Smoking Cessation Interventions in Arab Populations:
A Systematic Review

By

Kathryn Magee Abraham

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Dr. Cindy Feltner
Adviser

Date

Dr. Adam Goldstein
Second Reader

3/30/16
Date
Abstract

Background: Smoking is the leading preventable cause of death around the world. Arab populations have traditionally high smoking rates, and the influx of Arab immigrants to countries around the world can amplify the health disparities in this population. Primary care providers in areas with prominent Arab populations must develop a clear understanding of how to provide cessation support in a culturally appropriate and effective manner.

Objectives: To review the literature on the efficacy and comparative effectiveness of smoking cessation interventions for Arab adults living in the Middle East.

Eligibility Criteria: English language smoking cessation trials at clinics treating adult Arab smokers in Middle Eastern countries with follow-up after at least 6 months; behavioral, pharmacological, and combined interventions were eligible.

Data Sources: PubMed and Scopus were systematically searched for relevant articles published between January 1990 and December 2015.

Data Abstraction: One reviewer abstracted relevant data and performed a quality assessment of each included study.

Data Synthesis: The review of the literature yielded 517 unique titles and abstracts; 46 abstracts appeared eligible and were reviewed at the full-text stage. Of these, 7 studies met full eligibility criteria; 2 were rated as good quality and the others were rated as fair quality. Studies enrolled populations from Arab countries and interventions were generally set in outpatient settings. Two were randomized trials and five were pre-post studies. One study assessed a pharmacological intervention and all others assessed combination therapy. Studies assessed a range of pharmacologic agents, including: centrally-acting medicines (varenicline and bupropion), and
nicotine replacement therapies, including nicotine patches, gum, and tablets. Behavioral interventions included brief counseling, seminars, weekly meetings, and follow-up activities.

Limitations: A small body of literature was available, with very few randomized trials. Interventions and enrolled populations were heterogeneous, which made comparisons of quit rates difficult. This review’s scope only included English articles.

Conclusions and Implications of Key Findings: Using nicotine gum had a statistically significant improvement compared with the naltrexone and clonidine interventions at 6 months (RR 6.31; 95% CI 2.65, 15.06).\textsuperscript{59} No difference was found between the patches, gum, and tablets groups at 12 months. However, the use of patches and gum had a statistically significant improvement compared to a single nicotine replacement therapy (RR 1.86; 95% CI 1.28, 2.72).\textsuperscript{58} In the 5 pre-post studies, quit rates from baseline ranged from 12.9% to 34.6% over 6 months to 5 years. In Middle Eastern countries, additional research is needed regarding cultural components of interventions and methods of behavioral work. The development of culturally appropriate smoking cessation programs is vital for the provision of holistic care to Arab migrants and refugees.
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Introduction

Cigarette smoking harms nearly every organ of the body, making it one of the biggest public health threats worldwide. Tobacco causes approximately half of its users to face a premature death, totaling at over six million deaths per year.\(^1\) Furthermore, one billion tobacco-related deaths are predicted during the 21st century with over half occurring before the age of 70.\(^2\) Clearly, morbidity and mortality rates attributed to tobacco use has reached a dangerous level.

The World Health Organization Framework Convention on Tobacco Control (WHO FCTC) promotes six proven public health strategies to reduce tobacco use worldwide. Known as MPOWER, these strategies include the following: (1) monitoring tobacco use and prevention policies, (2) protecting people from tobacco smoke, (3) offering help to quit tobacco use, (4) warning about the dangers of tobacco, (5) enforcing bans on tobacco advertising, promotion and sponsorship, and (6) raising tobacco taxes.\(^3\) While these efforts have been very effective when targeting populations of Western ethnicity, use of tobacco products is increasing in less-developed countries and ethnic groups.

This review seeks to evaluate the efficacy and comparative effectiveness of smoking cessation interventions among Arab adults living in Arabic countries. For the purpose of this review, countries defined as Arabic include Afghanistan, Bahrain, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, Turkey, the United Arab Emirates, and Yemen. The interventions that have shown efficacy in other populations, such as Americans, may be more or less effective in Arab populations due to cultural factors, social norms, access to health care, and policy control in Arab countries. The findings and discussion may inform primary care physicians who treat the Arab population living as refugees how to best provide smoking cessation support.
**Harms of Smoking**

Smokers face significantly increased health risks, and there is no risk-free level of exposure to tobacco.\(^4\) Compared with nonsmokers, smokers are more likely to develop lung cancer, stroke, chronic obstructive pulmonary disease, and heart disease through mechanisms including DNA damage, inflammation, and oxidative stress.\(^2,5\) Smoking increases the risk of coronary heart disease and stroke by 2 to 4 times and lung cancer by 25 times.\(^4\) The risk of heart disease and cancer are currently leading causes of death in the US, both of which are primarily attributed to cigarette use. These conditions account for an estimated 50% of all deaths in the US, while the remaining eight leading causes combined account for only 25%.\(^6\) Smoking also causes significant morbidity related to other conditions such as asthma, digestive problems, gum disease, tuberculosis, vision problems, reduced fertility, and impotence.\(^2\) Overall, the effects of these conditions and others may significantly reduce quality of life.

There is also a significant impact on the health of a cigarette user’s family members and friends. Over 7,000 chemicals have been identified in secondhand smoke, and approximately 250 of them have been labeled as harmful.\(^7\) Exposure to secondhand smoke leads to an increase in endothelial dysfunction and inflammation, which cause a variety of health disparities, including acute cardiovascular events and thrombosis.\(^5\) Secondhand smoke also increases a nonsmoker’s chance of developing cancer by 20 to 30%. There is no safe level of exposure to secondhand smoke.\(^7\)

In addition to direct effects on the health of smokers, smoking contributes to increased health care utilization, health care costs, and increased absenteeism from work. Estimated costs per year attributed to cigarette use exceed $300 billion in the US alone.\(^4\) Due to the recent
denormalization of smoking, smokers are often stigmatized and discriminated against, which further reduces their quality of life.  

**Smoking Cessation Interventions in the US**

*Policy Interventions*

While smoking is still a major public health threat, the decline of smoking in the US due to tobacco control efforts can be considered one of public health’s greatest accomplishments. The prevalence of cigarette smoking among adults decreased from 42% in 1965 to 18% in 2012. Policy in the US has acted as a primary force behind cessation efforts, as laws can be used to made tobacco products less accessible, less attractive, and less affordable. For example, in 1965 the Federal Cigarette Labeling and Advertising Act was established which requires health warnings to be published on cigarette packages. In 1970, cigarette advertising on television and radio was prohibited through the Public Health Cigarette Smoking Act. In 1988, an amendment to the Federal Aviation Act made domestic flights of less than two hours smoke-free. In 2000, the Wendell H. Ford Aviation Investment and Reform Act extended this prohibition to all flights between the US and foreign destinations. A decade later, the 2009 Family Smoking Prevention and Tobacco Control Act transferred the authority to regulate tobacco products to the U.S. Food and Drug Administration. This act also enforced user fees upon tobacco manufacturers, which will be used to support youth education on prevention and cessation.  

*Medical Interventions*

Healthcare settings are also important venues for delivering effective smoking cessation interventions, and are the focus of this review. Even with effective public health policies in place, many people struggle to quit tobacco. Nearly 70% of cigarette users reported wanting to
quit and over 50% made at least one attempt in the past 12 months. Only 3 to 6% of individuals who made an unaided attempt to quit were smoke-free one year later.\textsuperscript{12}

Much of the challenge in reaching abstinence can be attributed to the addicting nature of cigarettes. Nicotine is the key chemical compound in commercial tobacco products; it causes and sustains their powerful addicting effects. Upon inhalation, nicotine quickly travels through the bloodstream to the brain where it acts on multiple types of nicotinic receptors.\textsuperscript{5} These receptors create temporary feelings of relaxation, stress relief, and mood improvement. However, the feelings are only temporary and when nicotine is not supplied withdrawal symptoms ensue.\textsuperscript{13} Cravings, anger, irritability, anxiety, depression, and weight gain are some symptoms among many others that smokers may struggle with when reducing their nicotine intake.\textsuperscript{14}

The addiction process and ensuing withdrawal symptoms can be alleviated through medical care. Among patients who comply with interventions provided by a clinician, over 30% of quit attempts are successful one year later.\textsuperscript{15} Clinicians usually employ behavioral therapy, pharmacotherapy, or a combination of these two techniques.

\textbf{Behavioral Therapy}

Behavioral treatment approaches include both individual and group counseling. Individual counseling plays an important role in helping smokers quit. Even a minimal intervention (e.g., one that lasts less than 3 minutes) can increase tobacco abstinence rates.\textsuperscript{16,17} Behavioral counseling may be complemented by telephone counseling, internet resources, and text messaging. Group therapy provides additional accountability and may include stress management or relaxation classes.\textsuperscript{18} This method creates encouragement and support, two crucial components in encouraging health behavior change.\textsuperscript{19} Behavioral therapy can be very
helpful and most studies have shown that individuals who utilize this technique experience increasing quit rates.\textsuperscript{20}

\textbf{Pharmacotherapy}

The two major types of pharmacotherapy include (1) nicotine replacement and (2) centrally-acting medications such as bupropion and varenicline. The US Public Health Service recommends nicotine patches combined with a short acting immediate release nicotine (e.g., gum, lozenge, inhaler, or nasal spray) as the first-line therapy. Nicotine replacement is available in various forms, including a transdermal nicotine patch, nicotine gum, lozenges, inhaler, and nasal spray. The patch creates a baseline protection by providing long-acting nicotine while options such as gum or lozenges release short-acting nicotine to handle cravings or other symptoms. The dosing of nicotine for each method is determined by the quantity of cigarettes smoked per day.\textsuperscript{21,22} These methods allow the provision of nicotine without the harmful effects of tobacco, decreasing the individual’s nicotine withdrawal symptoms.

Centrally acting agents have different mechanisms. Varenicline is a partial agonist of the alpha-4 beta-2 subunit of the nicotinic acetylcholine receptor. By partially binding to this receptor, symptoms of withdrawal are reduced and the rewards of smoking are blocked.\textsuperscript{23} The mechanism of bupropion is unknown, but researchers suggest that it acts through dopaminergic and noradrenergic pathways as it can also be used as an antidepressant.\textsuperscript{24}

\textbf{Tobacco Use in Arabic Countries}

\textit{Smoking Status}

Much of the success in decreasing smoking rates in the US is due to a revolutionary change in Americans’ collective view of smoking – it has converted from an accepted pastime to a threat to individual and public health. However, the previous decades of increased attention on
smoking morbidity and mortality primarily targeted White Americans.\textsuperscript{25} Significant disparities in cigarette use remain across different races, ethnicities, educational levels, and socioeconomic statuses. The Arab population is one such minority who has not experienced this transformation in their perceptions of smoking.

Arab countries have some of the highest rates of smoking in the world. In a recent collection of tobacco control country profiles issued by the World Health Organization (summarized in Table 1), prevalence of cigarette use in some Arabic countries reached 66\% for men and 30\% for women.\textsuperscript{26} Smoking is an acceptable social habit in the Middle East. A study in Jordan showed that 66\% of residents expressed no smoking restrictions around family members or when hosting guests, despite 79\% of study participants stating they understood the dangers of second-hand smoke.\textsuperscript{27} Cultural norms may prevent smokers from acting on this knowledge, as offering a cigarette is often a sign of hospitality and smoking inside the home is customary.\textsuperscript{25} Beyond cultural influences, the declining cigarette consumption in areas such as the US has encouraged transnational tobacco companies to increase their sales efforts in the Middle East due to the lack of restrictions on tobacco advertising.\textsuperscript{28} Without successful tobacco free policies similar to those in the US, Arabic countries are vulnerable to the pressures of both economic and media influences. This makes the availability of quality medical support in the quit attempt process even more important.

It is also important to note that tobacco use in the Middle East extends beyond the usual span of products found in the US, as regional tobacco use methods are becoming increasingly common. Water pipe use, also known as ‘narghile’, ‘hubble-bubble’, ‘sheesha’, ‘mada-a’, or ‘goza’, has recently increased in prevalence, especially among youth and women.\textsuperscript{29} A study performed in Kuwait found that 79.9\% of water pipe smokers were women.\textsuperscript{30} Because the
Table 1. Summary of WHO Tobacco Control Country Profiles for Arabic countries.31

<table>
<thead>
<tr>
<th>Area</th>
<th>Smoking rate</th>
<th>Pharmacy availability</th>
<th>Quit line</th>
<th>Cessation support</th>
<th>Insurance coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>NRT</td>
<td>Bupropion</td>
<td>Varenicline</td>
</tr>
<tr>
<td>Afghanistan</td>
<td>N/A</td>
<td>N/A</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Bahrain</td>
<td>42.7</td>
<td>7.1</td>
<td>Yes</td>
<td>With r/x</td>
<td>With r/x</td>
</tr>
<tr>
<td>Iran</td>
<td>22.4</td>
<td>1.0</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Iraq</td>
<td>N/A</td>
<td>N/A</td>
<td>Yes</td>
<td>With r/x</td>
<td>No</td>
</tr>
<tr>
<td>Israel</td>
<td>41.5</td>
<td>19.8</td>
<td>Yes</td>
<td>With r/x</td>
<td>With r/x</td>
</tr>
<tr>
<td>Jordan</td>
<td>65.5</td>
<td>10.2</td>
<td>Yes</td>
<td>No</td>
<td>With r/x</td>
</tr>
<tr>
<td>Kuwait</td>
<td>N/A</td>
<td>N/A</td>
<td>Yes</td>
<td>No</td>
<td>With r/x</td>
</tr>
<tr>
<td>Lebanon</td>
<td>43.9</td>
<td>29.9</td>
<td>Yes</td>
<td>With r/x</td>
<td>With r/x</td>
</tr>
<tr>
<td>Oman</td>
<td>19.5</td>
<td>1.0</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Qatar</td>
<td>N/A</td>
<td>N/A</td>
<td>With r/x</td>
<td>With r/x</td>
<td>With r/x</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>26.8</td>
<td>3.0</td>
<td>Yes</td>
<td>With r/x</td>
<td>With r/x</td>
</tr>
<tr>
<td>Syria</td>
<td>N/A</td>
<td>N/A</td>
<td>No</td>
<td>With r/x</td>
<td>With r/x</td>
</tr>
<tr>
<td>Turkey</td>
<td>41.6</td>
<td>13.2</td>
<td>Yes</td>
<td>With r/x</td>
<td>With r/x</td>
</tr>
<tr>
<td>UAE</td>
<td>N/A</td>
<td>N/A</td>
<td>Yes</td>
<td>With r/x</td>
<td>Yes</td>
</tr>
<tr>
<td>Yemen</td>
<td>N/A</td>
<td>N/A</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

a Nicotine replacement therapy
smoke is drawn through water, users often assume this decreases the health risks in comparison to cigarettes. However, this tobacco use method contains monoxide, tar, nicotine, heavy metals, and other toxic elements found in cigarettes.\textsuperscript{27,32,33} Water pipe smoking carries the same or more Middle Eastern cultural overtones that have been identified in cigarette use. For example, some countries discourage youth from smoking cigarettes in social settings but allow water pipe smoking.\textsuperscript{34} The differences in smoking habits among US populations and populations from Arabic countries suggests that culturally tailored cessation services may be more effective than standard interventions among Arabs living in the US.

\textit{Smoking Cessation Interventions}

Despite the strong cultural presence of smoking in Arabic countries and heavy broadcasting control, smokers in these countries are interested in cessation programs. In Syria, several studies showed that the rates of quit attempts were double the recorded rates in the US. However, the percentage of successful quit attempts is less than half the proportion in the US.\textsuperscript{35,36} This suggests an increased need for effective smoking cessation programs. Currently, only three out of the fifteen Arab countries offer the standard cessation therapies used in the US (nicotine replacement therapy, bupropion, varenicline, free quit line, and cessation support). Other countries provide a smaller combination of these therapies. Afghanistan, Oman, and Yemen only offer nicotine replacement therapies, Qatar provides insurance with full coverage for cessation interventions, and the majority offer partial or no financial assistance.\textsuperscript{26} Cessation support and insurance coverage in each country is fully illustrated in Table 1.

Even if a country provides a specific cessation service, this does not mean that this practice is effective. For example, in Saudi Arabia, only 14.5\% of primary care and family practice physicians report using the clinical practice guidelines for smoking cessation. An even
smaller percentage (6.5%) prescribe pharmacotherapy for smoking cessation, and 18.9% refer patients to cessation programs. In the United Arab Emirates, only 24% of general practitioners were familiar with a community resource that they could refer patients to for support in pursuing smoking abstinence. In Jordan, 38.8% of doctors and nurses were current smokers. Among male nurses and physicians, over 80% reported smoking. Approximately 64.1% shared the belief that health care professionals who smoke are less likely to advise patients to stop smoking. In Syria, there is a complete lack of clinical practice standards for smoking cessation or cessation counseling training opportunities. These studies illustrate the real challenges facing Arab populations interested in quitting, the need for more cessation interventions in Middle Eastern countries, and the need for more support from primary care providers for Arab patients that smoke. How this research translates to care of Arab immigrants upon resettlement in other countries, such as the US, is important and will be discussed next.

**Arab Immigration to the United States**

Arab immigration to the US began in 1875. Syrian and Lebanese Christians entered due to economic hardship from a decline in the oil industry. The majority obtained unskilled jobs. By the late 1930s, this community has grown to between 130,000 and 350,000 individuals. In 1945, a second wave of Arab immigration to the US began. This group of immigrants was from a wider span of Arabic countries, and the majority was Muslim. Most were educated professionals and immigrated due to regional conflicts, allowing them to enter a wealthier class than the previous immigrants.

Since late 1967, the majority of immigrants from Arabic countries have come to the US as refugees. The United Nations High Commissioner for Refugees defines a refugee as someone who “owing to a well-founded fear of being persecuted for reasons of race, religion,
nationality, membership of a particular social group or political opinion, is outside the country of
his nationality, and is unable to, or owing to such fear, is unwilling to avail himself of the
protection of that country.\textsuperscript{36} Over the past 30 years, the US has resettled over 3 million
refugees.\textsuperscript{42} The Arab-Israeli War of 1967 and years of political turmoil following significantly
increased the number of Middle Eastern refugees in the US, with the total population growing by
more than seven-fold to almost 1.5 million in 2000.\textsuperscript{35,43} In both 2009 and 2010, the largest
people group resettled in the US was from Iraq.\textsuperscript{39} In addition, Arabic was the most common
language spoken by refugee arrivals between 2008 and 2013. Syrian and Iraqi refugees were two
of the top five groups that obtained legal permanent resident status between 2001 and 2009.\textsuperscript{42}
According to the Arab American Institute, a current approximation of the Arab-American
population totals at around 3.7 million.\textsuperscript{44}

It is important to note the significant influence the process of acculturation has upon
immigrant Arabs’ smoking statuses. Immigrants who show less assimilation report that most of
their friends are Arabs, they do not follow American customs, they feel more comfortable around
Arabs than Americans, and are they highly dependent on nicotine. These Arab Americans
smoked more than individuals of the same culture who conform to American standards or
socialize mostly with Americans.\textsuperscript{25} These results suggest that smoking cessation interventions
for Arab Americans smoking at the highest rates should be culturally appropriate, as much of
their nicotine dependence is dictated by their home country’s traditional behaviors.

**Justification for a Systematic Review**

Little to no analysis has been performed to compare and identify the effectiveness of
smoking cessation interventions among Arab populations. To this point, there have been few
systematic reviews completed regarding interventions among minority populations, and these
results have not been confirmed among only Arab adolescents and adults. However, many recent events, including the September 11, 2001 attacks, the more recent 2015 Paris bombing, and the 2016 presidential campaign, have drawn increasing attention to this population. Unfortunately, much of this scrutiny has remained in the realms of media, politics, and public discourse and has yet to break into the medical and public health fields.

To best care for the recent increase in the Arab American population with improved cultural competence, an examination and comparison of current interventions targeting Arab populations is necessary. Ideally, this systematic review would analyze cigarette smoking cessation interventions targeting Arab adult migrants living outside of Arab countries. However, only two studies have been completed for this specific population, one of which was performed outside the US. Therefore, I chose to analyze smoking cessation interventions occurring in Arab countries in hopes that the best techniques would be transferrable to programs for migrants. In summary, this systematic review analyzes the efficacy and comparative effectiveness of smoking cessation interventions for Arab adults, in hopes that the most successful care models will be replicated by the sections of America’s primary care workforce serving Arabs.
Methods

The focused question this systematic review addresses is “Among Arab adults, what is the efficacy and comparative effectiveness of smoking cessation interventions?”.  

Study Inclusion/Exclusion Criteria

The inclusion and exclusion criteria are shown in Table 2 organized by PICOTS criteria. To summarize, the population of interest is adult Arabs, defined as males and females 18 years or older, who smoke. For this review, an individual qualifies as an Arab if they are from one of the following countries: Afghanistan, Bahrain, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, Turkey, United Arab Emirates, or Yemen. Eligible interventions included behavioral therapy, pharmacotherapy, and combination therapy (i.e., combined behavioral therapy and pharmacotherapy). The outcome of interest was an objective measure of smoking or self-reported smoking behavior collected at least six months after the start of the intervention. The studies analyzed could take place in any country as long as the subjects were Arab and they were receiving treatment at a smoking cessation center.

Table 2. PICOT Framework with Inclusion and Exclusion Criteria.

<table>
<thead>
<tr>
<th>Category</th>
<th>Include</th>
<th>Exclude</th>
</tr>
</thead>
</table>
| Population | Male and female Arabs who are self-reported smokers and/or have smoked within the past 30 days  
Arabic countries include: Afghanistan, Bahrain, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, Turkey, United Arab Emirates, Yemen | Specific populations i.e. pregnant women, military personnel  
Children and adolescents (age <18 years) |
| Intervention| Behavioral therapy  
Pharmacotherapy  
Combination therapy (behavioral therapy plus pharmacotherapy, delivered simultaneously) | All other interventions |
| Comparison | Studies with a concurrent control group, including a different therapy method, usual | All other comparisons, including historical |
care or no intervention; single group pre-post comparisons controls

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Objective measures of smoking or self-reported smoking behavior at least 6 months after the start of the intervention All other outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time period</td>
<td>January 1990 to December 2015 Prior to 1990</td>
</tr>
<tr>
<td>Setting</td>
<td>Smoking cessation clinic in an Arab country All other settings</td>
</tr>
<tr>
<td>Study design</td>
<td>Randomized controlled trials, nonrandomized trials, cohort studies, single-group pre-post studies All other study designs</td>
</tr>
<tr>
<td>Publication language</td>
<td>English Languages other than English</td>
</tr>
</tbody>
</table>

**Data Sources and Searches**

Information sources for the systematic evidence review included PubMed and Web of Science literature databases, as well as hand-searches of the references lists of key studies and systematic reviews. A full description of my search strategy is presented in Table 3. For the PubMed search, MeSH terms included “smoking cessation” and “Arabic”; filters for “Humans” and “English” were also used, and limited the search to articles published between January 1990 and December 2015. A similar search was completed for the Scopus database (Table 3).

**Table 3. Literature Search Terms.**

<table>
<thead>
<tr>
<th>Population</th>
<th>Arab OR Arabs* OR Arabia* OR Afghanistan OR Bahrain OR Iran OR Iraq OR Israel OR Jordan OR Kuwait OR Lebanon OR Oman OR Qatar OR “Saudi Arabia” OR Syria OR Turkey OR “United Arab Emirates” OR Yemen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention</td>
<td>Tobacco use cessation OR &quot;Smoking cessation&quot; OR ((Quit* OR Cessat* OR Reduc* OR Stop*) AND Smoking)</td>
</tr>
<tr>
<td>Limits</td>
<td>Humans English language January 1990 to December 2015 time period</td>
</tr>
</tbody>
</table>
Quality Criteria

This review used the US Preventive Services Task Force (USPSTF) quality rating criteria (Table 4). These guidelines are specific to each study type, with randomized controlled trials and pre-post studies having very similar measures. After evaluating each full text study, a rating was assigned. A summary of the USPSTF ratings (i.e., good, fair and poor) are outlined in Table 5. All studies rated “good” or “fair” were included; studies rated “poor” were excluded.

Table 4. USPSTF Quality Criteria.  

| Initial assembly of comparable groups | RCTs – adequate randomization, including concealment and whether potential confounders were distributed equally among groups  
Cohort studies – consideration of potential confounders with either restriction or measurement for adjustment in the analysis; consideration of inception cohorts |
| Maintenance of comparable groups | Includes attrition, crossovers, adherence, and contamination |
| Important differential loss to follow-up or overall high loss to follow-up | |
| Measurements are equal, reliable, and valid | Includes masking of outcome assessment |
| Clear definition of interventions | |
| Important outcomes considered | |

| Analysis | RCTs – intention-to-treat analysis  
Cohort studies – adjustment for potential confounders |

Table 5. USPSTF Quality Ratings.  

| Good | Meet all criteria – comparable groups are assembled initially and maintained throughout the study (follow-up at least 80%); reliable and valid measurement instruments are used and applied equally to the groups; interventions are spelled out clearly; important outcomes are considered; and appropriate attention to confounders in analysis |
| Fair | Any or all of the following problems are present without the important limitations noted in the poor category below – generally comparable groups are assembled initially but some question remains whether some (although not major) differences occurred in follow-up; measurement instruments are acceptable (although not the best) and generally applied equally; some but not all important outcomes are considered; and some but not all potential confounders are accounted for |
| Poor | Any of the following major limitations exist – groups assembled initially are not close to being comparable or are not maintained throughout the study; unreliable or invalid |
measurement instruments are used or not applied equally among groups (including not masking outcome assessment); and key confounders are given little or no attention

Study Selection

All titles and abstracts from database searches and hand-searches were reviewed by one reviewer to assess eligibility against criteria outlined in Table 2. For all titles and abstracts that appeared to be eligible, full texts were retrieved and again reviewed against inclusion and exclusion criteria listed in Table 2.

Data Extraction Process

I extracted data from articles selected for the systematic review after the full text review. A standard chart was used for each study. The following information was extracted from each study: study question, source of funding, source population, other population characteristics (e.g., percent female, mean age), study design, intervention, intervention setting, comparison, outcome measure, results, and others. All data abstracted from individual studies is shown in Appendix A and B, and a summary is provided in the Results (Table 6).

Synthesis of Evidence

Results for all included studies were synthesized in both narrative format and summary tables, which can be found in Appendix B. Due to the small number of articles selected by this review, leading to the collection of a very diverse group of studies, meta-analysis was not appropriate. Instead, I provide a narrative interpretation of the overall quality, themes, and suggestions for future practice in the Results and Discussion sections.
Results

Study Selection

Figure 1 shows the PRISMA flow diagram explaining the justification for exclusion from the review and the relevant numbers of articles. In total, 853 articles were identified from searches in PubMed and Scopus. After removing duplicates, a total of 517 articles remained. Title and abstract review yielded 46 eligible articles. Seven were excluded because they took place in specialized care settings as opposed to primary care or a clinic, seven were excluded for wrong outcome (e.g., no cessation rates reported), ten were excluded because they focused on a specific population (such as pregnant women or military personnel), four were excluded for wrong population, two were excluded due to low quality, two were excluded because they did not provide a description of the smoking cessation intervention, two were excluded because they did not use intervention strategies approved by this review, and three were excluded because they involved only adolescent smokers. Seven studies remained after the full text review for future data abstraction.
Study Characteristics

Six out of 7 included studies had a relatively small sample size (less than 350 participants), and one study (evaluating a pharmacologic only intervention) enrolled a larger sample (> 16,000 participants). The generally small sample size is most likely due to the intensive nature of behavioral therapy and the resources and time required to supply each participant with quality counseling.

The mean age of study participants was between 35 and 45 years in six studies; one study did not report the subjects’ age. Literature shows that many smokers begin as early as age 15, suggesting that attempts to quit may be less effective in the age group of 35 to 45 years old due to the long period of time for which they have been exposed to nicotine. In all but one study,
the majority of participants were male. One study intentionally excluded female participants as researchers believed that effective cessation techniques between genders would vary widely and that smoking is primarily a problem among men. 55

The baseline smoking levels and nicotine dependency for study participants varied widely in both numerical level and choice of measurement tool. Two used only the Fagerstrom scale. 56,57 One used a different scale with which to calculate nicotine dependence. 58 Two studies used only a self report of cigarettes smoked per day, with similar results at 20 and 21 cigarettes per day. 59,60 One study used both the Fagerstrom scale and the number of cigarettes smoked per day, but reported the results in ranges which made it hard to compare to other studies. 61 One study did not report the study participants’ baseline smoking status in any form. 62

Six out of seven studies included in this review used combination therapy as their primary intervention. The remaining study used just pharmacological therapy. 56 No studies employed only behavioral therapy. When analyzing the pharmacological components of each study, six out of seven studies offered nicotine replacement therapies as one of their medical interventions, including gum, tablets, and patches. The remaining study did not specify the type of nicotine replacement therapy offered. 62 Only one study did not offer any type of nicotine replacement therapy. 56 Four studies offered centrally-acting medicine. 56,58,59,61 Both bupropion and varenicline were offered in two separate studies. 56,58,61 For behavioral therapy, techniques ranged from 4 sessions to 23 sessions. 57,59 Six out of seven studies offered only group or individual counseling sessions. One study offered a wider variety of treatments, including seminars and follow-up activities. 61 Unfortunately, across all studies the behavioral therapies were described only briefly, making thorough analysis or replication virtually impossible. Only
three studies specified the duration of their behavioral or pharmacological interventions, which ranged from 8 weeks to unlimited access.\textsuperscript{56,57,59}

Two studies used a randomized trial design.\textsuperscript{58,59} The remaining five studies were pre-post studies. This reoccurring opportunity for study participants to self-select the pharmacological treatment they used introduced bias, as the most motivated or educated patients might have chosen the methods previously shown to be effective. In one study, participants were excluded if they did not begin the method of their choice in 3-14 days after receiving the medication, which also may have introduced selection bias or willingness to quit bias.\textsuperscript{56} Bias was also introduced by another study which only enrolled smokers who had previously taken part in a smoking intervention led by a clinic, instead of those in the general smoking population.\textsuperscript{58}

All studies measured abstinence as their outcome and reported this as a percent quit rate, but variations in how this abstinence was measured existed. Four studies used both self-reporting methods and biochemical test verification.\textsuperscript{58-60,62} Three studies used only self-reporting of smoking habits, which introduces the chance for reporting bias.\textsuperscript{56,57,61} The study characteristics are summarized in Table 8. Outcomes were collected between six months and five years after the intervention. A comparison of quit rates between study groups is shown in Table 7.

All of the studies included in this systematic review took place in smoking cessation clinics. This universal variable is extremely important in comparing the efficacy of each treatment, but does reduce the likelihood of replication in the primary care practice setting. Four out of seven studies took place in Iran.\textsuperscript{57-60} Two studies took place in Turkey.\textsuperscript{56,61} One study took place in Israel.\textsuperscript{62} Overall, less than one third of the Middle Eastern countries are represented.
Table 6. Study Characteristics.

<table>
<thead>
<tr>
<th>Author, year</th>
<th>Sample Size</th>
<th>Mean Age</th>
<th>Baseline CPD</th>
<th>Study Design</th>
<th>Behavioral Intervention</th>
<th>Pharmacologic Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ahmadi et al., 2003</td>
<td>171</td>
<td>37.7</td>
<td>19.93</td>
<td>RCT 24 weeks</td>
<td>23 weekly visits</td>
<td>Gum, naltrexone, or clonidine</td>
</tr>
<tr>
<td>Celik et al., 2015</td>
<td>16,473</td>
<td>NSb</td>
<td>NS</td>
<td>Pre-post 12 weeks</td>
<td>N/A</td>
<td>Varenicline or bupropion</td>
</tr>
<tr>
<td>Heydari et al., 2012</td>
<td>308</td>
<td>42.4</td>
<td>NS</td>
<td>RCT NS</td>
<td>4 sessions</td>
<td>Nicotine patches, gum, tablets, or patches and gum</td>
</tr>
<tr>
<td>Heydari et al., 2012</td>
<td>272</td>
<td>42.5</td>
<td>NS</td>
<td>Pre-post 8 weeks</td>
<td>Brief counseling</td>
<td>Varenicline, patches, or control</td>
</tr>
<tr>
<td>Oztuna et al., 2007</td>
<td>350</td>
<td>37.4</td>
<td>NS</td>
<td>Pre-post NS</td>
<td>Seminars, 4-5 sessions, and follow-up activities</td>
<td>Optional use of bupropion, patches, or gum</td>
</tr>
<tr>
<td>Sharifi et al., 2012</td>
<td>132</td>
<td>39.0</td>
<td>22.1</td>
<td>Pre-post Unlimited</td>
<td>5 biweekly sessions</td>
<td>Gum</td>
</tr>
<tr>
<td>Sperber et al., 2000</td>
<td>89</td>
<td>41.8</td>
<td>NS</td>
<td>Pre-post NS</td>
<td>8-10 weekly sessions</td>
<td>Unspecified NRT</td>
</tr>
</tbody>
</table>

aCPD = cigarettes per day
bNS = not specified

Quality Assessment

In regard to quality, two studies received a quality rating of good. The remaining studies were rated fair in quality. All studies had an attrition rate of less than 20%, except for one study which had an attrition rate of 45%.

Results: Smoking Cessation

Due to the significant heterogeneity in terms of populations, interventions and outcome measures assessed in the seven included studies, it is difficult to compare the effectiveness and
efficacy of each type of intervention. However, some overall themes in relation to behavioral and pharmacological interventions can be gleaned and are discussed in detail below.

Two randomized controlled trials compared different interventions. One evaluated weekly behavioral therapy combined with the use of nicotine gum, naltrexone, or clonidine; the nicotine gum arm had a statistically significant improvement compared with the naltrexone and clonidine interventions at 6 months (RR 6.31; 95% CI 2.65, 15.06). The second evaluated four sessions of behavioral therapy with the use of nicotine patches, gum, tablets, or patches and gum; no difference was found between the patches, gum, and tablets groups at 12 months. However, the patches and gum intervention had a statistically significant improvement compared to a single nicotine replacement therapy (RR 1.86; 95% CI 1.28, 2.72). In the 5 pre-post studies, quit rates from baseline ranged from 12.9% to 34.6% over 6 months to 5 years.

In regards to the overall effectiveness of behavioral therapy, six out of seven studies employed this intervention and attested to its effectiveness, with quit rates of greater than 30% for several interventions. In addition, the Celik et al. study which did not use behavioral therapy showed lower quit rates when using varenicline alone than when it is a part of a combination therapy. The addition of a brief counseling session in the Heydari et al. study caused the quit rate to increase from 30% to 33% after 12 months, despite using varenicline for only 8 weeks instead of 12.

Pharmacological therapy also proved helpful. Without accounting for variances in study design, nicotine replacement therapies provided more effective support than centrally-acting agents when pursuing tobacco abstinence. In particular, combination approaches within this category proved very successful. The greatest quit rate, 62.5% at 1 year, occurred in the Heydari et al. study group which received both nicotine patches and gum. Results varied on whether
nicotine gum or patches were more effective, with the Heydari et al. study suggesting both methods were equally effective and the Oztuna et al. study showing patches were more effective.\(^{57,61}\) The only study which compared the centrally-acting agents of interest to this review, varenicline and bupropion, produced statistically significant results supporting varenicline’s effectiveness over bupropion.\(^{56}\)

**Table 7. Study Results.**

<table>
<thead>
<tr>
<th>Author, year Country</th>
<th>Study Design Duration</th>
<th>Behavioral Intervention</th>
<th>Pharmacologic Intervention</th>
<th>Outcome Timing</th>
<th>Results (quit rate by study group)</th>
<th>Quality Score Attrition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ahmadi et al., 2003(^{59}) Iran</td>
<td>RCT 24 weeks</td>
<td>23 weekly visits</td>
<td>Gum, naltrexone, or clonidine</td>
<td>6 months</td>
<td>Gum: 36.8% Naltrexone: 5.3% Clonidine: 5.3%</td>
<td>Good 0%</td>
</tr>
<tr>
<td>Celik et al., 2015(^{56}) Turkey</td>
<td>Pre-post 12 weeks</td>
<td>N/A</td>
<td>Varenicline or bupropion</td>
<td>1 year</td>
<td>Varenicline: 29.6% Bupropion: 25.1%</td>
<td>Fair 20%</td>
</tr>
<tr>
<td>Heydari et al., 2012(^{58}) Iran</td>
<td>RCT NS</td>
<td>4 sessions</td>
<td>Nicotine patches, gum, tablets, or patches and gum</td>
<td>1 year</td>
<td>Gum: 25.8% Patches: 16.7% Tablets: 18.2% Patches and gum: 62.5%</td>
<td>Fair 9.4%</td>
</tr>
<tr>
<td>Heydari et al., 2012(^{57}) Iran</td>
<td>Pre-post 8 weeks</td>
<td>Brief counseling</td>
<td>Varenicline, patches, or control</td>
<td>1 year</td>
<td>Varenicline: 32.6% Patches: 25% Control: 6.6%</td>
<td>Good 0%</td>
</tr>
<tr>
<td>Oztuna et al., 2007(^{61}) Turkey</td>
<td>Pre-post NS</td>
<td>Seminars, 4-5 sessions, and follow-up activities</td>
<td>Optional use of bupropion, patches, or gum</td>
<td>5 years</td>
<td>34.6% (56 patches, 6 bupropion, 3 gum)</td>
<td>Fair 44.6%</td>
</tr>
<tr>
<td>Sharifi et al., 2012(^{60}) Iran</td>
<td>Pre-post Unlimited</td>
<td>5 biweekly sessions</td>
<td>Gum</td>
<td>6 months</td>
<td>12.9%</td>
<td>Fair 0%</td>
</tr>
<tr>
<td>Sperber et al., 2000(^{62}) Israel</td>
<td>Pre-post NS</td>
<td>8-10 weekly sessions</td>
<td>Unspecified NRT</td>
<td>1-3 years</td>
<td>33%</td>
<td>Fair 15%</td>
</tr>
</tbody>
</table>
\(^a\text{CPD} = \text{cigarettes per day}\)
\(^b\text{NS} = \text{not specified}\)


**Discussion**

Arab migrants contribute significantly to their resettlement country's tobacco smoking rates. Although many studies have analyzed the prevalence and incidence of smoking cessation interventions among at-risk populations, very few have studied specifically Arab migrants. Due to this dearth in data, strategies used by physicians providing care in Arab countries were analyzed instead. A better understanding of the care received prior to resettlement in another country, such as the US, will help physicians to better care for these recently arrived populations. In summary, the primary goal of the collected data was to use current practices in Arab countries to make recommendations for US primary care physicians serving Arab refugees regarding the feasibility and most effective design of smoking cessation interventions and related research.

**Interpretation of Evidence**

The evidence in this review supports combination therapy, or the use of both behavioral and pharmacological components, as the most effective strategy to help Arab populations reduce their tobacco use. This review recommends that clinicians prescribe nicotine replacement therapy as the pharmacological component for therapy due to the higher quit rates observed when comparing this tool to centrally-acting agents. The guidelines regarding behavioral therapy are less clear due to an unfortunate lack of description in the literature which was analyzed by this review. However, the importance of this component has been confirmed through the understanding of the relationship between tobacco and Arab culture that this review provides. Due to the family and community oriented nature of Arabic values and beliefs, personal support, encouragement, and accountability is very valuable during quit attempts. Because cigarette use is a culturally accepted, socially normal representation of friendship, hospitality, and maturity, smoking habits are often more deeply engrained in Arab individuals versus Westerners which
demands increased attention and social support from clinicians. The relational aspects of Arabic culture and the current lack of smoking cessation peer support show that the success of group and individual therapy is to be expected and should be capitalized upon during interventions in the US. There was no statistically significant difference between the results of the randomized controlled trials and the pre-post studies.

**Limitations of the Review**

Despite careful methodological development and consistency of evaluation, several limitations of this review are present. First, due to time constraints, only articles published in English are included in this review. Because our population of focus primarily speaks Arabic and all of the studies which met our inclusion criteria took place overseas, it is likely additional evidence is available in other languages. As with any review of literature, this paper is also subject to reporting and publication bias.

**Limitations of the Body of Evidence**

There are multiple limitations of this review’s compiled evidence. Firstly, the body of information regarding smoking cessation interventions among Arab patients is very small. This decreases the power of the results analyzed. Secondly, measurement bias is possible. Three out of the seven studies contained quit rate outcomes which were confirmed only by methods of self-report by each participant. Including scientific measurements, such as the carbon monoxide breath test, could have eliminated this potential for bias. In addition, selection bias is present. The majority of studies which take place among Arab populations recruit study participants from smoking cessation clinics. Individuals who attend appointments at such clinics have already shown a desire and motivation to quit, which increases their likelihood of quitting.
In addition, the studies selected were not very specific regarding the methods for the behavioral interventions. Only two out of seven studies clearly illustrated who led the therapy sessions; one was led by an outreach worker and the second was led by a physician with a degree in health behaviors and education. The variety in leaders and session designs have the potential to create considerable variation in results. Without specifying exact behavioral methods, it is impossible to account for these differences. Given the range of behavioral therapies and their general descriptions, this review is unable to identify the most effective technique or program length. The study designs of the articles included in this review also decrease the strength of the evidence. Only two studies were randomized. Self-selection of smoking cessation therapies was practiced in the other five studies, most of which were observational, creating a bias in the results. Only one study utilized a control group. The majority of the studies included were pre-post observational studies. This format may influence the behavior of smokers because specific methods used at certain cessation clinics could confound the effects of the individual aspects being studied.

Moreover, only 3 countries out of the previously identified 15 Arabic countries were represented. Despite being in a similar geographic area, each country has its own culture, smoking laws, cessation provisions, and insurance plans. Without a sampling more representative of the entire span of Arabic countries, it is hard to make assumptions about the Arabic population as a whole. In addition, little information was provided about the socioeconomic status of each participant. When planning the systematic review, this information was thought to be important and of value. Because the findings of this review are to be used to create programs for Arab refugees in the US, most of whom are of a low socioeconomic status, specifications regarding income and living situation would have been very helpful.
An additional limitation of this review is its focus on only cigarette use. As stated in the introduction, Arabic populations have begun to increase their use of other harmful smoking options such as the water pipe. As these alternative smoking methods are most popular among women and youth, the predominance of male subjects in these studies further our inability to understand proper cessation methods for other types of tobacco.

**Implications for Practice**

Due to the small pool of studies, this review can contribute only a few small findings towards the design of smoking interventions for Arabs living in the US. First, it can be deemed crucial that programs include both behavioral and pharmacological approaches. The community-style culture of Arabs affirms the need for personal support during quit attempts.\(^{25}\) It is important to provide culturally and linguistically appropriate cessation guides and feedback, just as each of the studies in this review were able to offer. In regards to pharmacotherapy, it is necessary to consider the financial aspect of purchasing centrally-acting medicines or nicotine replacement therapies. Most Arabic countries either do not offer these methods, or do not provide insurance coverage to help with their cost.\(^{26}\) Arab immigrants in the US must be educated about these differences in our healthcare systems, and the opportunities for cost reduction in doctor and pharmacy bills should be explained accordingly.

**Implications for Research**

While the implications for practice are few, the suggestions and ideas regarding future research are many. First, additional randomized trials using adult patients which use a universal measure to express each participant’s baseline smoking status or tobacco dependence should be completed in Middle Eastern countries. These studies should carefully analyze behavioral therapy methods. It may be unethical to include control groups, as interventions have been
proven to be successful in increasing abstinence in all of the literature in the review and researchers would have to deny this opportunity to a current smoker. Therefore, the comparison between different behavioral styles of therapy, including but not limited to the length and number of sessions, the type of personnel leading the session, the setting in which therapy takes place, the size of therapy groups, and the information taught at each lesson, should be emphasized. Studies should provide careful detail regarding the behavioral therapy they offer to patients, with emphasis on special cultural elements designed for Arab populations. Group or individual sessions should be led by qualified smoking cessation specialists. In addition, studies among smokers who have not previously participated in a smoking intervention should be attempted. Studies should also analyze the care provided at primary care clinics in the Middle East, as all seven of the included studies enrolled individuals who attend programs at smoking cessation clinics. Furthermore, it is important for researchers to expand their knowledge base beyond Iran, Turkey, and Israel by beginning to evaluate communities in new Middle Eastern countries with high smoking rates such as Jordan and Iraq. In addition, studies in Arab countries targeting women and different methods of tobacco use, such as water pipes, are required. Because an individual’s likelihood of smoking is influenced by the habits of those around them, a holistic understanding of tobacco habits inside the entire household and community is necessary.

After a deeper investigation regarding smoking cessation work abroad is completed, additional research should be performed in the US. Smoking cessation trials stateside will help to confirm or negate the findings from studies abroad. Studies in the US can also determine the influence assimilation has on an Arabic individual’s ability to quit smoking and any potential increases in hand rolled cigarette e-cigarette use. Results in US based smoking cessation trials
may also produce different results than those performed abroad due to the tobacco policies enforced by the US government.

**Conclusion**

By analyzing current research regarding smoking cessation programs in the Middle East, smoking cessation specialists in the US can best design new interventions for Arab migrants. This review shows that combination therapy, including both behavioral and pharmacological elements, is most effective. The pharmacotherapy of choice is pairing of nicotine replacement patches and gum, allowing for short- and long-term withdrawal symptom relief. Unfortunately, information regarding specific behavioral therapy techniques and how to tailor these programs to the culture of Arabs is sparse. Results from additional randomized trials completed in Middle Eastern countries are necessary, and corresponding projects should be performed in the US as new findings develop. It is vital for these studies to be completed if US physicians wish to provide effective, culturally appropriate smoking cessation support for the Arab migrants in their patient populations.
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### Appendix A. Completed Data Extraction Forms

<table>
<thead>
<tr>
<th>Study 1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>COMBINATION</strong></td>
</tr>
</tbody>
</table>
| **Study Question:** | To investigate the effect of nicotine gum, clonidine, and naltrexone in maintenance treatment of cigarette smoking  
| **Source of Funding:** | Not specified  
| **Source Population:** | Outpatient treatment center in the capital city Shiraz, Iran  
|  | DSM-IV criteria for nicotine dependence, 10 cigarettes or more per day for at least one year  
| **Study Population:** | N = 171  
|  | Mean age: 37.68 years  
|  | Sex (% female): 0  
|  | Baseline smoking status: 19.93 cigarettes per day  
| **Design:** | Prospective, double blind, randomized trial  
| **Intervention:** | Pharmacological: Nicotine gum (2 mg every 1-2 h for first 6 weeks, 2-4 h for next 3 weeks, 4-8 h for last 15 weeks),  
|  | Behavioral: Weekly visit from outreach worker  
| **Comparison:** | Oral naltrexone (50 mg daily), OR oral clonidine (0.4 mg daily)  
| **Intervention Setting:** | Smoking cessation clinic  
| **Measurement:** | Study groups: 3 groups of N=57  
|  | Outcomes: abstinence at 24 weeks  
|  | Outcome measures: self-report and test verification  
| **Results:** | 20.5% abstinence overall (36.8% nicotine gum, 19.3% clonidine, 5.3% naltrexone)  
| **Attrition:** | 0%  
| **Quality Score:** | Good  

<table>
<thead>
<tr>
<th>Study 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PHARM</strong></td>
</tr>
</tbody>
</table>
| **Study Question:** | To discover the effectiveness of a nation-wide community-based smoking cessation intervention  
| **Source of Funding:** | Omega Contract Research Organization  
| **Source Population:** | All 81 cities in Turkey – 228 smoking cessation clinics, over 400 physicians  
| **Study Population:** | N = 16,473  
|  | Mean age: not specified  
|  | Sex (% female): 29%  
|  | Baseline smoking status: 16% with 0-4 fagerstrom score, 45.6% with 5-7, 39.2% with 8-10  
| **Design:** | Single group pre-post study  

\[\text{Abraham 42}\]
### Study 1

**Intervention:** Free medicines provided: Varenicline (63.8%) and Bupropion (36.2%) for 12 weeks

**Intervention Setting:** Smoking cessation clinic

**Comparison:** None

**Measurement:**
- Study groups: N/A
- Outcomes: Quit rate at 1-year follow-up
- Outcome measures: self-reported

**Results:**
- Varenicline: 29.6% quit rate; Bupropion: 25.1% quit rate

**Attrition:** 20% responded to 1-year follow-up

**Quality Score:** Fair

### Study 3

**COMBINATION**

**Heydari et al. Which form of nicotine replacement therapy is more effective for quitting smoking? A study in Tehran, Islamic Republic of Iran.**

**Study Question:** To compare quit rates of different formulations of nicotine replacement

**Source of Funding:** Tobacco Prevention and Control Research Center, National Research Institute of Tuberculosis and Lung Diseases

**Source Population:** Smoking cessation clinic patients at the Iranian National Research Institute

**Study Population:**
- N = 308
- Mean age: 42.4
- Sex (% female): 31.5%
- Baseline smoking status: Fagerstrom score – 28.9% mild, 36.0% moderate, and 35.1% severe

**Design:** Pre-post study

**Intervention:** 4 sessions of behavioral therapy + one type of NRT (patches, chewing gum, tablets, or both patches and gum)

**Intervention Setting:** Smoking cessation clinic

**Comparison:** None

**Measurement:**
- Study groups: N=31 for patches, N=161 for gum, N=29 for tablets, N=87 for 2 types of NRT simultaneously
- Outcomes: 4 week, 6 month, 12 month quit assessment
- Outcome measures: self-reported

**Results:**
- Gum: 84.0%/45.8%/25.8% (4 week/6 mo/12 mo)
- Patches: 88.8%/91.7%/16.7%
- Tablets: 88.0%/18.2%/18.2%
- Patches + gum: 95.2%/67.5%/62.5%

**Attrition:** 9.4%

**Quality Score:** Fair

### Study 4

**COMBINATION**

**Heydari et al. Quitting smoking with varenicline: parallel, randomised efficacy trial in Iran.**
### Study Question:
To evaluate the effectiveness of varenicline for tobacco cessation

### Source of Funding:
Ministry of Health and Food, Masih Daneshvari Hospital Research Institute, Tehran

### Source Population:
Smokers attending tobacco cessation clinics in the Tobacco Prevention and Control Research Centre at Shahid Beheshti University of Medical Sciences in Tehran, Iran

### Study Population:
N = 272  
Mean age: 42.5  
Sex (% female): 41.2%  
Baseline smoking status: nicotine dependence score of 5.5 +/- 2.8

### Design:
Randomized parallel clinical study

### Intervention:
Brief counseling on cessation + nicotine patches 15 mg/day or varenicline 1 mg twice daily for 8 weeks

### Intervention Setting:
Smoking cessation clinic

### Comparison:
Brief counseling on cessation

### Measurement:
Study groups: N=91 for behavioral only, N=92 for behavioral and nicotine, N=89 for behavioral and varenicline  
Outcomes: smoking status at 6 and 12 months  
Outcome measures: personal report and exhaled carbon monoxide measurement

### Results:
Control: 13.2%/6.6% (6/12 months)  
Varenicline: 58.4%/32.6%  
NRT: 51.1%/25%

### Attrition:
0%

### Quality Score:
Good

### Study 5  
COMBINATION  
*Oztuna et al. Five-year outcomes for a smoking cessation clinic.*

### Study Question:
To determine what demographic characteristics and factors include the success of quitting among participants in a smoking cessation program

### Source of Funding:
Not specified

### Source Population:
Patients at smoking cessation clinic in Trabzon, Turkey 18 years or older

### Study Population:
N=350  
Mean age: 37.4  
Sex (% female): 42%  
Baseline smoking status: 5.4 Fagerstrom score; 24% smoke <10 cig per day, 53.1% smoke 11-20, 11.7% smoke 21-40, 11.2% smoke >40

### Design:
Pre-post study

### Intervention:
Educational seminars + 4-5 behavioral counseling sessions + follow-up counseling and activities to help them abstain
<table>
<thead>
<tr>
<th>Study 6 COMBINATION</th>
<th><strong>Sharifi et al. Efficacy of harm education programs among patients of a smoking cessation clinic in Tehran, Iran.</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Study Question:</strong></td>
<td>To evaluate the effect of harm reduction programs on smoking patterns of subjects who presented to a smoking cessation clinic in Tehran, Iran</td>
</tr>
<tr>
<td><strong>Source of Funding:</strong></td>
<td>Tobacco Prevention and Control Research Center at Shaheed Beheshti Medical Science University</td>
</tr>
<tr>
<td><strong>Source Population:</strong></td>
<td>Tobacco Prevention and Control Research Center’s smoking cessation clinic in Tehran, Iran who had previously attended smoking cessation programs</td>
</tr>
</tbody>
</table>
| **Study Population:** | N=132  
Mean age: approx 39  
Sex (% female): 12.9%  
Baseline smoking status: 22.1 cigarettes per day |
| **Design:** | Pre-post design interventional study |
| **Intervention:** | Group or individual behavioral therapy every 15 days + 2mg nicotine gum |
| **Intervention Setting:** | Smoking cessation clinic |
| **Comparison:** | None |
| **Measurement:** | Study groups: N=132  
Outcomes: 3rd and 6th month follow up = number of smoked cigarettes, level of expired CO, number of nicotine gum used  
Outcome measures: self-reported and CO measurement |
| **Results:** | 64.4% reduced cigarette use by at least half  
12.9% quit smoking |
| **Attrition:** | 0% |
| **Quality Score:** | Fair |

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<p>| Study 7 COMBINATION | <strong>Sperber. Smoking cessation support groups in Israel: a long-term follow up.</strong> |</p>
<table>
<thead>
<tr>
<th>Study Question:</th>
<th>To assess quitting rate of smokers who participated in smoking cessation groups, and to characterize predictors of success or failure over a 1-3 year follow-up period</th>
</tr>
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<tbody>
<tr>
<td>Source of Funding:</td>
<td>Not specified</td>
</tr>
<tr>
<td>Source Population:</td>
<td>Israel</td>
</tr>
</tbody>
</table>
| Study Population: | N=89  
Mean age: 41.8  
Sex (% female): 64.5%  
Baseline smoking status: not specified |
| Design: | Prospective interventional study |
| Intervention: | 8-10 behavioral sessions led by a physician with a master’s degree in health behavior and education + NRT |
| Intervention Setting: | Smoking cessation clinic |
| Comparison: | None |
| Measurement: | Study groups: N=89  
Outcomes: quit rate at least 1-3 years  
Outcome measures: self-report and carbon monoxide breath test |
| Results: | 33% quit |
| Attrition: | 15% |
| Quality Score: | Fair |
Appendix B. Individual Study Analyses

Pharmacological Therapy

Study 1

<table>
<thead>
<tr>
<th>Citation</th>
<th>Celik, I.; Yuce, D.; Hayran, M. et al. (November 23 2014). Nationwide smoking cessation treatment support program – Turkey project. Journal of Health Policy, 119:50-56. DOI: 10.1016/j.healthpol.2014.11.017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study Design</td>
<td>Pre-post study</td>
</tr>
<tr>
<td>Quality</td>
<td>Fair</td>
</tr>
</tbody>
</table>
| Study Population | N=16,473  
Age: not specified  
Sex (% female): 29%  
Baseline smoking status: 16% with 0-4 Fagerstrom score, 45.6% with 5-7, 39.2% with 8-10                                                                                       |
| Intervention  | Provision of free smoking cessation medicine for 12 weeks; 63.8% used Varenicline and 36.2% used bupropion                                                                                     |
| Results       | Varenicline: 29.6% quit rate at 12 months  
Bupropion: 25.1% quit rate at 12 months                                                                                                                                                |

The Celik et al. study “Nationwide smoking cessation treatment support program – Turkey Project” is a prospective observational study published in the Journal of Health Policy which sought to determine the effectiveness of a nation-wide community-based smoking cessation intervention. Free smoking cessation medicine was offered to smokers in 81 cities at 228 smoking cessation clinics in Turkey for a period of 12 weeks. Financial constraints often prohibit individuals from pursuing smoking cessation methods, especially in Turkey where insurance only provides partial coverage for medications. Approximately one-fourth of the 16,473 study participants remained abstinent one year later.56

The study received a quality rating of fair due to several limitations. The number of subjects was extremely large, which prohibited researchers from taking into account personal smoking cessation challenges. These include comorbidities, nicotine dependence levels, health perceptions, psychosocial conditions, and economic aspects. Patients self-selected their nicotine replacement therapy and were required to begin treatment in 3-14 days after receiving the
medication, which may have introduced selection bias and willingness to quit bias. In addition, results were collected only by follow-up phone calls, with an attrition rate of 20%, and no biological measures were taken.

Overall, this study shows that pharmacological methods are successful in helping smokers remain abstinent over long periods of time. In addition, it provides an excellent illustration of how a health system can utilize its purchasing power to reduce drug costs and increase nationwide utilization of smoking cessation drugs.

Behavioral Therapy

No studies using solely behavioral therapy matched this review’s inclusion criteria.

Combination Therapy

**Study 1**

<table>
<thead>
<tr>
<th>Citation</th>
<th>Ahmadi, J.; Ashkani, H.; Ahmadi, M.; et al. (February 20 2003). Twenty-four week maintenance treatment of cigarette smoking with nicotine gum, clonidine and naltrexone. <em>Journal of Substance Abuse Treatment; 24</em>:251-255. DOI: 10.1016/S0740-5472(03)00027-8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study Design</td>
<td>Prospective randomized trial</td>
</tr>
<tr>
<td>Quality Score</td>
<td>Good</td>
</tr>
</tbody>
</table>
| Study Population | N=171  
Mean age: 37.68 years  
Sex (% female): 0%  
Baseline smoking status: 19.93 cigarettes per day |
| Intervention | Pharmacotherapy: 24 weeks of  
• Group 1: Nicotine gum (taper of 2 mg every 1-2 h to every 4-8 h)  
• Group 2: Oral naltrexone (50 mg daily)  
• Group 3: Oral clonidine (0.4 mg daily)  
Behavioral therapy: Weekly visit from outreach worker |
| Results | 20.5% quit rate overall at 6 months  
• 36.8% quit rate for nicotine gum  
• 19.3% quit rate for clonidine  
• 5.3% quit rate for naltrexone |

The Ahmadi et al. study “Twenty-four week maintenance treatment of cigarette smoking with nicotine gum, clonidine, and naltrexone” is a prospective randomized trial published in the
Journal of Substance Abuse Treatment which investigates the effect of nicotine gum, clonidine, and naltrexone in the maintenance treatment of cigarette smoking. Pharmacotherapy and weekly behavioral therapy was offered to 171 patients at a smoking cessation clinic in Shiraz, Iran who smoked 10 cigarettes or more per day. Overall, 20.5% remained abstinent 6 months later. Among nicotine gum, clonidine, and naltrexone users, 36.8%, 19.3%, and 5.3% quit respectively.59

This study’s quality was labeled as good. It was the first study with three large groups in Iran, subjects were allocated randomly, and the attrition rate was 0%. However, the qualifications of the individuals who performed the behavioral counseling were not specified, suggesting this therapy may have been less effective than usual.

Overall, this study encourages the use of combination therapy and especially the selection of nicotine patches over the use of clonidine or naltrexone. No female patients were included in this study which may suggest results are only valid among male smokers.

**Study 2**

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<tbody>
<tr>
<td>Study Design</td>
<td>Pre-post study</td>
</tr>
<tr>
<td>Quality Score</td>
<td>Fair</td>
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</tbody>
</table>
| Study Population | N=308  
Mean age: 42.4 years  
Sex (% female): 31.5%  
Baseline smoking status: Fagerstrom score – 28.9% mild, 36.0% moderate, and 35.1% severe |
| Intervention   | Pharmacotherapy: Nicotine patches, nicotine gum, nicotine tablets, or both patches and gum  
Behavioral therapy: 4 sessions                                                                                                                                                               |
| Results        | Gum: 84.0% at 4 weeks, 45.8% at 6 months, 25.8% at 12 months  
Patches:88.8% at 4 weeks, 91.7% at 6 months, 16.7% at 12 months  
Tablets:88.0% at 4 weeks, 18.2% at 6 months, 18.2% at 12 months  
Patches and gum: 95.2% at 4 weeks, 67.5% at 6 months, 62.5% at 12 months |
The Heydari et al. study “Which form of nicotine replacement therapy is more effective for quitting smoking? A study in Tehran, Islamic Republic of Iran” is an observational study published in the Eastern Mediterranean Health Journal which compares quit rates of different formulations of nicotine replacement therapy. Nicotine patches, gum, tablets, or both patches and gum and 4 sessions of behavioral therapy were offered to 308 smoking cessation clinic patients at the Iranian National Research Institute. At 12 months, 62.5% of patients using patches and gum, 25.8% of patients using only gum, 18.2% of patients using tablets, and 16.7% of patients using only patches remained abstinent.57

This study was determined to have a quality score of fair. Participants were able to self-select the nicotine replacement therapy they used, suggesting the most motivated patients might chose the most extensive package (patches and gum). In addition, quit rates were self-reported with an attrition rate of 9.4%.

Overall, this study illustrates the effectiveness of combination therapy, especially when multiple pharmacotherapies are used. The medications and therapy sessions in this trial were provided for free to patients, but researchers hope to discover in future trials if commitment to quit is greater if patients pay for part of the cost of treatment. However, cost is often a barrier to patients accessing care so the financial aspect should be balanced carefully.

Study 3

<table>
<thead>
<tr>
<th>Citation</th>
<th>Heydari, G.; Talischi, F.; Tafti, S.F. et al. (2012). Quitting smoking with varenicline: parallel, randomized efficacy trial in Iran. International Journal of Tuberculosis Lung Disease, 16(2):268-272. DOI: 10.5588/ijtid.11.0183</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study Design</td>
<td>Randomized trial</td>
</tr>
<tr>
<td>Quality Score</td>
<td>Good</td>
</tr>
</tbody>
</table>
| Study Population | N = 272  
Mean age: 42.5  
Sex (% female): 41.2%  
Baseline smoking status: nicotine dependence score of 5.5 +/- 2.8 |
The Heydari, Talischi et al. study “Quitting smoking with varenicline: parallel, randomized efficacy trial in Iran” is a randomized trial published in the International Journal of Tuberculosis Lung Disease which evaluates the effectiveness of varenicline for tobacco cessation. Pharmacotherapy consisting of varenicline or nicotine patches was assigned to each subject in the intervention group for 8 weeks; all subjects received brief behavioral counseling on cessation. The study included 272 smokers attending tobacco cessation clinics in Tehran, Iran. After 12 months, 32.6% of varenicline users, 25% of nicotine patch users, and 6.6% of control subjects remained abstinent.58

This study received a quality score of good. It was randomized and the attrition rate was 0%. In addition, smoking cessation outcomes were measured by personal report and exhaled carbon monoxide measurements.

Overall, this study concluded that the addition of medical treatment to a smoking cessation plan is very helpful. Despite the very brief behavioral counseling provided, this study showed a higher success rate for patients accessing only behavioral therapy in comparison to studies completed in Western cultures. This suggests that personalized, interactive treatment plans may be especially effective among Arab populations.

Study 4

Citation | Oztuna, F.; Can, G.; & Ozlu, T. (2007). Five-year outcomes for a smoking

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Intervention group</th>
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<tbody>
<tr>
<td>Pharmacotherapy: 8 weeks of</td>
<td></td>
</tr>
<tr>
<td>- Group 1: Varenicline (1 mg bid)</td>
<td></td>
</tr>
<tr>
<td>- Group 2: Nicotine patches (15 mg per day)</td>
<td></td>
</tr>
<tr>
<td>Behavioral therapy: Brief counseling on cessation</td>
<td></td>
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</tbody>
</table>

| Control group |
| Behavioral therapy: Brief counseling on cessation |

| Results | Varenicline: 58.4% quit rate at 6 months, 32.6% quit rate at 12 months |
| Nicotine patches: 51.1% quit rate at 6 months, 25% quit rate at 12 months |
| Control: 13.2% quit rate at 6 months, 6.6% quit rate at 12 months |
The Oztuna et al. study “Five-year outcomes for a smoking cessation clinic” is an observation study published in the Journal of Respirology which sought to determine what demographic characteristics encourage the success of quitting among participants in a smoking cessation program. Extensive behavioral therapy and optional pharmacotherapy was offered to 350 patients at a smoking cessation clinic in Trabzon, Turkey. After five years, 34.6% remained abstinent. Out of these subjects, 86.2% had selected nicotine patches as their nicotine replacement therapy of choice. Participants using a nicotine replacement therapy abstained from smoking 1.9 times longer than those without (95% CI: 1.2-2.9). In addition, participants without withdrawal symptoms remained abstinent 2.3 times longer (95% CI: 1.5-3.4).  

This study was determined to be of fair quality due to it’s attrition rate of 44.6%. In addition, patients were allowed to self-select their pharmacotherapy and self-report their follow-up smoking habits.

Overall, this study commends the use of nicotine patches. It also demonstrates the effectiveness of a multidisciplinary smoking clinic with regular follow-up.

*Study 5*
The Sharifi et al. study “Efficacy of harm reduction programs among patients of a smoking cessation clinic in Tehran, Iran” is a pre-post design interventional study published in the Archives of Iranian medicine which evaluates the effect of harm reduction programs on smoking patterns of individuals presenting to a smoking cessation clinic in Tehran, Iran. Nicotine gum and both group and individual therapy was offered to 132 patients. Six months after the beginning of the intervention, 12.9% of participants had quit smoking. In addition, 64.4% reduced their cigarette use by at least half.\(^6\)

This study was deemed fair in its quality. The smoking cessation interventions offered during the first ten weeks were not structured, which decreases the impact of the results. In addition, all participants recruited for this study had attended an organized smoking cessation program before but failed to quit. This introduces selection bias and may be the cause behind the low quit rates. However, the combination of self-reported and biochemical outcome measures as well as the 0% attrition rate add strength to the study.

Overall, it is hard to quantify any specific recommendations for future smoking cessation programs among Arab populations due to the lack of clear organization in this intervention.

*Study 6*
The Sperber et al. study “Smoking cessation support groups in Israel: A long-term follow-up” is a prospective interventional study published in the Israel Medical Association Journal which assesses the quitting rates of smokers. Nicotine replacement therapy and 8-10 behavioral therapy sessions were offered to 89 smokers living in Israel. Between one to three years after the intervention, 33% of participants remained abstinent from cigarettes.62

The quality of this study was determined to be fair. Participants had to express the desire to quit to meet eligibility for the study which may influence results. In addition, the small sample size and 15% attrition rate leaves room for type II error. However, behavioral sessions were led by a physician with a master’s degree in health behavior and education which helps to confirm the quality of the therapy.

Overall, this study suggests that smoking cessation support groups are effective methods for pursuing abstinence from cigarettes. Because the method of nicotine replacement is not specified, it is hard to tell if this study encourages the use of gum, patches, a combination of methods, or other techniques.

<table>
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<tbody>
<tr>
<td>Study Design</td>
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</tr>
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<td>Quality Score</td>
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</tr>
<tr>
<td>Study Population</td>
<td>N=89</td>
</tr>
<tr>
<td></td>
<td>Mean age: 41.8 years</td>
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<tr>
<td></td>
<td>Sex (% female): 64.5%</td>
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<tr>
<td></td>
<td>Baseline smoking status: not specified</td>
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<tr>
<td>Intervention</td>
<td>Pharmacotherapy: Nicotine replacement therapy</td>
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<tr>
<td></td>
<td>Behavioral therapy: 8-10 sessions</td>
</tr>
<tr>
<td>Results</td>
<td>33% quit at 1-3 years</td>
</tr>
</tbody>
</table>

62 The quality of this study was determined to be fair. Participants had to express the desire to quit to meet eligibility for the study which may influence results. In addition, the small sample size and 15% attrition rate leaves room for type II error. However, behavioral sessions were led by a physician with a master’s degree in health behavior and education which helps to confirm the quality of the therapy. Overall, this study suggests that smoking cessation support groups are effective methods for pursuing abstinence from cigarettes. Because the method of nicotine replacement is not specified, it is hard to tell if this study encourages the use of gum, patches, a combination of methods, or other techniques.