

# Effect of Fasting on Smoking Addiction

## A Multicentered Primary Care Research

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### Abstract

**Background:** Smoking is a serious public health challenge across the world. Fasting in Ramadan requires people to stay away from smoking as well as activities such as eating, drinking, and sexual intercourse. We examined the effect of fasting on cigarette smoking and nicotine addiction during the Ramadan.

**Methodology:** This study was designed as a descriptive cross-sectional survey. A questionnaire was prepared to determine sociodemographic data and smoking habits of a sample population. The questionnaire was delivered through face-to-face interviews at several family medicine clinics in Turkey, with smokers who fast in Ramadan.

**Results:** There were 354 persons, of which 278 were male (78.5%), 76 were female (21.5%), and the mean age was  $32.92 \pm 11.84$  years. A significant decrease in cigarette consumption during the Ramadan was reported by 285 (80.5%) smokers ( $p < .001$ ). The number of smokers who had difficulty resisting the urge to smoke was less in Ramadan than non-Ramadan periods ( $p < .001$ ). Religious sentiments were reported as the most important reason for coping with nicotine abstinence (53.7%). Significantly in

14.7% of the cases, participants stopped smoking during the whole period of Ramadan.

**Conclusions:** Religious beliefs and willpower were found to be effective in helping people reduce or temporarily stop smoking. Fasting may play a significant role in changing smoking behavior. Smoking cessation along with counseling supported by the state, health authorities, and clergy can be useful in the fight against smoking in Ramadan.

**Keywords:** Fasting, Prevention, Public Health, Ramadan, Smoking Cessation, Starvation

### INTRODUCTION

Smoking and nicotine addiction presents a serious public health challenge across the world because it is one of the major preventable risk factors for many health problems (Rigotti, 2013). Smoking has been associated with poor health outcomes including cancer (Lu et al., 2011), increased disability, hospitalization, mortality, difficulty in performing activities of daily life, and poor mobility (Banks et al., 2015). Worldwide smoking-related deaths are expected to rise to 8.3 million by 2030 (Mathers & Loncar, 2006). Therefore, it is critical to employ all available means in the war against smoking including special circumstances where alteration in smoking behaviors occurs spontaneously. Some examples of these specific circumstances are pregnancy and lactation (Öztürk et al., 2018), being admitted to hospital for any reason (Ho et al., 2018; Nahhas et al., 2017; Ünal, 2017), and students visiting and staying in their parents' homes during holidays and during the holy month of Ramadan.

Being religious has been associated with smoking cessation in several studies. According to a review by Koenig and colleagues, at least 125 studies examining the association of religiousness and spirituality with smoking were published between 2000 and 2010 (Koenig et al., 2012) and most of these studies showed that religiousness and spirituality were hindrances to smoking.

Fasting is a religious activity as old as human history, and it is seen in almost all societies. Fasting has a place in the Jewish and Christian traditions as well as Indian and Chinese teachings. It is also known that fasting was important in the ancient Celts, Mexicans, Peruvians, Babylonians, and Assyrians (Demir, 2016).

Ramadan is a lunar month (29 or 30 days) in which a special form of fasting is practiced, and this is believed to have

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positive effects on health as the body uses more time to regenerate and clean toxic substances (Afni et al., 2017). According to a Nobel Prize winning study, starvation triggers autophagy, an essential process for recycling waste material with many important health implications (Ohsumi, 2014; Tooze & Dikic, 2016). Fasting has potential for clinical applications (Longo & Mattson, 2014; Mattson et al., 2017). Indeed fasting or different forms of starvation have also being used throughout history in traditional medicine (Lauche et al., 2018).

In the Islamic tradition, fasting is practiced between the daybreak and sunset. During the fast, people are expected to refrain from ill deeds and thoughts as well as eating, drinking, and smoking. Fasting fosters conditions of moral rectitude and spiritual growth because it requires self-discipline and patience (Erdem, 2018), which are necessary qualities for smoking cessation. It is remarkable that, during the long fasting time, people manage to refrain from smoking. This is important as smoking is more prevalent in Muslim countries (Ghouri et al., 2006).

Nonnemaker et al. reported that being religious has a protective effect against addiction and smoking is reduced (Nonnemaker et al., 2003). Ismail et al. found that, in Ramadan, all scores of Fagerström Test for Nicotine Dependence are decreased and remain so in the post-Ramadan period (Ismail et al., 2017).

Addiction is the continuation of self-harming behavior, which people are often unable to stop without professional help. In the beginning, addictive substances are tried because of impulses of pleasure, curiosity, and affectation, but as the addiction sets in, the user is compelled to have the substance to satisfy cravings and prevent unpleasant symptoms of abstinence. Nicotine in tobacco has potency as strong as heroin if not more (Sæbø & Scheffels, 2017), and when it is not consumed regularly, a wide range of abstinence symptoms including irritability, nervousness, and inability to concentrate occur. Therefore, smoking is continued regularly despite the fact that it causes life-threatening conditions. Like with other addictive substances, treatment success is low and the relapse rates are high.

Although smoking is a fairly regular activity and a top-up of nicotine dosage is sought throughout the day, smoking behavior changes dramatically in some specific situations mentioned earlier. These changes in smoking patterns include the ability to postpone or modify smoking behavior without experiencing severe symptoms of abstinence and cravings (Türkkanı et al., 2014).

A good example of this is seen in hospitalized patients. Patients in the hospital stop or modify their smoking behavior temporary while in the hospital. The idea of using this period for an opportunistic smoking cessation intervention has led to a very successful smoking cessation counseling model specific to hospitalized patients (Nahhas et al., 2017). This model involves providing smoking cessation counseling to hospitalized patients within 24 hours, the use of drug treatments to control abstinence symptoms, and a follow-up system after discharge from the hospital because most patients return to

former smoking habits quickly if they are not followed up. In Ramadan, the similarities are striking: Smokers stay long periods without smoking during fasting; cravings and abstinence may be bothersome as nicotine intake is ceased abruptly, necessitating nicotine replacement therapy (NRT); and smokers return to former smoking habits quickly after Ramadan. We can perhaps devise a similar smoking cessation model specific for Ramadan.

Ramadan offers an excellent opportunity to examine behavioral changes regarding smoking as these changes remain in the whole month (Mughal, 2017). This study is designed to evaluate the effects of Ramadan on smoking in terms of cravings, abstinence symptoms, and changes in the number of cigarettes smoked. It will also propose a smoking cessation model specific to Ramadan.

## METHODOLOGY

### Study Design

This study is designed as a descriptive, cross-sectional survey.

### Samples

The study samples were smokers of 18 years old and over who fast during the month of Ramadan and have no psychotic disorders. Participants' demographics are given in the Results section.

Samples were interviewed between August 2017 and December 2017 in four family medicine clinics in different cities/districts of Turkey (Ankara/Mamak District, Ordu/Unye District, Samsun/Asarcık District, and Düzce University Medical Faculty).

### Outcomes

**Questionnaire** A 15-item questionnaire was designed in view of the literature to obtain sociodemographic and smoking data in Likert formations (three 2-point Likert, five 3-point Likert, one 4-point Likert, three 5-point Likert, and three 6-point Likert) and directed to participants in face-to-face interviews by the authors. All questions used here were well established in previous tobacco addictions literature (Fagerström et al., 2012). However, because of unique characteristics of fasting, we had to compile relevant questions for the study. For example, one of the questions of Fagerström nicotine addictions testing is about how soon the first cigarette is smoked after getting up. In fasting, this question is irrelevant as no smoking is allowed until sunset. Before the survey, there was no education given to participants on the harms of smoking, and there were no discussions about quitting. Each questionnaire took an average of 10 minutes to complete, and participants did not get any material benefit.

### Ethical Approval

Ethical approval was issued by the Ethics Committee of the 19 Mayıs University of Samsun in July 2017.

## Statistical Analysis

In the following data summary from this study, frequency distribution, percentage statistics, and mean  $\pm$  standard deviations are given. The chi-square test was used to compare differences between variables. Statistical analyses were assessed using SPSS 20.0 package program, and the significance level was taken as .05 ( $p$  value).

## RESULTS

Three hundred fifty-four people from different cities were included in this study. Of these, 278 were male (78.5%), 76 were female (21.5%), and the mean age was  $32.92 \pm 11.84$  years. Generally, prevalence of smoking in men is more than women, and men tend to suffer more from smoking-related diseases such as lung cancer and cardiovascular diseases. Therefore, outlining demography including gender is carried out. There was no difference between genders (men =  $32.54 \pm 12.0$ , women =  $34.29 \pm 11.20$ ;  $p = .255$ ). The marital status and occupation of participants are shown in Table 1. Daily cigarette consumption increased in three cases (0.8%), did not change in 66 cases (18.6%), and decreased in 285 cases (80.5%) during the Ramadan. The amounts of daily cigarette consumption in normal daily life (non-Ramadan) and during Ramadan were categorized and compared in Table 2. The results clearly show that the number of cigarettes smoked decreased in Ramadan ( $p < .001$ ). There is no statistically significant relationship between genders and changes in the number of cigarettes consumed after exclusion of the three people who increased smoking ( $p = .322$ ).

The percentage of those who found difficult to stop smoking was different during Ramadan and non-Ramadan periods, and the difference was statistically significant (24.9% [ $n = 88$ ] and 31.9% [ $n = 113$ ], respectively [ $p < .001$ ]). Those who had

TABLE 1 The Marital Status and Occupations of the Cases in View of the Gender			
	Woman	Man	$p$
	$n$ (%)	$n$ (%)	
Jobs			<.001
Worker	8 (10.5)	108 (39.2)	
Farmer	0 (0)	18 (6.1)	
Officer	5 (6.6)	26 (9.4)	
Student	17 (22.4)	44 (15.8)	
Free	5 (6.6)	54 (19.4)	
Housewife	40 (52.6)	14 (5.0)	
Retired	1 (1.3)	14 (5.0)	
Marital status			<.001
Married	44 (57.9)	174 (62.6)	
Widow	8 (10.5)	1 (0.4)	
Single	24 (31.6)	103 (37.1)	

TABLE 2 The Amount of Cigarette Consumption in Ramadan and Non-Ramadan Periods			
Cigarette Consumption/Day	Ramadan	Non-Ramadan	$p$
	$n$ (%)	$n$ (%)	
0–10	286 (80.8)	141 (39.8)	<.001
11–20	52 (14.7)	126 (35.6)	
>20	16 (4.5)	87 (24.6)	

difficulty refraining from smoking in both Ramadan and non-Ramadan periods were not more likely to smoke before they ate after fasting ( $p = .34$  and  $p = .07$ , respectively), but the last activity before daybreak was likely to be smoking ( $p < .001$ ). When asked how they were able to manage nicotine abstinence in Ramadan, they attributed it to the following reasons: religious sentiments ( $n = 190$ , 53.7%), not feeling like smoking ( $n = 89$ , 25.1%), sleeping through the day ( $n = 30$ , 8.5%), health concerns ( $n = 25$ , 7.1%), and other causes ( $n = 20$ , 5.6%). Desire to smoke, withdrawal symptoms, and the wish to quit in Ramadan and other times are shown in Table 3.

Fifty-two (14.7%) cases reported no smoking at all during the whole of the Ramadan, with 41 male (78.8%) and 11 female (21.2%), and there was no statistical significance regarding gender. Daily cigarette consumption of these 52 people in the non-Ramadan period is depicted in Figure 1. According to this, most participants smoked one to five cigarettes/day before Ramadan ( $n = 28$ , 54%). Those with lower cigarette consumption were more likely to stop during Ramadan ( $p < .01$ ).

TABLE 3 Intention of Not to Smoke, Wish to Quit, and Withdrawal Symptoms in Ramadan and Non-Ramadan Periods			
	Ramadan	Non-Ramadan	$p$
Questions	$n$ (%)	$n$ (%)	
Do you find it difficult not to smoke?	Yes, 88 (24.9)	Yes, 113 (31.9)	<.001
	No, 188 (53.1)	No, 171 (48.3)	
	Sometimes, 78 (22.0)	Sometimes, 70 (19.8)	
Do you have severe desire of smoking when you do not smoke?	Yes, 97 (27.4)	Yes, 121 (34.2)	<.001
	No, 178 (50.3)	No, 145 (41.0)	
	Sometimes, 79 (22.3)	Sometimes, 88 (24.9)	
Are you thinking to quit?	Yes, 135 (38.1)	Yes, 127 (35.8)	.104
	No, 95 (26.8)	No, 157 (44.3)	
	Sometimes, 124 (35.0)	Sometimes, 70 (19.7)	

In those who decreased daily cigarette numbers in Ramadan, 237 (83.2%) reported that this decrease was a result of their own free will. The number of cases that had constant cravings for smoking during Ramadan was 43 (12.1%). The remaining cases stated that they only experienced smoking crisis, on average,  $2.20 \pm 1.4$  times during Ramadan. One hundred fifteen cases (32.5%) thought that their rate of daily cigarette consumption would increase after Ramadan. Eighty cases (22.6%) said that they prioritized smoking over either eating or drinking when breaking their fast, and 180 cases (50.8%) said that the last thing they did before daybreak was to smoke.

For the first cigarette smoked after fasting, 70.9% ( $n = 251$ ) of the participants described negative feelings of dizziness, discomfort, and disgust, and only 29.1% ( $n = 103$ ) of cases associated this moment with positive feelings, that is, pleasure and reunion.

## DISCUSSION

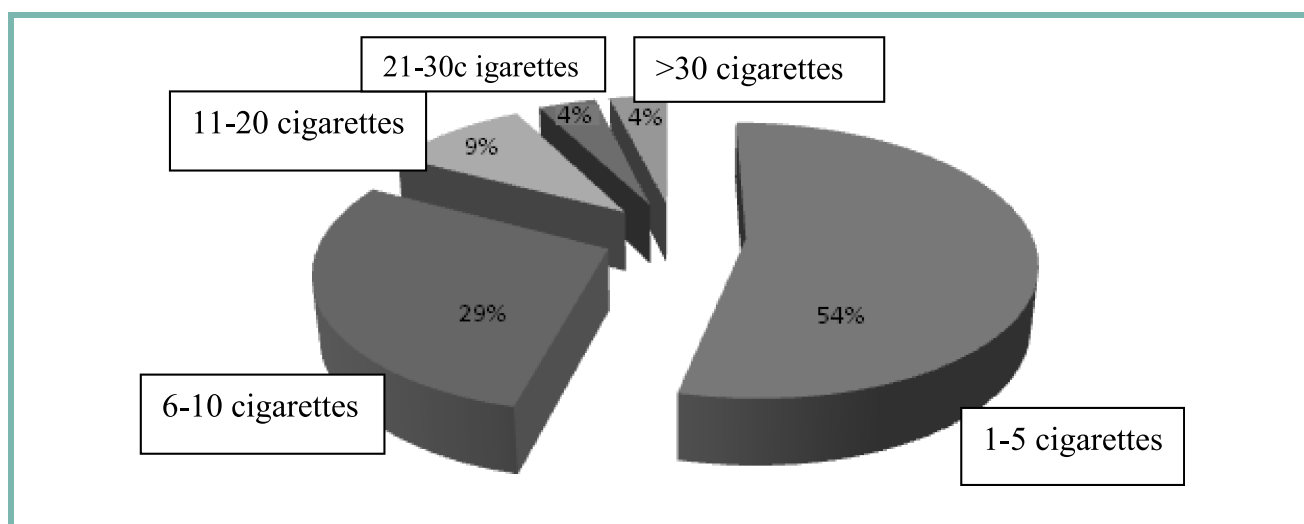
In this study, despite being temporary, Ramadan's potent influence on decreasing and/or cessation of smoking was observed. This change in smoking behavior may offer a unique opportunity to intervene with the aim of turning this temporary change into a permanent one, leading to complete cessation of smoking. Studies evaluating smoking in Ramadan were limited in the literature, so we had to interpret some parameters through our own findings. Our study included the highest number of cases in this field compared with similar studies. In this study, we exhibited smoking behavior alterations and attempted to explain underlying mechanisms.

The number of women in our study was low, but this is consistent with the lower rates of smoking in women in Turkish culture (Buturak et al., 2016). However, our study indicates that gender, marital status, and occupational status were not significant on smoking behavior changes in Ramadan.

According to our findings, a large number of smokers greatly reduced daily cigarette consumption, and many completely ceased smoking during the whole month. In addition, the idea or intention of quitting increased. Smoking was successfully avoided most of the day until the time to break fast in the evening, and withdrawal symptoms associated with the lack of nicotine were not felt significantly among the large number of participants. The fewer number of cigarettes smoked before Ramadan was associated with complete cessation during the whole month. Nearly one in five people stopped smoking in Ramadan. This suggests that those with low levels of addiction would probably be the primary targets for smoking cessation therapies in Ramadan.

A minority of our participants smoked the same or even increased the amount of cigarettes during Ramadan, but even they could manage to go through the fasting process without too much difficulty. This high level of success for managing abstinence for long hours without severe withdrawal symptoms is interesting because lack of nicotine along with hunger and thirst are expected to provoke feelings of irritability and nervousness (Cheskin et al., 2005; Kendzor et al., 2008). When asked how they managed this, most of our participants responded that it was because of personal choice and free will. They think they overcome cravings and abstinence symptoms with the help of religious sentiments. This is in line with the literature. Timberlake et al. examined the relationship between smoking behavior and religious affiliation, organizational religious activity, and self-rated religiousness; all three factors were found to reduce smoking (Timberlake et al., 2006).

Smoking is a well-known risk factor for health, and the religious stance on smoking is largely negative. Religion can help people to strengthen willpower (Baumeister et al., 2010), and in Ramadan, religious sentiments are heightened. This phenomenon may have facilitated altering smoking behavior in Ramadan.



**Figure 1.** Non-Ramadan cigarette consumption among those who quit smoking during the Ramadan ( $n = 52$ ).

Cigarette smoking can be stopped with faith-based behavioral methods (Ismail et al., 2017). Weaver et al. examined 29 research studies related to the subject; there was a negative relationship between religion and smoking dependence in 22 studies. In other words, an increased level of religiosity diminishes dependence on smoking (Weaver et al., 2005). Our participants, however, stated that their stopping or decreasing smoking behavior was because of their own free will. In our opinion, a combination of factors may be effective in achieving this behavioral change: free will, religious sentiments, and, more importantly, the effects of starvation.

Limited studies are available on Ramadan's specific effects on smoking behavior. A Ramadan campaign in London reported that 83% of Muslims had a positive attitude toward smoking cessation in Ramadan (Taket et al., 2003). Another study from Malaysia showed similar results, encouraging people to stop smoking (Ismail et al., 2017). A similar study involving 950 university students in Iran found that the students who engaged in religious activities decreased smoking behavior (Nakhaee et al., 2009). The studies mentioned here overlook some other key elements that may be effective in achieving this, such as starvation and refraining from smoking for the large part of the day, which smokers are usually unable to do in normal daily life. This refraining period creates a unique window of opportunity for a smoking cessation intervention, and such an intervention is well established in some hospitals (Nahas et al., 2017). Our findings in fasting people suggest that Ramadan presents a similar golden opportunity for an opportunistic intervention of smoking cessation counseling.

Ismail et al. reported that, although a decrease in the scores of Fagerström Test for Nicotine Dependence in Ramadan lasted after the Ramadan, those who gave up smoking in Ramadan had no difficulty starting up again after the Ramadan (Ismail et al., 2017). Our study also showed the fact that most of our participants were not sure they would remain smoke-free after Ramadan. So their intention here was not giving up smoking permanently in the first place but, simply, taking a break. Could this intention be pivotal to explain the fascinating change in smoking behavior and also the unfortunate temporary nature of it? Studies are needed to explain these mechanisms psychologically as well as biochemically (nicotine addiction is very much a biochemical process involving dopamine and others). Nonetheless, as clinicians, our concerns here should be concentrated on how to seize the opportunity and convert this intention to a permanent concept leading to complete cessation of smoking.

Literature indicates that motivation and determination are effective factors in smoking cessation. Mak and Loke have prepared a smoking cessation protocol and stressed the importance of psychological determination in accepting the process of quitting (Mak & Loke, 2015). Most of our participants also stated that reducing the number of cigarettes was a result of personal determination primarily. The primary challenge here is to motivate people to stop smoking for good.

Nicotine stimulates the feelings of enjoyment and rewards with neurobiological mechanisms (Sönmez & Özbey, 2016).

Sleep during the night starves the brain for nicotine, and the first cigarette is associated with positive feelings of pleasure and reunion. Our study, however, revealed a very different picture. Instead of pleasure and reunion, our participants reported negative feelings such as disgust and dizziness with the first cigarette. This is a striking finding because, during fasting, people stay off the nicotine nearly 18 hours compared with a night's sleep of 8 hours or less. Prolonged nicotine abstinence is expected to provoke higher desire for smoking, but after such a long period of starving brain for nicotine, fasting people were not rushing toward this union and choosing food and drinks first. More importantly, they denied having severe withdrawal or abstinence feelings associated with nicotine absence and reported milder symptoms, which they overcame easily. Many factors may play a role in these astounding findings such as metabolic factors (hypoglycemia), psychological factors (postponing mechanisms), sociologic factors (collective behavior dynamics), diurnal rhythm disruption (similar to so-called jetlag as people get up to eat in late night), religious sentiments, and the complex interaction of starvation with many hormones (Pan et al., 2008).

Some of the contributing factors according to the current study are as follows:

- 1-Heightened religious sentiments facilitated by a special form of ritual of fasting in a month believed to be holy.
- 2-The knowledge and intention of being able to smoke again freely (in the evenings and after the month). This may empower the mind.
- 3-Prolonged nonsmoking time up to 18 hours or more in a day, as opposed to only 8 hours or less during sleep.
- 4-Lack of smoking accompanied by starvation. (In clinic, we often see the increased eating and drinking behaviors to compensate for lack of cigarettes, hence weight gain.)

Results from this study should be interpreted with consideration of its limitations. For example, smoking status was obtained by self-report; thus, there was the potential for recall bias. Another limitation is the dearth of similar studies on the relationship between fasting and addictions despite being practiced by large populations. The limitations, however, should not overshadow the strengths. For example, this study suggests that fasting may be beneficial in helping smokers to abstain from smoking.

Further research is needed to elaborate interactions of smoking, prolonged nicotine absence time, hunger, and thirst with laboratory (chemical, hormonal) and imaging (functional magnetic resonance imaging for corresponding areas of the brain) tests. Results may have implications beyond smoking, that is, addiction in general and obesity. Many believe intermittent fasting is a good way to fight obesity (Rynders et al., 2019). It may also help us better understand the mechanisms behind temporary or permanent behavioral changes.

We may be a long way off from understanding these complex interactions. In Ramadan, like in hospitalized patients, people can take long breaks from smoking, which we can exploit for total cessation with a new treatment model, involving smoking counselors, the government, and health and religious authorities.

Smoking consultants who wish to provide a service in this program need training in the specific nature of fasting such as cravings for food, drink, and tobacco; symptoms of low blood sugar; effects of nicotine abstinence; and the choice of drugs for the treatment of smoking. Drug choice here is likely to be different than usual smoking cessation drugs. In the clinic, if we choose varenicline or bupropion, we expect stopping of smoking after about a week. However, in specific circumstances, smoking is stopped first, which may trigger nicotine abstinence and cravings symptoms requiring specific treatment such as NRT in the forms of patches, chewing gums, and so forth.

Government health officials need to get involved in this program in terms of policy adjustment, advertisement, and supply of drugs. Clergy need to get involved to encourage people to stop smoking and also to reassure them that using drugs will not undermine spiritual values of fasting as people may think otherwise and be reluctant to use them (Özkara, 2013).

## Recommendations

In Ramadan, people who smoke can take long breaks from smoking, which we can exploit for total cessation with a new treatment model. Smoking cessation counseling in Ramadan should include the following:

- 1-Effective counseling (Aveyard et al., 2011; timing, duration, and frequency should be investigated): Preferably, the counseling should start before Ramadan.
- 2-Nicotine supplies and other smoking cessation drugs should be readily available. Some people may be suitable for varenicline or bupropion use at night (Öztürk et al., 2016). Like in hospital counseling, nicotine is good to help abstinence or withdrawal symptoms. Religious authorities can reassure people that using NRT does not harm fasting (Özkara, 2013).
- 3-Post-Ramadan follow-ups with telephone or other means. (Interactive voice recognition systems are shown to work after patients are discharged from hospitals.)
- 4-Ramadan campaign of smoking cessation should be coordinated by health, religious, and government authorities together.
- 5-Large numbers of counselors are required, hence family health-care centers may be used.

One additional benefit of a nationwide smoking cessation campaign can be reaching people in rural areas where they have not equally benefited from previous smoking cessation campaigns.

## CONCLUSIONS

Religious beliefs and personal will were found to be effective in reducing or eliminating cigarette smoking and managing withdrawal symptoms in Ramadan. Starvation from fasting also seemed to play a significant role, which needs further study. A mass cessation campaign with specifically designed intervention methods can help to reduce smoking among fasting people. Health and religious authorities should collaborate in this campaign. Functional imaging methods and laboratory studies for hormones and mediators can help to understand the postponing mechanisms of the brain.

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