiology and Intensive Care Unit, [2]Assistant Professor, Department of Orthopaedics, [3]Associate Professor, Department of Obstetrics and Gynaecology, [5]Registrar, Department of Administrative, Zoram Medical College, Falkawn, Mizoram, [4]Professor and Head, Department of Community Medicine, Nagaland Institute of Medical Sciences and Research, Kohima, Nagaland, [6]Psychologist, [7]Social Worker, National Tobacco Control Programme, Government of Mizoram, Mizoram, India

ABSTRACT

Background: The relationship between tobacco consumption and coronavirus disease 2019 (COVID-19) deaths among patients admitted in an intensive care unit (ICU) has not been studied in North-east parts of India. **Aims and Objectives:** The aims and objectives of the present study were to study the prevalence of smoke form and smokeless form of tobacco usage among the patients who had died of COVID-19 and to study the relationship of tobacco usage and number of duration of stay in ICU and number of days taken to death from the time of testing positive. **Materials and Methods:** This was a retrospective descriptive study of 279 COVID-19-positive patients who got admitted in ICU in Zoram Medical College. Mizoram from February 2020 to February 2022 and subsequently died because of COVID-19 in ICU. The data regarding age, sex, date of testing positive, date of admission in ICU, and date of death were collected from the patient case sheet. The details regarding tobacco consumption were collected from the patients close relatives. Descriptive analysis was carried out by mean and standard deviation along with range for quantitative variables, frequency, and proportion for categorical variables. Data were analyzed using IBM software version 22. P < 0.05 was considered as significant. **Results:** The mean age of the study population was 63.8 years. Majority were males 178 (63.80%). 198 (70.97%) had comorbidities. One hundred and twenty-nine (46.24%) were tobacco users. Mean stay in ICU in days was 7.75 days. Majority were using smokeless form of tobacco 73 (56.59%). The mean duration of survival in days from time tested positive to the death was 39.52 days among tobacco users when compared with non-tobacco users (47.48 days) (P = 0.265). Mean duration of survival was 53.07 days among smoke form versus 31.3 days among smokeless form users. (P = 0.031). **Conclusion:** There is no conclusive finding to say that there is a significant difference in time taken to death between tobacco users and non-tobacco users.

Key words: SARS CoV-2; Smokeless form; Intensive care unit; North-east India; Duration of stay

INTRODUCTION

The total number of coronavirus disease 2019 (COVID-19) cases according to Government of India as on date September 17, 2023, is 4, 49, 98, 162, 55, and total number of deaths reported were 5,32,0301.[1] The total number of cases reported in Mizoram as on date September 17th, 2023 is 239561.[1] Mizoram is one of the States with the lowest

Address for Correspondence:
Dr. Jane R Ralte, Registrar, Department of Administration, Zoram Medical College, Falkawn, Mizoram, India. **Mobile:** +91-9436141314.
E-mail: drjralte@gmail.com

number of deaths of around 734.[1] Mizoram is one of the states in India with the highest prevalence of tobacco usage. The National Family Health Survey done in 2019–2020 showed the prevalence of tobacco usage among men in Mizoram was high. The prevalence of tobacco usage among women is also a major problem in Mizoram and in Sikkim. Hence, from the latest data, we can observe that the prevalence of tobacco usage in Mizoram among the north-east states remains a major challenge.[2-5]

A previous study published by Ralte et al. has previously studied about the prevalence of various forms of tobacco usage among COVID-19 patients getting admitted in wards in Mizoram.[6] Studies done by Alizadehsani et al.,[7] Zhang et al.,[8] and Zheng et al.,[9] did not find any association between tobacco and COVID-19 deaths. A meta-analysis done by Mahamat-Saleh et al.,[10] involving studies around the world showed that smoking was associated with increased risk of death in COVID-19 patients.

Lippi and Henry[11] published a met analysis, which consisted of five studies. The meta-analysis showed showed that there is no association between smoking and the severity of COVID-19 infection. In contrast, a systematic review done by Vardavas and Nikitara[12] concluded that smoking is most likely associated with the negative progression and adverse outcomes of COVID-19.[6,12] Several studies have been done to find out the relationship between smoking and COVID-19 deaths, but the relationship of tobacco usage and time taken to death in terms of the number of days from the time of testing positive to the date of death has not been studied much in India. Hence, we wanted to study the relationship of tobacco usage and COVID-19 deaths.

Aims and objectives
Hence, our aims and objectives were to study the prevalence of smoke form and smokeless form of tobacco usage among the patients who had died of COVID-19 and to study the relationship of tobacco usage and number of duration of stay in intensive care unit (ICU) and number of days taken to death from the time of testing positive.

MATERIALS AND METHODS

The study design was retrospective and descriptive study. The study was conducted among 279 COVID-19-positive patients who got sick and admitted in ICU of Zoram Medical College and died of COVID-19-related complications from February 2020 to February 2022. Convenient sampling techniques were used. The details regarding type of COVID-19 test, date tested positive, date of getting admitted in ICU, comorbidities, and date

of death were retrospectively collected from the patients case sheet and the details regarding the type of tobacco usage, duration of tobacco use, and details regarding quitting of tobacco were collected from patients close relatives after getting informed oral consent. The patients close relative means who have been living with expired in the same house and also should be a close blood relative. The method of data collection from the relatives was by telephonic interview using a standarized questionnaire. The study was conducted after getting Institutional Ethical Clearance (IEC) from the IEC of Zoram Medical College, IEC dated March 16, 2022, Reference No.F.20016/1/18-ZMC/IEC/59. Oral consent was obtained from all the patients relatives considering the pandemic situation.

Inclusion criteria
The COVID-19-positive patients who got admitted in ICU of Zoram Medical College between February 2020 to February 2022 and subsequently died of COVID-19-related complications were only included in the study population. The patient relatives who gave consent were only included in the study. Only patients who died of COVID-19 between February 2020 and February 2022 in ICU were included in the study subjects.

Exclusion criteria
The patients who got COVID-19 and admitted in ICU and alive are excluded from the study. The patients relatives who did not give oral consent to participate in the study were excluded from the study.

Statistics
The number of days of stay in ICU and number of days taken for death were considered as primary outcome variables. Factors such as tobacco users, non-tobacco users, smoke form, and smokeless form of tobacco usage were considered as a primary explanatory variable. Descriptive analysis was carried out by mean and standard devation along with range for quantitative variables, frequency, and proportions for categorical variables. Chi-square test was used to compare the difference between the tobacco users, non-tobacco users, and various forms of tobacco users against the time taken to COVID-19 death. Data were analyzed using IBM Software version SPSS 22. $P<0.05$ was considered as significant.[13]

RESULTS

Table 1 shows the baseline characteristics of the study population. Majority were males (63.80%), 70.97% had comorbidity, and 46.24% were tobacco users. About 89.61% were tested by Rapid Antigen Testing. Majority used smokeless form of tobacco (56.59%). Zozial is

Table 1: Baseline characteristics of the study population

Variables	Frequency	Percentage
Gender		
Male	178	63.80
Female	101	36.20
Type of COVID-19 test		
RAGT	250	89.61
RT-PCR	18	6.45
TRUENAT	11	3.94
Comorbidity		
Yes	198	70.97
No	81	29.03
Tobacco user		
Yes	129	46.24
No	150	53.76
Type of tobacco user		
Smoke form	46	35.66
Smokeless form	73	56.59
Both smoke and smokeless form	10	7.75
Type of smoke form used		
Cigarette	20	7.17
Zozial	41	14.7
Type of smokeless form used		
Gutka	2	0.7
Sahdah	56	20.1
Tuibur	31	11.1
Khaini	2	0.7

RT-PCR: Reverse transcription polymerase chain reaction

Table 2: Mean age and survival parameters of the study population (n=279)

Parameter	Mean±SD	Median	95% CI	
			Lower	Upper
Age	63.8±18.14	65.00	61.66	65.93
Stay in ICU in days	7.75±7.73	6.00	7.16	9.00
Duration of critical stage entry	29.43±55.34	6.00	22.91	35.95
Duration of survival (tested positive to death date)	43.8±59.41	17.00	36.80	50.80

ICU: Intensive care unit

Table 3: Comparison of mean of different durations between tobacco users versus non-tobacco users

Parameter	Using tobacco (Mean±SD)		P-value
	Yes (n=129)	No (n=150)	
Duration of critical stage entry	28.81±54.78	29.96±55.98	0.863
Duration of survival (tested positive to death date)	39.52±54.24	47.48±63.47	0.265
Stay in ICU in days	8.49±8.02	7.49±7.47	0.28

ICU: Intensive care unit

a smoke form of tobacco and it was used higher than cigarette. In smokeless form of tobacco, Sahdah was used the most (20.1%).

Table 2 shows the mean age of the study population was 63.8 years. The mean number of stay in ICU in days was 7.75. Duration of critical stage entry means the time taken to become more sick so that they required ICU care. The median duration of critical stage entry was 6 days and median duration of survival time in number of days from the time tested positive was 17 days.

Table 3 shows the comparison of mean of the different durations in days between tobacco user and nontobacco user. As you can see from Table 3, we could not find anything significant in terms of critical stage entry, duration of survival, and number of days of stay in ICU when compared between tobacco users and non-users.

Table 4 shows the comparison of mean of different durations in days between the population those who were using smoke form of tobacco versus not using smoke form of tobacco. From Table 4, you can see the mean duration of survival that is time taken in the number of days from the time tested positive to the death was lesser in non-cigarette users.

Table 5 shows the comparison of mean of different durations between the population those who were using

smokeless form of tobacco versus not using smokeless form of tobacco. We did not find anything significant in relation to smokeless form of tobacco.

Table 6 shows the comparison of mean duration of critical stage entry, duration of survival, and mean number of days of stay in ICU across different types of tobacco users. From Table 6, you can see that the duration of survival from the time tested positive to the death in number of days was less among the smokeless form of tobacco users when compared with smoke form of tobacco users.

DISCUSSION

The present study population was 279 COVID-19 patients who got admitted in ICU and then died during their stay in ICU. The mean age of the study population was 63.8 years. This was comparable with another study done by Auld et al.,[14] in which the median age was 64. This clearly shows the patients who got admitted in ICU were in older age group. About 46.24% of the study population were tobacco users. This was comparable with a previous study done by Ralte et al.[6] The study done by Ralte et al., was also done in Mizoram, the only difference was that the study was done in COVID-19 patients getting admitted in wards.

The present study showed that the usage of smoke form of tobacco was 35.6% and that of smokeless form of

Table 4: Comparison of mean of different durations between different tobacco products usage (smoke form)

Parameter	(Mean±SD)		P-value
	Yes	**No**	
	n=20	**n=109**	
CIGARETTE			
Duration of critical stage entry	35.5±65.72	27.58±52.79	0.554
Duration of survival (tested positive to death date)	69.4±77.56	34.04±47.25	0.007*
Stay in ICU in days	8.85±9.53	8.42±7.77	0.827
	n=41	**n=88**	
Zozial (smoke form of Tobacco)			
Duration of critical stage entry	25.46±46.67	30.36±58.36	0.638
Duration of survival (tested positive to death date)	41.66±58.18	38.52±52.62	0.761
Stay in ICU in days	8.22±8.02	8.61±8.07	0.796

*P<0.05 considered as significant. ICU: Intensive care unit

Table 5: Comparison of mean of different durations between different tobacco products usage (smoke less form)

Parameter	(Mean±SD)		P-value
	Yes	**No**	
	(n=2)	**(n=277)**	
Gutka			
Duration of critical stage entry	5.5±7.78	29.17±55.13	0.546
Duration of survival (tested positive to death date)	6±8.49	40.05±54.49	0.380
Stay in ICU in days	1±0	8.61±8.03	0.185
	(n=56)	**(n=73)**	
Sahdah			
Duration of critical stage entry	31.86±60.86	26.47±49.93	0.582
Duration of survival (tested positive to death date)	34.41±43.75	43.44±61.09	0.351
Stay in ICU in days	8.84±7.77	8.22±8.26	0.665
	(n=31)	**(n=98)**	
Tuibur			
Duration of critical stage entry	14.16±31.81	33.44±59.64	0.088
Duration of survival (tested positive to death date)	26.74±44.96	43.56±56.46	0.133
Stay in ICU in days	8.65±7.61	8.44±8.19	0.901
	(n=2)	**(n=127)**	
Khaini			
Duration of critical stage entry	65±82.02	28.24±54.54	0.348
Duration of survival (tested positive to death date)	45.5±54.45	39.43±54.45	0.876
Stay in ICU in days	11±14.14	8.45±7.98	0.657

ICU: Intensive care unit

Table 6: Comparison of mean duration of critical stage entry across type of tobacco using (n=119)

Parameter	Type of tobacco user (Mean±SD)		P-value
	Smoke form (n=46)	**Smokeless form (n=73)**	
Duration of critical stage entry	31.93±55.33	28.23±56.61	0.727
Duration of survival (tested positive to death date)	53.07±66.31	31.3±42.38	0.031*
Stay in ICU in days	7.89±8.88	8.36±7.24	0.755

*P<0.05 considered as significant. ICU: Intensive care unit

tobacco was 56.5%. The smokeless form of tobacco usage was more among the present study. This was comparable with the survey done jointly by Indian Council of medical research and National Centre for disease informatics and research. In that survey, they found that the prevalence of tobacco use (smoked and smokeless) in Mizoram is as high as 77.1%, with the use of smokeless tobacco higher at 54.1% as compared to smoked tobacco at 43.6%.[6,15]

The prevalence of usage of smokeless form of tobacco was comparable in the neighboring state of Assam. The Assam cancer foundation has reported that nearly 41.7% people

used smokeless form of tobacco versus 13.3% used smoke form of tobacco[16] this reflected in the present study too.

In the present study, median number of days of stay in ICU was 6 days. Another study done by Charles de Roquetaillade et al.,[17] showed that the median number of days of stay among those who died in ICU was 15 days. Another retrospective study done by Carbonell et al.,[18] involving 3795 critically ill patients from spain, Andorra, and Ireland showed that the length of stay in ICU among non-survivors was 16 days.

In the present study, the time taken from testing positive to death in number of days was 17 (median days). This was comparable with another study done by Zhou et al.,[19] involving 191 patients getting admitted in ICU from Jinyintan Hospital and in Wuhan Pulmonary Hospital. The Zhou et al., study showed that the time from illness onset to death was 18.5 median days. The length of stay in ICU among non-survivors was 8 days.

From Table 4, you can see that the mean number of days from the time tested positive to the time of death was comparatively more among those who used smoke form of tobacco 69.4 days versus 34.04 days who did not use smoke form of tobacco. The exact reason not known, but may be attributed to other factors such as the stage of admission in ICU, comorbidities, and the COVID-19 viral strain.

Likewise from Table 6, also you can see that the time taken to days, that is, the mean number of days to death from the time of testing positive was 53.07 days among smoke form tobacco users versus 31.3 days among smokeless form tobacco users. Again the exact reasons cannot be identified.

Limitations of the study

The present study included only those patients who died in ICU. The present study was also a retrospective descriptive study. Future studies are needed by including those who also survived from the ICU. Studies like case–control study design can bring out more information in terms of tobacco usage and its relationship to deaths.

CONCLUSION

From the present study, we can conclude that smokeless form of tobacco usage was more among this study population. There are no conclusive findings to say that there is a significant difference in time taken to death between tobacco users and non-tobacco users. The present study also showed the burden of tobacco usage in Mizoram. Hence, health awareness campaigns and prevention strategies to prevent tobacco usage should be intensified in the state of Mizoram.

REFERENCES

1. Government of India. India Fights Corona COVID-19. Available from: https://www.mygov.in/covid-19 [Last accessed on 2023 Sep 17].

2. Tata Institute of Social Sciences (TISS), Mumbai and Ministry of Health and Family Welfare, Government of India. Global Adult Tobacco Survey GATS 2 India 2016-17. Available from: https://www.ntcp.nhp.gov.in/assets/document/surveys-reports-publications/global-adult-tobacco-survey-second-round-india-2016-2017.pdf [Last accessed on 2022 Nov 07].

3. Ministry of Health and Family Welfare, Government of India, International Institute for Population Sciences Fact Sheets, Key Indicators 22 STATE, S/UTs FROM PHASE I: National Family Health Survey (NFHS-5) 2019-2020. Available from: https://www.rchiips.org/nfhs/nfhs-5_fcts/nfhs-5%20state%20 factsheet%20compendium_phase-i.pdf [Last accessed on 2022 Nov 07].

4. Ladusingh L, Dhillon P and Narzary PK. Why do the youths in Northeast India use tobacco? J Environ Public Health. 2017;2017:1391253.
   https://doi.org/10.1155/2017/1391253

5. Rai B and Bramhankar M. Tobacco use among Indian states: Key findings from the latest demographic health survey 2019-2020. Tob Prev Cessat. 2021;7:19.
   https://doi.org/10.18332/tpc/132466

6. Ralte JR, Hrahsel L, Sailo L, Anusuya GS, Sailo L and Ruata L. A cross-sectional study on tobacco usage among COVID-19 positive patients admitted in a tertiary care center in Mizoram, India. Asian J Med Sci. 2023;14(1):10-14.
   https://doi.org/10.3126/ajms.v14i1.49843

7. Alizadehsani R, Sani ZA, Behjati M, Roshanzamir Z, Hussain S, Abedini N, et al. Risk factors prediction, clinical outcomes, and mortality in COVID-19 patients. J Med Virol. 2021;93(4):2307-2320.
   https://doi.org/10.1002/jmv.26699

8. Zhang G, Hu C, Luo L, Fang F, Chen Y, Li J, et al. Clinical features and short-term outcomes of 221 patients with COVID-19 in Wuhan, China. J Clin Virol. 2020;127:104364.
   https://doi.org/10.1016/j.jcv.2020.104364

9. Zheng Y, Xu H, Yang M, Zeng Y, Chen H, Liu R, et al. Epidemiological characteristics and clinical features of 32 critical and 67 noncritical cases of COVID-19 in Chengdu. J Clin Virol. 2020;127:104366.
   https://doi.org/10.1016/j.jcv.2020.104366

10. Mahamat-Saleh Y, Fiolet T, Rebeaud ME, Mulot M, Guihur A, El Fatouhi D, et al. Diabetes, hypertension, body mass index, smoking and COVID-19-related mortality: A systematic review and meta-analysis of observational studies. BMJ Open. 2021;11(10):e052777.
    https://doi.org/10.1136/bmjopen-2021-052777

11. Lippi G and Henry BM. Active smoking is not associated with severity of Coronavirus disease 2019 (COVID-19). Eur J Intern Med. 2020;75:107-108.
    https://doi.org/10.1016/j.ejim.2020.03.014

12. Vardavas CI and Nikitara K. COVID-19 and smoking: A systematic review of the evidence. Tob Induc Dis. 2020;18:20.

    https://doi.org/10.18332/tid/119324

13. IBM Corp. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp; 2013.

14. Auld S, Caridi-Scheible M, Blum JM, Robichaux CJ, Kraft CS, Jacob JT, Jabaley CS, Carpenter D, Kaplow R, Hernandez AC, Adelman MW, Martin GS, Coopersmith CM, Murphy DJ. ICU and ventilator mortality among critically ill adults with COVID-19. Critical care medicine.2020; 48(9):p e799-e804.

    https://doi.org/10.1097/CCM.0000000000004457

15. The Weather Channel. Health. Survey Reports High Prevalence of Tobacco use in Mizoram. Available from: https://www.weather.com/en-IN/india/health/news/2022-07-25-high-prevalence-tobacco-use-in-mizoram [Last accessed on 2022 Nov 24].

16. Assam Cancer Care Foundation. Government of Assam and Tata Trusts Initiative. Tobacco users are at Higher Risk of Severe Illness when Affected by COVID-19. Available from: https://www.assamcancercarefoundation.org/media/releases/tobacco-users-at-higher-risk.html [Last accessed on 2023 Oct 01].

17. de Roquetaillade C, Bredin S, Lascarrou JB, Soumagne T, Cojocaru M, Chousterman BG, et al. Timing and causes of death in severe COVID-19 patients. Crit Care. 2021;25(1):224.

    https://doi.org/10.1186/s13054-021-03639-w

18. Carbonell R, Urgeles S, Rodriguez A, Bodi M, Loeches IM, Violan JS, et al. Mortality comparison between the first and second/third waves among 3795 critical COVID-19 patients with pneumonia admitted to the ICU: A multicentric retrospective cohort study. Lancet Reg Health Eur. 2021;11:100243.

    https://doi.org/10.1016/j.lanepe.2021.100243

19. Zhou F, Yu T, Du R, Fan G, Liu Y, Liu Z, et al. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: A retrospective cohort study. Lancet. 2020;395(10229):1054-1062.

    https://doi.org/10.1016/S0140-6736(20)30566-3

Orcid ID:
Dr. Lalnun Diki - https://orcid.org/0000-0001-7670-3181
Dr. Joseph C Vanlalsanga - https://orcid.org/0009-0001-0774-7487
Dr. Lalrin Fela - https://orcid.org/0000-0002-8602-1253
Dr. Ganesh Shanmugasundaram Anusuya - https://orcid.org/0000-0002-6853-6616
Dr. Jane R Ralte - https://orcid.org/0000-0002-0693-7043
Ms. Rebecca Lalruatfeli Hnamte - https://orcid.org/0009-0001-3311-5678
Ms. Laldinsangi C - https://orcid.org/0009-0008-6338-1599