Systematic content analysis of self-help smokeless tobacco cessation smartphone applications available in India

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ABSTRACT

Background: The content of smartphone applications (apps) that offer smoking cessation interventions has been appraised in the past. Considering the high prevalence of smokeless tobacco (SLT) use in Southeast Asia, identifying high-quality and credible apps for SLT cessation would be more helpful.
Objective: This study evaluated the technical quality of apps for SLT cessation and their content adherence with the standard tobacco cessation guidelines.
Materials and methods: A systematic search of SLT cessation smartphone apps freely available in the Google PlayStore was conducted using nine relevant search terms, and the first fifty apps under each search term were identified. The technical quality of the apps was rated using the Mobile App Rating Scale (MARS). Adherence of the app content to the standard tobacco cessation guidelines was also determined.
Results: Three apps were found to be relevant for SLT cessation. However, none of the apps was high-quality or incorporated existing evidence on SLT cessation.
Conclusion: Adherence of these apps to the tobacco cessation guidelines by the National Tobacco Control Program (NTCP), India and the National Institute for Health and Care Excellence (NICE), U.K., was limited only to a few checklist parameters.

1. Introduction

Tobacco use accounts for an estimated 1.6 million deaths every year in Southeast Asia alone.[1] Behavioural counselling and pharmacotherapy are time-tested approaches in tobacco cessation, requiring patients to visit tobacco cessation centres (TCC).[2] However, their support is below optimum, considering fewer TCCs, shortage of dedicated staff, limited clinicians' training and skills, and the need for multiple patient reinforcement sessions.[3,4] Smartphones can be utilized to overcome many of these reported barriers as mobile applications (apps) are used by many for carrying out day-to-day activities, including access to health resources.[5] Recently, smartphone apps have emerged as a promising MPOWER tool for tobacco cessation, achieving quit rates of up to 19 percent.[6,7] These apps increase user awareness, provide motivation and referral support and often act as an adjunct to professional cessation advice.[8] These apps usually offer free and customized cessation support with reinforcement to tobacco users, even in inaccessible regions.[8] The 2016 Cochrane review highlighted the beneficial impact of mobile phone-based smoking cessation interventions on 6-month cessation outcomes. But, most of these apps focus only on smoking cessation and are popular in high-income countries.[9] A few studies in Australia, the U.K., and the USA reviewed the quality and adherence of these apps to local cessation guidelines, whereby high-quality and credible apps that offered smoking cessation were identified, and potential improvements were discussed.[10–14]

Smokeless tobacco (SLT) use is a much more significant concern than tobacco smoking in the Southeast Asia region, which accounts for more than 80 % of global SLT users.[1] SLT cessation provided through mobile phone apps can be a promising approach in the Southeast Asian context, considering that more than 326 million people have smartphones with internet access.[15] Such apps are available on the Google PlayStore, but their quality and credibility have not been tested. Hence, the present

study was planned to evaluate the technical quality and content adherence of the SLT cessation smartphone apps to the standard tobacco cessation guidelines.

2. Materials and Methods

Ethical approval for the study was obtained from the Institutional Ethics Committee, PGIMER, Chandigarh (INT/IEC/2022/SPL-237). Content analysis of self-help and free-to-use smartphone apps for SLT cessation in the Indian Google PlayStore (Android supported) was conducted. However, the smartphone apps that used languages other than English or Hindi, games or those that targeted tobacco forms other than SLT were not included. A systematic search to identify smartphone apps for SLT cessation was conducted using the search function in the Google PlayStore. Nine relevant search terms/keywords were identified with the help of the tobacco cessation experts for identifying SLT cessation apps. These were 'smokeless tobacco', 'dip tobacco', 'chew tobacco', 'tobacco', 'quit tobacco', 'tobacco cessation, 'tobacco addiction', 'tobacco-free' and 'cold turkey'. The first fifty apps under each search term were selected and listed with their names, and duplicates were removed. The apps were then screened based on app title, description, screenshots or videos and information on the PlayStore landing page to exclude the non-relevant apps. The remaining apps were explored for the eligibility criteria after downloading and reviewing them on a compatible smartphone. Eligible apps for SLT cessation were identified and used independently for at least 30 min by two trained reviewers to appraise their technical quality and content adherence to the standard tobacco cessation guidelines.[16–18] Ambiguities were resolved by mutual discussion or with the help of a third expert to reach a consensus.

A customized data record sheet was prepared to review the apps. It comprised of three sections: app demographics, quality, and content assessment. The demographic section was adapted from the descriptive part of the Mobile App Rating Scale (MARS).[10] It included items about the app categorization, focus, theoretical affiliation, target age group, technical aspects, user review rating and the number of downloads. App quality was assessed using MARS, comprising 23 items under five domains. The first four domains (Aesthetics, Engagement, Functionality, and Information) objectively rate the app quality, whereas the fifth domain is subjective.[10] Original resource materials and training slides of the MARS scale were obtained from the authors before commencing the study. The credibility of app content was assessed using a tailored 14-item checklist based on the tobacco cessation guidelines given by the National Tobacco Control Program (NTCP), India and the National Institute for Health and Care Excellence (NICE), U.K. The NTCP guidelines are based on the 5A's principle ("ask," "advice," "assess," "assist," and "arrange follow-up") for effective intervention against tobacco. NICE guidelines are globally acknowledged official evidence-based recommendations for self-help material on tobacco cessation that go beyond treatment and offer post-cessation support to patients for relapse prevention.[16,17]

2.1. Data management and analysis

The technical quality scores were recorded manually on the data record sheet and entered in Microsoft Excel. Calculations were done using the Statistical Package for Social Sciences software version 21.0. All 23 items of the MARS scale were rated using a five-point Likert scale ranging from inadequate to excellent (score one to score five). The mean scores of all five domains were calculated by adding up individual Likert scores of the respective domain items. App quality mean score was determined by adding mean scores of the first four domains (Aesthetics, Engagement, Functionality, and Information). Objective and subjective quality scores of more than four (threshold value) implied the high quality of an app.[18] The content adherence of the apps with the NTCP and NICE guidelines was qualitatively assessed as 'yes/no' against each checklist item.

3. Results

A total of 450 apps were identified using nine search terms. Two hundred and ninety apps were excluded after duplicate removal. The remaining 160 apps were screened based on the app title and PlayStore landing page and 149 apps were excluded. Consequently, 11 potential SLT cessation apps were identified and fully downloaded to assess the eligibility criteria. Eight apps were further excluded and finally, only three apps based on the eligibility criteria were found to be relevant for SLT cessation, namely 'Tobacco Quit', 'Tambakoo chorne ke upaya (Ways to quit tobacco)' and 'Quitzilla' (Fig. 1).

These SLT cessation apps mainly focused on goal setting, bringing positive behaviour change, increasing physical health, and decreasing substance use through information education communication (IEC)/behaviour change communication (BCC) and habit monitoring. Except for the 'Quitzilla', the other two apps, 'Tambakoo chorne ke upaya' and 'Tobacco Quit', were less popular among Android users (Table 1).

All the apps were poor performers when assessed for user engagement, app functionality, aesthetics and information provided except the 'Tambakoo chorne ke upaya' app, which faired in just one domain, i.e. app functionality. All three apps' overall and subjective quality were below the threshold value (Table 2). Detailed MARS assessment scores have been provided in the supplementary file (Supplementary Table 1).

The adherence of SLT cessation apps to the NTCP guidelines was limited only to a few parameters. Tobacco Quit asked the users about their tobacco use status and willingness to quit SLT and advised them about initiating nicotine replacement therapy for SLT cessation. Tambakoo chorne ke upaya advised against SLT use and presented approaches to cut down SLT use or minimize harm through non-standardized IEC material. Quitzilla asked the users to self-register their current addiction and advised them to quit by bringing to their conscious level the money they would be saving by quitting tobacco. The role of apps in assisting users in bringing positive change and arranging further support was found inadequate (Table 3).

4. Discussion

In the present study, only three apps for smokeless tobacco cessation were identified in the Indian Google PlayStore. These apps focus on behaviour change and substance use through IEC dissemination, goal setting, or habit tracking to bring about changes in SLT usage habits. Similar focus areas and theoretical backgrounds were identified by Thornton et al. while rating the technical quality of smoking cessation apps in Australia.

Two of the three identified apps, Tobacco Quit and Tambakoo Chorne ke Upaye, have been downloaded by only a few users since their inception. This is contrary to the results obtained in the studies done in Australia, the U.K., and the USA, where many downloads and star ratings were obtained for smoking cessation apps even with lower content credibility.[10–14] However, the Quitzilla app showed a very high number of downloads and is relatively popular among users. It could be because the app targets all sorts of addictions, including tobacco use, making it relevant for many people.

None of the identified SLT cessation apps was found to have high technical quality when evaluated using MARS. On the contrary, a quality assessment of the smoking cessation apps in the Australian Google PlayStore identified six high-quality apps rated using MARS. Poor-quality apps that lack a scientific basis can demotivate the patients or discourage them from obtaining cessation support through other legitimate sources.[10] The 5A-based behavioural management therapy is currently recommended for tobacco cessation in India. These are globally recognized by the World Health Organization, the U.S. Public Health Services, and the Royal Australian College of General Practitioners.[19,20] None of the three identified SLT cessation apps were consistent with the 5A tobacco cessation guidelines. Tambakoo chorne ke upaye provided only passive SLT cessation advice through
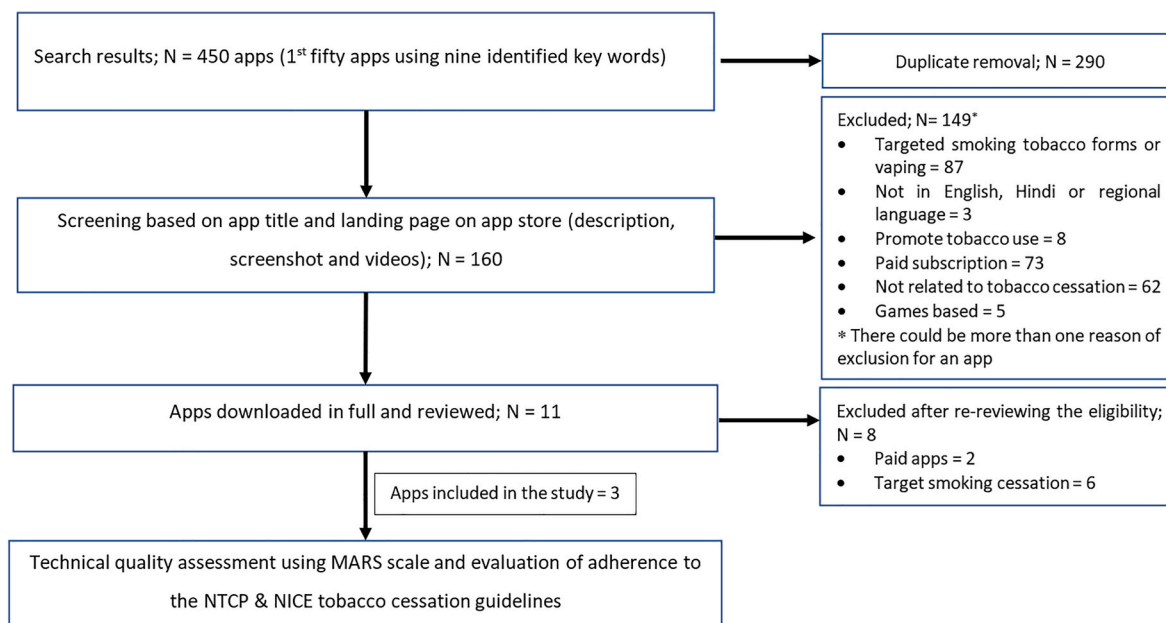
Fig. 1. Flowchart for app selection.

Table 1
Demographics of SLT cessation apps.

Name of the app	App category	App language	Focus	Theoretical	Affiliation	Age group	Technical aspects	Review rating	Downloads
Tamba-koo chorne ke upaya	Health and fitness	Hindi	Behaviour Change Substance Use Physical health	IEC Goal setting Behavioral change	Unknown	General	Allows sharing (Facebook, Twitter etc.)	–	100+
Tobacco Quit	Health and fitness	English	Behaviour Change Substance Use	IEC product prescription	Commercial	General	Requires login	–	10+
Quit zilla	Health and fitness	English	Behaviour Change Substance Use Goal Setting	Monitoring/ Tracking Goal setting	Private, Ukraine	General	Allows sharing (Facebook, Twitter etc.)	4.5	1 million +

Table 2
App technical quality ratings using the MARS scale.

Domain (mean scores)	*Tambakoo chorne ke upaya*	Quit Zilla	Tobacco Quit
Engagement	1.8	1.8	2.2
Functionality	4.25	2.5	2.75
Aesthetics	1.33	3.33	2.67
Information	2.2	2.0	2.2
App quality mean Score	2.4	2.41	2.46
Subjective quality score	1.5	1.6	1.75

Table 3
App adherence to the cessation guidelines.

SLT Cessation Guidelines	Tobacco Quit	Tambakoo chorne ke upaya	Quit Zilla
NTCP Guidelines			
ASK	✔	X	✔
ADVISE	✔	✔	✔
ASSESS	✔	X	X
ASSIST	X	X	X
ARRANGE	X	X	X
NICE guidelines			
Harm reduction	X	✔	X
Benefits of quitting	X	✔	X
Planning a schedule	X	X	X
Strategies to cut down	X	✔	X
Benefits of NRT	✔	X	X
Types of NRT products	✔	X	X
How to use NRT products	X	X	X
Where to get NRT products	X	X	X
Where to get further support	X	X	X

non-scientifically validated IEC material. *Quitzilla* notified about the abstinence time and the money saved by leaving the habit or addiction to its users. It did not offer any customizations like the assessment of readiness to quit SLT nor the assistance and follow-up support. Based on the Fagerstrom test, only a single app, *Tobacco Quit*, assessed user SLT dependence. It recommended using a commercial nicotine replacement product without offering behavioural counselling or specialist support. A previous study found the *My Quit Buddy app* in the Australian Play-Store compliant with the national tobacco cessation guidelines.[10] The Australian National Preventive Health Agency developed this app, one of the highest-rated and recommended apps by government

departments in Australia.[10]

Smartphone apps offer self-help cessation support to tobacco users. So, we also assessed the adherence of smartphone apps with existing guidelines for a standard self-help tobacco cessation material given by NICE, U.K. A previous study on content analysis of smoking cessation smartphone apps in the U.K. reported three apps that adhered to these guidelines.[11] On the contrary, SLT cessation apps identified in this study were not all-inclusive in providing behavioural or pharmacological assistance.

Countries falling in the WHO Southeast Asia region, in collaboration with the World Health Organization and the International Telecommunications Union, have initiated web-based health interventions to make cessation services accessible to those who want to quit tobacco. An extension of these efforts through smartphone-based apps can be an interactive interface to reach millions of smartphone users in India. An ideal SLT cessation smartphone app should embed high-quality characteristics for user engagement and not miss out on content credibility.[21] However, the existing SLT cessation apps lack an evidence-based strategy, as reported in the results of this study. Our findings suggest a need for a monitoring mechanism to review the content of the existing smartphone apps. Also, future app development should be based on a scientific rationale, adopting current cessation guidelines.

It was the first study to comprehensively review the technical quality and content of existing smartphone applications for smokeless tobacco. We adopted a rigorous process to carry out each step of the study. The original training material was requested from the MARS authors and used to train both reviewers. Content adherence was not only limited to the national guidelines (NTCP, India) but internationally recognized NICE, UK tobacco cessation guidelines for self-help material were also used. However, this study has a few limitations. We did not consider the iOS apps since the number of iPhone users in India is less than 5 %.[22] A previous content assessment study found iOS and Android-based apps to provide cessation support similarly, justifying the current approach.[13] SLT use is often associated with low socioeconomic status, and previous studies have cited subscription cost as a deterring factor in health app adoption.[23–25] Hence, we did not include paid apps in the present content analysis.

5. Conclusion

The quality of available smartphone apps for SLT cessation in the Indian Google PlayStore is low. Adherence of SLT cessation apps to the NTCP and NICE guidelines is limited only to a few parameters.

Patient's/Guardian's consent

Not applicable.

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Conflicts of interest

The authors declare that they have no known conflict of interest that could influence the present research.

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Ethics statement

Ethical approval for the study was obtained from the Postgraduate Institute of Medical Education and Research, Chandigarh, Institutional Ethics Committee, (IEC-INT/2022/Study-225).

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jobcr.2024.04.011.

References

1. Chen DT, Nargis N, Fong GT, Huq SM, Quah ACK, Filippidis FT. A longitudinal study of transitions between smoking and smokeless tobacco use from the ITC Bangladesh Surveys: implications for tobacco control in the Southeast Asia region. *Lancet Reg Health Southeast Asia*. 2023 Apr 12;14, 100185.
2. Krist AH, Davidson KW, Mangione CM, et al. Interventions for tobacco smoking cessation in adults, including pregnant persons: US preventive services task force recommendation statement. *JAMA*. 2021 Jan 19;325(3):265–279.
3. Varghese C, Kaur J, Desai NG, et al. Initiating tobacco cessation services in India: challenges and opportunities. *WHO South-East Asia J Public Health*. 2012 Apr-Jun;1(2):159–168.
4. Mishra GA, Pimple SA, Shastri SS. An overview of the tobacco problem in India. *Indian J Med Paediatr Oncol*. 2012;33(3):139–145.
5. Barratt M, Lenton S. Beyond recruitment? Participatory online research with people who use drugs. *International Journal of Internet Research Ethics*. 2010;3:69–86.
6. Ubhi HK, Michie S, Kotz D, Wong WC, West R. A mobile app to aid smoking cessation: preliminary evaluation of SmokeFree28. *J Med Internet Res*. 2015;17:e17.
7. Bricker JB, Mull KE, Kientz JA, et al. Randomized, controlled pilot trial of a smartphone app for smoking cessation using acceptance and commitment therapy. *Drug Alcohol Depend*. 2014;143:87–94.
8. Brouwer W, Kroeze W, Crutzen R, et al. Which intervention characteristics are related to more exposure to internet-delivered healthy lifestyle promotion interventions? A systematic review. *J Med Internet Res*. 2011 Jan 6;13(1):e2.
9. Whittaker R, McRobbie H, Bullen C, Rodgers A, Gu Y. Mobile phone-based interventions for smoking cessation. *Cochrane Database Syst Rev*. 2016 Apr 10;4(4), CD006611.
10. Thornton L, Quinn C, Birrell L, et al. Free smoking cessation mobile apps available in Australia: a quality review and content analysis. *Aust N Z J Public Health*. 2017 Dec; 41(6):625–630.
11. Rajani NB, Weth D, Mastellos N, Filippidis FT. Adherence of popular smoking cessation mobile applications to evidence-based guidelines. *BMC Publ Health*. 2019 Jun 13;19(1):743.
12. Hoeppner BB, Hoeppner SS, Seaboyer L, et al. How smart are smartphone apps for smoking cessation? A content analysis. *Nicotine Tob Res*. 2016 May;18(5): 1025–1031.
13. Abroms LC, Lee Westmaas J, Bontemps-Jones J, Ramani R, Mellerson J. A content analysis of popular smartphone apps for smoking cessation. *Am J Prev Med*. 2013 Dec;45(6):732–736.
14. Robinson CD, Seaman EL, Grenen E, et al. A content analysis of smartphone apps for adolescent smoking cessation. *Transl Behav Med*. 2020 Feb 3;10(1):302–309.
15. Cheung MC. Southeast Asia digital users forecast 2022 rising connectivity is driving commerce opportunities. Available from: https://www.insiderintelligence.com/content/southeast-asia-digital-users-forecast-2022 ; 2022 May 9. Accessed October 16, 2023.
16. National Tobacco Control Programme Directorate General of Health Services. Ministry of health & family welfare government of India. Tobacco dependence treatment guidelines. Available from: https://ntcp.mohfw.gov.in/guidelines_manuals; 2011.
17. National Institute of Care and Excellence. Smoking: harm reduction. Available from: https://www.nice.org.uk/guidance/ph45/chapter/1Recommendations#recommendation-2-self-help-materials; 2013 June 5.
18. Stoyanov SR, Hides L, Kavanagh DJ, Zelenko O, Tjondronegoro D, Mani M. Mobile app rating scale: a new tool for assessing the quality of health mobile apps. *J Med Internet Res*. 2015;3, e27.
19. World Health Organization. Toolkit for delivering the 5A's and 5R's brief tobacco interventions in primary care. Geneva. Available from: https://iris.who.int/bitstream/handle/10665/112835/9789241506953_eng.pdf?sequence=1; 2014.
20. Royal Australian College of General Practitioners. *Supporting Smoking Cessation: A Guide for Health Professionals*. Melbourne: (AUST): RACGP; 2014.
21. Girvalaki C, Mechili EA, Papadakis S, et al. *Current Practices and Perceived Barriers to Tobacco-Treatment Delivery Among Healthcare Professionals from 15 European Countries. The EPACTT Plus Project*. vol. 6. Tob Prev Cessat; 2020 Jan 21:6.
22. Leswing K. Why India is so important to Apple. Available from: https://www.cnbc.com/2023/04/18/why-india-is-so-important-to-apple.html; 2023 April 18.
23. Singh A, Arora M, English DR, Mathur MR. Socioeconomic gradients in different types of tobacco use in India: evidence from global adult tobacco survey 2009-10. *BioMed Res Int*. 2015;2015, 837804.
24. Peng W, Kanthawala S, Yuan S, Hussain SA. A qualitative study of user perceptions of mobile health apps. *BMC Publ Health*. 2016 Nov 14;16(1):1158.
25. Cowan LT, Van Wagenen SA, Brown BA, et al. Apps of steel: are exercise apps providing consumers with realistic expectations? A content analysis of exercise apps

for the presence of behaviour change theory. *Health Educ Behav*. 2013;40(2): 133–139.