Smokeless Tobacco – Countering the Global Epidemic

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Abstract

**Background:** Globally, twelve percent of all deaths among adults aged 30 years and over are attributable to tobacco use. A large proportion of the tobacco attributable disease and deaths in many countries are now due to use of Smokeless tobacco (ST) and this has gone unnoticed in most countries except in a few south Asian economies. However most of the tobacco control strategies have traditionally been directed at smoking forms of tobacco especially cigarettes. The regulation of ST is therefore increasingly posing a major public health challenge, especially in LMIs where high prevalence of ST coexists with limited expertise and resources for regulation. This paper aims to draw attention of relevant stakeholders to the growing epidemic of smokeless tobacco, its impact and issues related to regulation.

**Methods:** A standard literature search was performed using multiple electronic databases to identify peer reviewed articles. The internet and organizational databases were also used to find other types of documents (e.g. books and reports). The reference lists of identified relevant documents were reviewed to find additional sources.

**Results:** The use of smokeless tobacco is prevalent across all WHO regions, with high prevalence (≥ 10%) countries representing about 25% of the global adult population. The use of ST is associated with a wide range of harmful effects on health. Tobacco manufacturers are continuously introducing newer forms of smokeless tobacco products and expanding their user base. The diversity of ST products, information and research gap, industry tactics, promotion as harm reduction product, in addition to lack of resources, technical knowhow and proven regulatory policies have emerged as major challenges to regulate ST globally.

**Conclusion:** The growing epidemic of ST requires sustained and effective public health action. Many countries have tried partial bans on import and sale of ST. Looking at the circumstances and challenges involved in regulating ST, authors call for a more coordinated approach and global and regional consultation to look at appropriate policies and strategies including a complete, comprehensive and transnational ban on ST products to counter this epidemic.

**Keywords:** Tobacco epidemic; Tobacco use; Smokeless tobacco; Harmful effects of ST; Regulation of ST

Introduction

Globally, twelve percent of all deaths among adults aged 30 years and over are attributable to tobacco use [1]. According to WHO, nearly 6 million people die from tobacco-related causes every year. If present patterns of use persist, tobacco use could cause as many as one billion premature deaths globally during the 21st century [2].

Although most of the tobacco that is consumed throughout the world is in the form of manufactured cigarettes, smokeless tobacco now forms a significant and growing portion of global tobacco use, especially in South Asia [3].

When viewed globally, smokeless tobacco (ST) is a non-homogenous group of products that vary widely in appearance and composition of both tobacco and non-tobacco constituents, encompassing a wide array of products. The term smokeless tobacco implies use of unburned tobacco in the finished products. A variety of smokeless tobacco products are available, for oral or nasal use. Products intended for oral use are sucked, chewed (dipped), gargled or applied to the gums or teeth, while fine tobacco mixtures are usually inhaled into the nostrils [4]. Various forms of loose-leaf chewed tobacco are commonly consumed in the Indian subcontinent. For example, betel quid is made of tobacco, areca nut, slaked lime, and flavouring agents, all of which are wrapped in a betel leaf. Snuff (finely-chopped tobacco) is used in many countries and in some is branded with the names of leading cigarette varieties [5].

The harm from smokeless tobacco use, both at the level of individuals and society at large has posed a complex and widespread challenge to public health which has so far received limited attention from researchers and policy makers. In spite of rapidly evolving landscape of manufacturing and marketing of smokeless tobacco, these products are not sufficiently regulated in many countries [3].

The WHO FCTC was developed in response to the globalization of the tobacco epidemic. The treaty is comprehensive and covers all forms of tobacco, including ST. However many of the strategies and policy options developed under the Convention were largely based on country experiences in regulating cigarette smoking. Some Parties to WHO-FCTC concerned with the lack of clear strategy and policy options on ST have raised this issue in the Conference of the Parties to WHO-FCTC.

Methodology

A standard literature search was performed using multiple electronic databases to identify peer reviewed articles on prevalence of ST, its harmful effects on health, specific issues related to newer forms of ST and regulatory provisions and challenges in respect of ST. The internet and organizational databases were also used to find other types

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The prevalence of smokeless tobacco use

The prevalence of smokeless tobacco use reported in the various surveys (Global Adult Tobacco Surveys, national level STEPS non-communicable risk factor surveys, Demographic and Health Surveys, WHO Report on Global Tobacco Epidemic (GTCE), 2011) and other surveys such as the Behavioral Risk Factor Survey, the National Smoking/Tobacco/Drug use Survey, health cost studies, and national health, public health or morbidity surveys is not directly comparable because of the different methodologies and time periods. However, these surveys do provide a snapshot of the global smokeless tobacco burden. While large variations are observed between countries, between sex, within a region, and sometimes within a country the use of smokeless tobacco is now prevalent across all WHO regions. These countries with a high prevalence (>10%) represent about 25% of the global adult population, including, Bangladesh, India, Myanmar, Bhutan, Madagascar, Marshall Islands, Micronesia, Nepal, Norway, Sri Lanka, Sudan, Sweden, Turkmenistan, Uzbekistan and Yemen. In most countries, current prevalence of smokeless tobacco use is higher among men than among women. Demographic health survey data indicate that in countries in AFRO (WHO Regional office for Africa) and SEARO (WHO Regional office for South East Asia) smokeless tobacco is more prevalent in rural compared to urban areas, and higher among low-income compared to high-income groups [4].

The prevalence of ST use among youth is reported by The Global Youth Tobacco Survey (GYTS), a school-based survey of students aged 13–15 years. The results reveal prevalence of ST use among youth in all WHO regions. In AFRO, the prevalence of smokeless tobacco use among youth ranged from 5.4% in Swaziland to 16.4% in Congo. In AMRO (WHO Regional office for the Americas) region, prevalence of smokeless tobacco use among youth varied from 3.5% in Panama to 9.8% in Barbados. SEARO reported prevalence ranging from 4.9% in Bangladesh to 9.4% in Timor-Leste. EURO (WHO Regional Office for Europe) region reported lowest prevalence of smokeless tobacco use among youth as compared to other WHO regions, ranging from 1.1% in Montenegro to 6.9% in Estonia. In EMRO (WHO Regional office for Eastern Mediterranean region), prevalence of smokeless tobacco use among youth varied from 1.6% in Oman to 12.6% in Djibouti. Prevalence of smokeless tobacco use among youth ranged from 2.1% in Macau to 8.7% in Cook Islands in WPRO (WHO Regional office for Western Pacific region) [4].

Chemical composition of smokeless tobacco

Besides containing varied proportions of nicotine (between 0.17 and 4.93% in N. tabacum and up to 12% in N. rustica), the ST also contains multiple carcinogens, including Tobacco-specific N-nitrosamines, N-Nitrosamino acids, Volatile N-nitrosamines, and polycyclic aromatic hydrocarbons (PAH). There are 3095 chemical components in ST products with 28 potential or known carcinogens [6]. Detectable levels of several metals, classified as IARC group 1 (i.e., arsenic, beryllium, cadmium, chromium 533 (IV), nickel), 2A (i.e., lead), or 2B (i.e., cobalt) carcinogens (e.g., cobalt, lead), have been reported in ST. The tobacco used in a particular product has a decisive influence on its chemical composition, and varies with tobacco species, growing, curing, processing and storage. During product manufacture, tobacco is blended to achieve a specific nicotine content and pH. The pH strongly influences the concentration of unprotonated nicotine, the bio-available form of nicotine, while the nitrate/nitrate content strongly influences the levels of carcinogenic nitrosamines in the product [4].

Harmful effects of smokeless tobacco on health

The use of ST is associated with a wide range of harmful effects, ranging from oral premalignant lesions/conditions e.g. leukoplakia, erythroplakia, submucous fibrosis or lichen planus [6-9] to oral cancer [6,10] esophageal cancer [6,10,11] and pancreatic cancer [6,12,13]. The increased risk of renal and cervical cancer (in women) is also reported [6]. The non-cancerous conditions associated with use of smokeless tobacco include increased inflammation of the buccal and gingival mucosa, gingival recession, dental caries and decay and excessive tooth wear [14-17].

Much of the work on cardiovascular effects of tobacco and nicotine has focused on cigarette smoking; some, but not all, of these factors may also be relevant to smokeless tobacco [17]. Several of the constituents in cigarette smoke that cause cardiovascular disease are also present, although in differing amounts, in smokeless tobacco including nicotine, PAHs, and heavy metals such as cadmium. The evidence that smokeless tobacco use is associated with developing insulin resistance, metabolic syndrome and diabetes is limited but plausible [6,18]. Some studies suggest an increased risk of non-fat cardiovascular disease associated with use of smokeless tobacco including sniff, chewing tobacco, paan, and mishri [19-21]. Reproductive outcomes associated with use of smokeless tobacco during pregnancy include stillbirth, preterm birth and low birth weight [6,22-24]. Men who use smokeless tobacco have reduced semen volume, reduced sperm count, reduced sperm motility, and increased frequency of abnormal spermatozoa [6].

Introduction of new smokeless tobacco products

The recent introduction of a new generation of novel smokeless tobacco products by tobacco manufacturers calls for a specific mention. These new ST products may have even broader consumer appeal and user base due to their attractive flavourings, such as mint or fruit flavours, and new delivery methods that eliminate the need to spit [25]. These novel smokeless tobacco products are called "dissolvables", which are essentially tobacco pressed in tablets, rods, toothpicks or flat strips that fully dissolve in the mouth [26,27].

There is also a trend in branding newly introduced smokeless tobacco products under the same name as popular cigarette brands [28-32]. This is most notable in the United States where moist snuff and dissolvable tobacco products have recently appeared with names like Marlboro (Altria Group) and Camel (Reynolds American). The branding technique intends to encourage Marlboro cigarette smokers to substitute or supplement their habit by using Marlboro snus and to stimulate sales of products bearing the Marlboro brand name.

Challenges identified in regulation of smokeless tobacco

Globally tobacco control policies and strategies remained confined mainly to control of cigarettes. Some specific challenges to regulation of ST are listed below:

Diversity of ST products: One of the challenges to the creation and implementation of any regulatory framework is the heterogeneity of ST products from country to country. For example, the manner in which particular products are manufactured and commercially distributed makes enforcement of regulation more difficult. This is especially true in countries where products are manufactured and distributed in non-traditional ways thereby making ST less amenable to a conventional regulatory system of product registration, inspection, and...
enforcement. The situation is further complicated by the fact that the added ingredients and levels of nicotine and other toxic constituents vary widely among different types of ST products.

**Information and research gap:** The WHO Global Tobacco Control Report (GTCR) provides a qualitative assessment of progress made by countries in the implementation of the WHO-MPOWER package (M: Monitor tobacco use and prevention policies, P: Protect people from tobacco smoke, O: Offer help to quit tobacco use, W: Warn about the dangers of tobacco, E: Enforce bans on tobacco advertising, promotion and sponsorship, R: Raise taxes on tobacco). However, the report does not contain specific information on ST regarding relative progress on packaging and labelling, enforcement of a comprehensive ban on advertising, promotion and sponsorship, raising taxes etc. Likewise, the COP (Conference of Parties, WHO, FCTC) reporting instrument does capture the progress made in tobacco control by Parties to WHO-FCTC but there is no specific question on ST. It is left to the discretion of the parties to volunteer additional information on ST.

Research addressing ST is limited and significant research gaps exist in identifying ingredients, additives, and toxicities of ST products. Very little is known about product pricing, substitution of ST for smoked tobacco, and youth susceptibility to ST [3]. The need for substantial evidence base on various aspects of ST has been repeatedly reiterated and highlighted at different forums.

**Non uniform taxation and price control measures:** In view of low cost of manufacturing and low taxes on ST products, these are quite inexpensive and hence affordable as compared to cigarettes. Due to high social acceptance of ST in certain countries, young and the poor are likely to consume more ST products.

**Product regulation:** The WHO Study Group on Tobacco products Regulation (TobReg), in a technical report, has laid out reasoning for limits on specific toxicants in smokeless tobacco products, such as nitrosamines and heavy metals, which are technically achievable [33,34]. The validated methods to test the contents of ST products are lacking. In addition, heterogeneity and prevalence of traditional and custom made ST products in developing countries is a serious challenge for regulation. The partial guidelines for implementation of Articles 9 and 10, adopted by COP4 do not address methods of testing ST products adequately.

**Attractiveness and appeal of newer ST products:** Due to the added flavours, easy usability, small and attractive packages, the newer ST products has normalized its use over the years, making it culturally acceptable in many Asian and African societies. The newer ST products have less harmful than others. A recent study suggested that all smokeless tobacco products currently on the market carry an ‘unacceptable’ risk for cancer and therefore require regulatory actions [46].

**ST and harm reduction:** The beginning of the 21st century saw emergence of evidence suggesting the role of Swedish snus use in contributing to declines in cancer and smoking rates [36-40]. This interpretation remains controversial as it is unclear the extent to which circumstances in Sweden would generalize to other markets, such as Europe or Australia, where sale of ST is currently banned or to the US where ST containing more toxins has long been available [35]. Nonetheless, these data have formed the basis for movements to promote snus-type products (herein referred to as low nitrosamine ST [LNST] more broadly as alternative to cigarettes for smokers) [41,42]. However endorsing ST products as posing a lower risk may confuse and blunt current efforts including mass media campaigns [43], aimed at dealing with the disease occurrence resulting from using indigenous ST products. Moreover in the absence of substantial effect on female smoking prevalence in Sweden, the questions are raised about the applicability of encouraging ST use in populations such as those in India, Bangladesh, Cambodia, Mauritania and South Africa [2], where there are already a substantial number of female ST users, but smoking prevalence among women is low. It may be kept well in mind that Swedish style LNST products are neither available nor affordable to the consumers of ST products in LMIs having high prevalence of ST use. Any confusion resulting from promotion of ST products as harm reduction will actually boost the existing social acceptance of high toxicity indigenous forms of ST products prevalent in many South Asian and African countries.

**Effective implementation of policies related to “smoke-free environments”:** The guidelines for Article 8 of WHO FCTC recommend 100% bans on smoking in worksites, restaurants and bars. Movements are now in place to restrict smoking in certain public outdoor spaces as well (e.g. parks, beaches, stadia, bus stands etc.). The same may create market pressure on smokers still addicted to nicotine to seek out alternative delivery systems in the form of ST products. Indeed, marketing by tobacco companies targeting new ST products towards smokers in the USA have taken this approach [44,45].

**Limited cessation support for ST:** There is very limited support available for ST cessation. Majority of the treatment guidelines in use in the developed countries cater to the needs of smokers. Countries and societies with high prevalence of ST lack capacity and access to affordable treatment for ST dependence.

**Discussion**

The ultimate aim of tobacco control is to reduce the burden of death and disease caused by the use of various tobacco products. It is well documented that smokeless tobacco is not harmless. Some products, in particular the Swedish smokeless tobacco, snus, may be considerably less harmful than others. A recent study suggested that all smokeless tobacco products currently on the market carry an ‘unacceptable’ risk for cancer and therefore require regulatory actions [46].

WHO-FCTC, while aiming to reduce the health effects of all forms of tobacco use through policy intervention, has largely focused on the effects and regulation of cigarette smoking, due to longer experience of public health and tobacco control advocates in cigarette driven markets. This is especially problematic in markets where tobacco products other than manufactured cigarettes dominate [35]. In a number of countries there are policies mandating strong pictorial health warning labels on the packaging of manufactured cigarettes but none or weaker warnings for ST products. Likewise, anti tobacco media campaigns largely target cigarette smoking or ad bans (banning tobacco advertisement, promotion and sponsorship) or tobacco taxation measures that are mainly directed at regulating demand of cigarettes [2].

**Conclusion**

The governments of many developing countries have little...
experience in tackling the growing challenge of ST and new non-communicable disease epidemic or in countering the transnational tobacco companies. The key to ST control lies in prevention. Looking at the challenges involved in regulating ST, especially in LMs with high prevalence, limited resources for regulation, and taking into consideration the already existing conclusive global data on the hazards of ST, it is high time that preventive public health action to regulate ST is initiated now without waiting for further research on this front.

The import and sale of ST products are banned in forty countries and areas [3]. Most of these ban are partial. Although tobacco use is endemic in many societies, the presence of powerful commercial interests and tactics of tobacco industry prevent strong political action to counter the challenge of ST. Bhutan is a standalone example of taking stringent measures by making illegal the sale of tobacco products. Current EU regulation bans snus, but permits the marketing of chewing tobacco. The highly toxic varieties of ST which exist in India are thereby allowed on the European market [47]. Several developing countries in the Western Pacific region, where chewing tobacco has never been a popular habit, have taken the opportunity to ban smokeless tobacco before it became established on their markets. It is also argued that the EU ban on ST should be replaced by a regulatory framework applying to all smokeless tobacco products and focusing on eliminating those that are most harmful [47]. However the main challenge with regulation would be the burdens of testing and verification and absence of ISO standards for measuring toxic constituents for smokeless tobacco [47]. Recently India has witnessed examples of banning certain ST products at sub-national level by using provisions under the Food Safety and Standards Regulations (2011) that provide for ban on food articles containing tobacco. Since the chewing tobacco is covered under the definition of “food”, many State/Union territory governments have banned sale, manufacture and distribution of gutkha and paan masala (ST products) in their respective jurisdictions. This was strongly supported by the judiciary and civil society and highlighted by the media. This is also an example of using laws other than tobacco control law for regulating ST in a country with high prevalence of ST use.

Concerned with growing ST use, some Parties to WHO FCTC introduced ST as a global issue for consideration of the fourth session of the Conference of the Parties to the WHO FCTC (COP4, Punta del este, November 2010). A more comprehensive report on ST was discussed by the fifth session of the Conference of the Parties to the WHO FCTC (COP5, Seoul, and November 2012) and COP has requested the Convention Secretariat to invite WHO to work further on the issue of ST and report to COP6 in 2014.

It can be argued that while the twentieth century saw the proliferation of cigarette epidemic, the twenty first century is now witnessing the ST epidemic. The global community can no longer afford to ignore the challenge posed by the emerging and growing epidemic of ST by labeling it as regional or local issue.

There is therefore an urgent need to identify the critical challenges and available best practices to regulate ST. There is also a strong felt need to engage with all the relevant stakeholders at the global/ regional level in order to develop effective strategies and policy options that governments could adopt. Some of the strategies may include development of way forward to achieving a comprehensive and transnational ban on ST products.

Contributors

Dr Jagdish Kaur wrote the first draft of the manuscript and was involved in analysis and interpretation of the data.

Dr Vinayak Prasad contributed to data interpretation, extensive review and editing of the paper.

Conflicts of Interest

We declare that we have no conflicts of interest.

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