



## **Tobacco use and Dependence in Adolescents: A Review**

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### **Authors' contributions**

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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**Review Article**

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## ABSTRACT

Despite rising acknowledgement of the onset of tobacco smoking in children and adolescents, foundational understanding about many elements of early-life smoking behavior, as well as statistics to advocate for specific treatment approaches among children and adolescents, is inadequate. Nicotine addiction and withdrawal have been linked to continued cigarette use and difficulty stopping. When adolescents first start smoking, few expect to have trouble quitting. However, more than half of smoking teens say they try to quit every year, and fewer than 20% of those who smoke ten or more cigarettes per day say they are successful for even a month. Treatment of tobacco addiction rely mainly on the behavioral interventions as medications safety are not assessed for those less than 18 years old, so more research should be encouraged to find about the safety and availability for alternatives as behavioral intervention is not suitable alone for moderate to severe cases, Tobacco products are used by youth in a variety of ways, When smoking cessation efforts are undertaken in developed and developing nations, the wide diversity of tobacco products must be taken into consideration.

This research deals with the causes of tobacco dependence among young people, diagnosis and treatment methods.

*Keywords: Tobacco use; early-life smoking behavior; adolescents.*

## 1. INTRODUCTION

Despite rising acknowledgement of the onset of tobacco smoking in children and adolescents, foundational understanding about many elements of early-life smoking behavior, as well as statistics to advocate for specific treatment approaches among children and adolescents, is inadequate. This scenario may be due, at least in part, to a number of perceived and real hurdles to teenage smoking research, such as human subjects and ethical concerns. Studies incorporating tobacco use in this vulnerable demographic present significant problem in addition to the various methodological limitations and issues that are common in research [1-3].

The usage of tobacco is a widespread public health issue in the United States, and it is the largest cause of preventable morbidity and mortality. Treatment of teenage cigarette smoking and tobacco use disorders, in particular, is a high priority for public health. Adolescence is a vital period for neurodevelopment, and the exposure for nicotine during this time leads to addiction, continued tobacco use throughout adulthood, and possibly long-term negative effects on brain development [4-6].

Despite the fact that the negative health effects of smoking have been established since the 1950s, 1.1 billion individuals still consume tobacco. Smoking is responsible for four million deaths per year, and if current trends continue, the death toll from smoking will exceed ten million per year by 2030. Cancers of the lung,

and pancreas, cardiovascular illnesses, bronchitis, pneumonia, sudden infant death syndrome (SIDS), prematurity, and low birth weight, are all examples of smoking-related deaths [7-9]. Adolescent smoking rates rose rapidly throughout the 1990s and have only just begun to level down. In the year 2000, 31.4 percent of high school seniors said they had smoked in the previous 30 days, and 20.6 percent said they smoked virtually every day [10].

The 2006 National Youth Tobacco Survey (CDC, 2006) of high school students found 30 day rates of any tobacco use to be 30.2 percent for males, 21.3 percent for females, 28.4 percent for whites, 15.7 percent for blacks, 24.7 percent for Hispanics and 9.2 percent for Asians. Another recent National Youth Tobacco Survey, that surveyed students from modern and high schools, found the following demographic trends for rates of smoking. Rates for males (8.3 percent) and females (7.4 percent) were similar. Rates increased regularly from age 11 (0.1 percent) to age 18 (20.9 percent). Whites had a higher rate (9.8 percent) than blacks (3.2 percent), Hispanics (3.5 percent) or Asians (6.0 percent) [11,12].

One of the most serious problems in developing countries is the secondhand smoke (SHS) exposure. In 1999, the World Health Organization (WHO) mentioned that 700 million children were subjected to environmental tobacco smoke. This has led to severe health issues. Increased rates of pneumonia, asthma

and asthma exacerbations, and respiratory complications under anesthesia are Short-term effects resulting from postnatal SHS exposure. While Long-term effects such as retardation in pulmonary function, increased progression of atherosclerosis, dental decay and higher rates of malignancies. India, China, Pakistan, Nigeria, Vietnam, and Russia are known to be the highest percentage in children exposed to SHS [13]

Nicotine addiction and withdrawal have been linked to continued cigarette use and difficulty stopping. When adolescents first start smoking, few expect to have trouble quitting. However, more than half of smoking teens say they try to quit every year, and fewer than 20% of those who smoke ten or more cigarettes per day say they are successful for even a month [14]. Only 5% of high school smokers expect to be smoking five years after graduation; in reality, 75% will still be smoking [15]. According to Ershler et al. More than half of all teenagers had withdrawal symptoms after attempting to quit smoking. Adolescent smokers, like adult smokers, report numerous failed quit efforts and to smoke and withdrawal symptoms as reasons for their inability to quit [16,17]. Indeed, in a 1994 investigation, the US Surgeon General determined that the majority of daily smokers are addicted to nicotine and desire to quit, while being unable to achieve this [18].

**Etiology of tobacco dependence among youth:** Many young people get addicted to nicotine once they start using tobacco. In reality, research show that 20% of teen smokers have a high level of nicotine dependence, with just a small percentage of them being nicotine-free. Nicotine attaches to nicotinic receptors once it reaches the brain. The release of dopamine, a neurotransmitter linked to addiction, is then stimulated by activated receptors. The developing brains of teenagers may make them particularly vulnerable to nicotine addiction, and the amount of time and smokes required for developing nicotine addiction in adolescents is less than in adults. According to recent study, some adolescents lose control over their smoking within few weeks of starting smoking their 1st cigarette [19-23].

Adolescent smoking start is a complex, multi - dimensional issue that has been extensively researched in the United States and other nations. For example, the US Surgeon General's report "Preventing Tobacco Use Among Young People" published in 1994 identified four

categories of psychosocial risk factors linked to teenage smoking initiation: sociodemographic, behavioral, personal, and environmental. Poor socioeconomic position, being white, being male, having a low parental education level, and staying in a single-parent household were the main sociodemographic risk factors for starting smoking during adolescence in the United States [24].

**Family effect:** The socio-cultural factors and family environment that promote the onset of tobacco use differ from nation to nation, from developed to developing countries, region to region, and culture to culture [25]. The family has the most direct and lasting impact, not only in education and psycho-intellectual development but also in shaping values, attitudes, manners, and habits in children [25]. It is believed that tobacco intake is mostly learnt at home; and thus, effective methods for tobacco control should first target the home environment.

Poor educational accomplishment, participation in risk-taking hobbies, lack of self, and greater susceptibility to peer influences are some of the behavioral and personal characteristics that may enhance smoking beginning among teenagers. Smoking by parent, and peers, as well as the lack of a smoking ban in the home, were all factors that could lead to teenagers starting to use tobacco. In general, parental smoking has a considerable influence on smoking initiation for young people, while smoking initiation is more connected with peer smoking when young people enter their teens. Although much study has been done in the United States to uncover the psychological risk factors associated with teenage smoking, more research is needed in underdeveloped nations, particularly among different ethnic groups [24-27].

The lessons adolescents perceive from media marketing sources such as movies, prints, and television are examples of environmental impacts that may be working on a global scale. In a content examination of 250 films comprising the top 25 box office hits from 1988 to 1997, 1 in every 20 Hollywood films represented tobacco smoking favorably. films from the United States have introduced global audiences to Western society, including depictions of cigarette smoking. Images of smoking are not unique to American films; some Bollywood films in India feature images of smoking to entice viewers who wish to imitate their movie idols. Smoking is glamorized in most Hollywood and Bollywood films [28,29].

In terms of increasing tobacco use among youth, television has been highlighted as one of the most important medium. A content study indicated that music videos represent tobacco use in a spectacular, positive light. Smoking is represented at significantly greater levels in TV dramas in nations like Japan than it is in the United States. In the United States, images of smoking can also be found on television shows. According to one study, the risk of youngsters starting to smoke increased as they are watching television for more time. Aside from actors and actresses, sports personalities and singers frequently represent tobacco use in ways that is attractive to adolescents, who seek to mimic such individuals. Solving this problem could be done by Reducing children's exposure to R-rated films in communities (R, means restricted movies that don't suit young people, according to Sargent and DiFranza [30-33].

**Diagnosis:** Clinical presentation is the first diagnostic tools which reveal the main signs of tobacco dependence. The basic examination may uncover indicators that indicate a higher likelihood of smoking. The presence of smoke-scented clothing, or packs of cigarette, may prompt the doctor to ask more thorough inquiries about tobacco usage. Clinical indications seen in adults, such as yellow or brownish colored teeth or fingernails, wrinkles, or a raspy voice, are infrequently seen in adolescents. Nicotine withdrawal in adolescents can produce anger, nervousness, and agitation, as well as the question, "How long will I stay here indicate the needs for having a cigarette. Tobacco includes nicotine, this substance that stimulates the CNS, central nervous system. Nicotine causes tachycardia, increased blood pressure, increased breathing, improved storage capacity, better alertness, and hunger suppression in the short term. Around 1 hour following the last dose, Nicotine causes withdrawal symptoms. the most known symptoms of withdrawal are irritability, anger, anxiety, and tobacco cravings which are not fatal if left untreated and usually self-limiting.

The personal medical or psychiatric interview is the most common way of identifying tobacco use. Adolescent self-report is used to determine what type of tobacco product consumed, as well as the frequency and severity of usage. The 2015 Clinical Practice Policy of the American Academy of Pediatrics (AAP) that aims to protect youth from Tobacco, Nicotine, and Tobacco Smoke recommends using several questions from the American College of Chest Physicians

Tobacco Treatment Toolkit to check for and characterize adolescent tobacco use. It is also should be taken in consideration asking for non – tobacco smoking such as e- cigarette as adolescents may not consider them as smoking [34].

Question to be asked are [34]:

- a) Do any of your peers smoke cigarettes? Do any of your peers use e-cigs, or vape?
- b) Have you ever experimented with tobacco? What cigarette products have you used in the past?
- c) Have you ever tried an electronic cigarette, e-hookah, or a vape?
- d) How often have you attempted it?
- e) How frequently do you make use of it?

The Hooked on Nicotine Checklist or the modified Fagerstrom Test for Nicotine Dependence (both accessible at the -University of Washington Library) could be used by physician to estimate the level of cigarette smoking consumption. Adolescents can score positively on these tests (showing tobacco dependency symptoms) once they start smoking occasionally, and they don't have to be daily or long-term smokers to exhibit signs of addiction. Even with low rates of tobacco use, teenage tobacco users showed symptoms of dependence, according to results from the 2012 National Youth Tobacco Survey [35-37].

However, outside of intense smoking cessation therapy program, breath carbon monoxide can be utilized to determine the presence of smoking in the previous 24 hours. Cotinine, a nicotine metabolite, can be detected in urine, blood, and saliva for up to one week after smoking; however it is rarely utilized in clinical practice to guide treatment. For determining the time for starting treatment, on the other hand is recommended by the American Psychiatric Association's Practice Guideline for Treatment of Patients with Substance Use Disorders. When a patient has severe psychiatric comorbidity, the doctor must consider the risks and advantages of starting or postponing tobacco dependency treatment. At some point throughout their psychiatric therapy, all adolescents with concomitant mental problems should be provided the opportunity to participate in quitting smoking treatment, despite of the timing [34,38].

**Tobacco products worldwide:** Tobacco products are used by youth in a variety of ways.

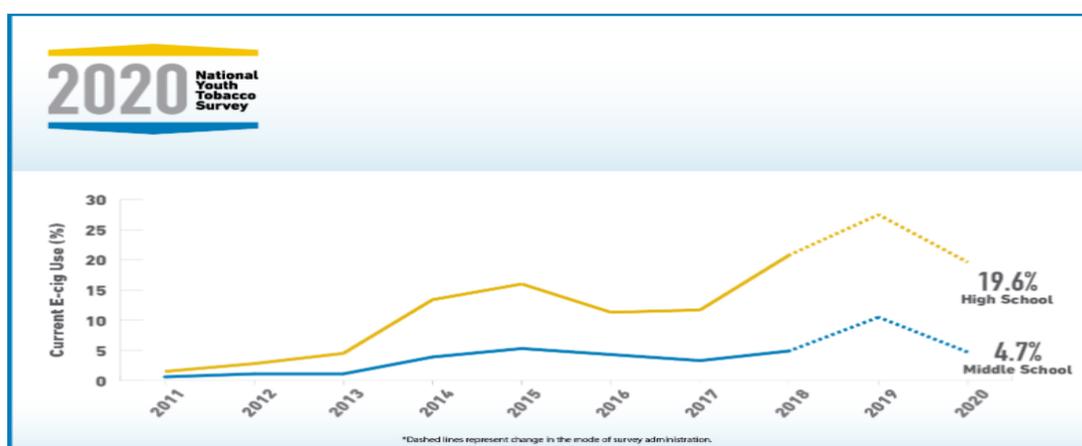
Bidis (tobacco in hand-rolled dry leaves), chuttas (tiny, handcrafted, unfiltered cigars frequently smoked by placing the lit end inside the mouth), hookahs (also called water pipes), and smokeless tobacco are all examples of tobacco. When smoking cessation efforts are undertaken in developed and developing nations, the wide diversity of tobacco products must be taken into consideration. The pattern of adolescents' usage of tobacco is changing over time which should be taken into consideration by using all types of tobacco products in the surveillances. Individual counseling for both children and adults should include instructions about these products [39].

**Electronic Cigarettes:** E-cigarettes are currently the most popular tobacco product among teens in the United States. E-cigarettes come in a variety of styles, including disposable, cartridge, and tank-style e-cigarettes. Adolescents refer to them as vape pens, e-hookah, e-pens and vape sticks. Nicotine, propylene glycol, vegetable glycerin, flavorants, and other chemicals are all found in e-cigarette liquid ("e-juice"). Puffing on the e-cigarette activates the atomizer's heating element, which vaporizes the liquid in the cartridge into a vapor that they inhale. When young people start using e-cigarettes, they frequently start with flavored e-cigarettes. It normally has a nicotine content of 0 to 36 milligrams per milliliter of solution. This could cause toxicity or death if mistakenly consumed. E-cigarette use was reported by 13.4% of high school students and 3.9 percent of middle school students in 2014. Between 2011 and 2014, the number of middle school and high school

students who had ever used an e-cigarette tripled, that indicates increased curiosity about cigarette smoking [40-44].

**Cigarettes:** It is the most produced tobacco product globally. There is no other tobacco product on the market today that causes more harm to youngsters around the world. Usually, people start smoking before they reach the age of 18, and 20% of these people start smoking before they reach the age of ten. Due to the high cost of cigarettes, they are frequently sold as single ones making them more accessible to youngsters. In some situations where youngsters do not receive proper nutrition, cigarettes are used as an appetite suppressor. Even the lowest of the impoverished spend money on cigarettes and other tobacco products rather than food. Cigarettes with flavor are currently on the market in the United States appearing to have been created expressly to entice new smokers from outside the country [45-47].

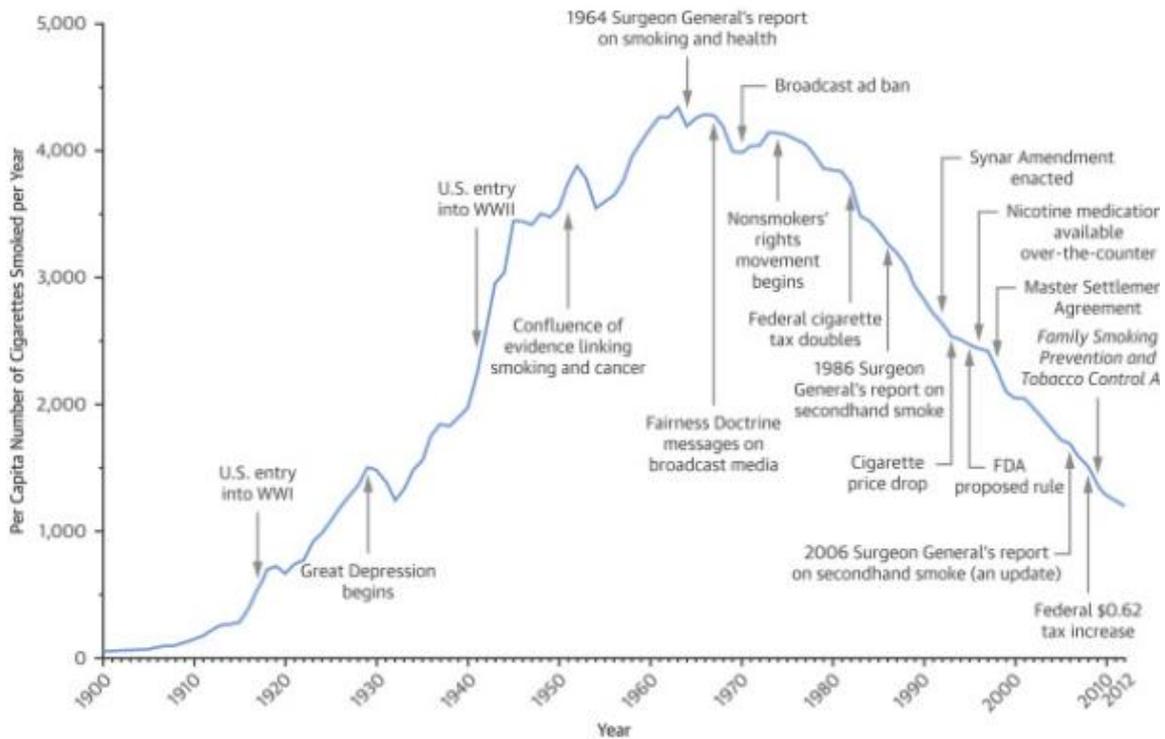
**Bidis:** Bidis are tobacco cigarettes wrapped by hand with a dried temburni leaf and in the form of string. Bidis are available in a variety of flavors, and account for up to 85% of all tobacco products consumed worldwide, alongside manufactured cigarettes and other hand-rolled cigarettes. Adolescents think that they are "natural herbal cigarettes" because of the sweet smell, flavor, and advertisement, and that they are thus healthier than conventional cigarettes. Owing to their ostensibly harmless qualities and low price bidis are popular among adolescents. On the other hand, the truth is actually the



**Frequent E-Cigarette Use Suggests a Strong Dependence on Nicotine**



Fig. 1.



**Fig. 2. Per capita cigarette consumption per year among U.S. adults from 1900 to 2012**

opposite as They emit higher levels of carbon monoxide and tar than traditional cigarettes. Furthermore, because the wrapper used has a low burning rate, smokers must inhale regularly to keep the cigarette lighted, which means consuming more pollutants than traditional cigarette smokers [48-52].

South Asian countries are known for consuming bidis in higher rates than any other countries. Beside the previously mentioned factors that potentiate tobacco consumptions such as low education and poverty, children working in tobacco factories is also another factor as it makes tobacco more available for them, without knowing its harmful effects [53,54].

**Kreteks:** Kreteks, commonly known as clove cigarettes, are made up of shredded clove spice and Indonesian tobacco wrapped in an ironed cornhusk or a slip of paper. They are frequently flavored and may have anesthetic properties, allowing for deeper breathing. Kreteks have a tobacco concentration of 60 to 70%, which is comparable to ordinary cigarettes. Kreteks produced twice as much tar, nicotine, and carbon monoxide as typical US cigarettes, according to smoking-machine testing. Furthermore, the clove content may represent a health concern. Cloves

contain eugenol, which is an anesthetic that can lead to the development of respiratory tract infections. When smoking a kretek, eugenol causes numbness of the back of the throat and trachea and masks the harshness of the cigarette, encouraging a new smoker to take more puffs. As it is produced mainly in Indonesia, its usage is not popular worldwide, but the internet sellers made it more available for consumers over the world, they also promote it as an exotic product filled with aroma [55-57].

**Hookahs:** A hookah is a water pipe with a long neck. When smoke goes through the long tube and into the water, it makes a bubbling sound, earning the hookah the nickname "Hubble bubble." Coconut shells are used to make the bulb that holds the water in India. Hookahs are also known as nargils. Some hookahs have been transformed into works of art. The pipe might be constructed of porcelain, silver, or crystal and ornamented with gold or silver rather than glass. Some hookahs even have flowery designs carved into them. Despite the fact that hookahs originated in India, they rapidly spread throughout the Arab world.

Hookah smokers, unlike cigarette smokers, are usually gregarious. As a result, limiting

hookah smoking in restaurants could have a substantial impact on prevention and quitting. Iran has set a promising example: in 2004, officials from the Iranian Ministry of Health stated that hookahs will soon be outlawed in public spaces [58-60].

**Management:** Behavioral and pharmacologic therapies, which can be employed in combination, are used in the clinical management of tobacco use. Adolescents with mild to moderate levels of dependence may benefit the most from behaviorally oriented smoking cessation programs. For moderate to severely tobacco-dependent teenagers who desire to quit smoking, medication may be considered [34,61].

- i. **Behavioral Interventions:** Most trials utilized sophisticated therapies that combined tactics from several health behavior theories, according to Stanton and Grimshaw's 2013 Cochrane Review "Tobacco cessation interventions for young people." Motivational enhancement, cognitive-behavioral therapy, and stage-based therapies employing the trans theoretical paradigm were all common modalities. The met analysis found that using a trans theoretical model resulted in a combined risk ratio of 1.56 (95 percent confidence interval )for quitting, motivational enhancement resulted in a risk ratio of 1.60 (95 percent confidence interval), and cognitive-behavioral therapy trials did not result in any statistically significant changes .stopped, the kidney functions revert to normal. Controlling cardiovascular risk factors (diet, exercise, blood cholesterol, glycemic management, removal of tobacco use and Treatment of dyslipidemia)

The AAP 2015 Clinical Practice Policy and the US Public Health Service 2008 Guideline both advocate counseling for adolescent smokers' treatment. The 5A model of care is recommended which means (Ask, Advise, Assess, Assist, arrange follow up). In this strategy, the physician is urged to inquire about tobacco use and secondhand smoke exposure from all adolescents. The clinician should then recommend quitting with a powerful message that describes the patient's personal health concerns as well as the benefits of quitting. Secondhand smoke

prevention should also be addressed in the advice. The doctor should then assess the level of nicotine addiction, as well as preparedness to undertake a stop attempt and/or begin treatment, using questions. The therapist should then assist the patient in developing an effective tobacco quitting strategy, which may include behavioral treatments as well as medication. Finally, physicians should schedule a follow-up appointment within two weeks to evaluate the patient's improvement [34,61].

**Pharmacotherapy:** Adults can use nicotine replacement therapy (NRT, which includes patches, gum, inhalers, and nasal sprays), bupropion and varenicline to quit smoking. However, because there are few studies evaluating the efficacy of various pharmacotherapies for adolescent, the FDA recommends that these drugs be used by individuals over the age of 18 [62].

The known side effects for these medications are Nicotine Patch cause Local skin reactions, insomnia and/or vivid dreams while Nicotine gum can cause Mouth soreness, hiccups, dyspepsia, jaw ache , on one hand Nicotine inhaler may result in Mouth and throat irritation, cough, rhinitis , on the other hand varenicline causes Nausea, insomnia, vivid dreams; rare cases of agitation, changes in behavior, and suicidal ideation

Two studies testing bupropion for teenage smoking cessation were identified, although neither found a benefit of this medication. varenicline is approved for use in people over the age of 18 , it is also used with caution with those who have psychiatric illnesses), no studies on its usage in adolescents have been published yet. The American Academy of Pediatrics recently suggested that practitioners investigate utilising NRT for adolescents with moderate to severe substance use disorders . Given the absence of research on the safety and efficacy of e-cigarettes, the AAP further suggests that clinicians inform teenagers that these devices should not be used to quit smoking. [34,63,64]

**Chool-based tobacco prevention and cessation programs:** The goal of school-based tobacco prevention and cessation programs is to keep young people tobacco free so that they remain tobacco free for the rest of their lives. In 2000, the Surgeon General's Report stated that school-based interventions can reduce or

postpone the onset of smoking among youth by 20 to 40%. In addition, the 2012 Surgeon General's Report reviewed the literature on school-based programs and determined that many can be effective in preventing and decreasing tobacco use in the short-term, and that certain programs demonstrated long-term prevention effects as well. The report emphasized that effective programs are integrated into community-wide prevention efforts [65,66].

**School-based prevention programs:** School-based prevention programs are often in the form of age-specific classroom curricula, but are also implemented as special school programs, media literacy training, and peer education programs. These programs can inform participants about the dangers of secondhand smoke, build participants' capacity to identify and resist the influence of peers and tobacco marketers, and teach refusal skills [66].

Antismoking programs as part of school curriculum have been shown to be effective in preventing initiation of smoking among children and adolescents [67]. Likewise, evidence suggests that state sponsored antismoking media campaigns may play a potentially effective role in reducing smoking among those exposed to the message [68–69]. In the United States, electronic antitobacco advertising has been used as part of comprehensive tobacco control program in several states and communities [70]. McAlister et al. found that significant reductions in adult tobacco use can be achieved through a combination of intensive media and community campaigns [71].

## 2. CONCLUSION

Tobacco usage in adolescence is a serious issue, due to the increase in the youth consumption of tobacco worldwide, the availability of tobacco in different attractive forms to teens and also the media role as they encourage younger people by promoting smoking as an acceptable behavior. Treatment of tobacco addiction rely mainly on the behavioral interventions as medications safety are not assessed for those less than 18 years old, so more research should be encouraged to find about the safety and availability for alternatives as behavioral intervention is not suitable alone for moderate to severe cases.

## CONSENT

It's not applicable.

## ETHICAL APPROVAL

It's not applicable.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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