# Interventions for smoking cessation with supporting of health staff in low - and middle-income countries: a systematic review and meta-analysis study

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**Abstract**

*The level of smoking cessation support in hospitals are low, especially in resource limited settings. Current healthcare systems are not well organized to address the issue. This review aimed to evaluate the effectiveness of smoking cessation interventions initiated in health facilities in resource-limited settings. A systematic review using meta-analysis techniques was applied. Bibliographic databases included PubMed, Medline, LILACS, the United States Clinical Trials and the Cochrane Collaboration Library. Eligibility criteria included smoking cessation intervention studies were published in English or Vietnamese, from the year 1990 to 2018. Study designs were randomized controlled trials, quasi-randomized controlled trials, cohort studies and before and after studies. Populations were limited to those in low and middle-income countries. Interventions were limited smoking cessation programs conducted in health facilities. 17 studies had included for the reviewing. 12 studies had been assessed to the meta-analysis. The proportion of successful smoking cessation in 6 months follow-up were range from 11.7% to 62.2% for the intervention group. In 12 months, follow-up, the abstinence rate ranges from 13.6% to 73%. The popularly of medical staff support the intervention was the physicians (8/17, 47.1%) and doctor (5/17, 29.4%). The evidence from our study suggests that the abstinence rate can be affected by the supporting of medical staff follow the smoking cessation (SC) program.*

**Keywords:** *Smoking cessation; resource-limited setting; systematic review; meta-analysis*

## 1. Introduction

By making tobacco cessation support to be readily accessible, there will be a great impact to reduce the prevalence of tobacco using. The number of adult smokers around the world is 1.1 billion people and within about 367 million are smokeless tobacco users, but many of them had intended quit [1 – 3]. Only 30% people in the world can get accessing to tobacco cessation services [4]. This could lead to a significant challenge, especially health care expenditures smoking diseases in low-and middle-income regions [5]. The percentage of smokers had been screened for tobacco use or advised to quit in these countries was lower than 50% [6]. Furthermore, many countries in this group might have no prevention programmed or tobacco control programmed in place at best-practice level for young generation [7].

Even through there are many benefits of health can be got by quitting tobacco use but also many stepping stone problems. One of the main disadvantages of the impact of an intervention smoking cessation at LMICs could be the cost-coverage of tobacco cessation services [8]. Spending budgets for cessation programs had been conducted at a few countries in the world [9]. To solve this problem, primary responsibility for implementing tobacco cessa-

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tion can be given to health care systems [10]. Thus, the cost of cessation treatment could be reducing which lead to the number of people attempt to quit and the success in quitting both could increase [11]. But in LMICs, a health care service that provides tobacco users with the resources to quit is still not widespread.

Developing and implementing tobacco cessation programs from health care services in LMICSs has been limited by the few availability and quality of data research. We performed a systematic review to evaluate the effectiveness of smoking cessation interventions initiated in health facilities in resource-limited settings.

## 2. Methods

*Study population*

We included studies where a comparator group was available. Study designs included randomized controlled trials, quasi-randomized controlled trials, cohort studies and before and after studies. Included studies reported the findings of studies of interventions to reduce smoking rates among people in the healthcare settings in low or middle-income countries, defined according to World Bank criteria (reference). Studies were published in English or Vietnamese, from the year 1990 to 2018.

Exclusion criteria included studies reporting on a primary outcome of interest without a control or comparator group, commentaries, mathematical modeling studies, letters to the editor and studies with number of enrolled subjects in the intervention arm less than 20. We also excluded conference abstracts.

Relevant studies were retrieved, and two reviewers (EH and TD) independently screened studies on the basis of title and abstract. Any disagreement between these reviewers was resolved by consensus. If disagreements persist, then these had been resolved by a third reviewer. Duplicate publications were removed. The full texts of identified articles were then reviewed independently by two reviewers (EH and TD), with discrepancies resolved by consensus.

*Place and time*

Bibliographic databases included PubMed, Medline, LILACS, the United States Clinical Trials and the Cochrane Collaboration Library.

*Study design*

This review was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta Analyses (PRISMA) statement (Moher, 2009).

*Sample size*

All article met inclusion criteria were reviewed.

*Sampling methods*

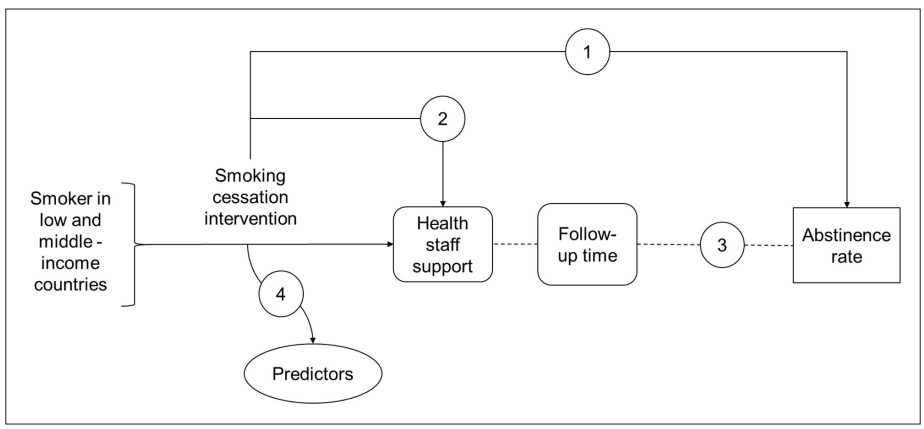


**Fig.1.** *Analytic framework for the smoking cessation intervention in low and middle-income countries*

There were 4 key questions in the analytic framework for this systematic review:

Line 1. What is the abstinence rate for each type of smoking cessation intervention with the support of medical staff at health facility in low and middle - countries?

Line 2. Which is the suitable type of medical staff can support the smoking cessation intervention at health facility in low and middle - countries?

Line 3. How long does the follow up time for the smoking cessation intervention with the support of medical staff conducted at health facility in low and middle - countries?

Line 4. What is the predictors of smoking cessation intervention with the support of medical staff conducted at health facility in low and middle - countries?

*Variables*

Principal summary measures the abstinence rate of the smoking cessation intervention, which is supported by the health staff.

*Data Collection*

Bibliographic databases included PubMed, Medline, LILACS, the United States Clinical Trials and the Cochrane Collaboration Library.

Search strategy

We had focused to a structured format of PICO mnemonic to improve the scientific rigor of our review. Population in our review was the smoker in low and middle-income countries who had received the smoking cessation intervention. The smoking cessation intervention studies did not meet this standard that had been conducted at health facilities had been removed from the final results. All of the studies need had the comparison before and after the intervention or between at least 2 groups participation in the intervention. The outcomes of these interventions should have the changing in the smoking status of the study subject such as: Abstinence rate or the number of cigarettes had been reduced.

**Table 1.** *Electronic search strategy for databases*

| Database | | Search Query |
|---|---|---|
| PubMed | #1 | "Health personnel" [MeSH Terms] OR "medical staff" [MeSH Terms] OR "nursing staff" [MeSH Terms] OR "pharmacists" [MeSH Terms] OR "physicians" [MeSH Terms] OR "inpatients" [MeSH Terms] OR "outpatients" [MeSH Terms] OR "ambulatory care facilities" [MeSH Terms] OR "health facilities" [MeSH Terms] OR inpatient [Title/Abstract] OR inpatient' [Title/Abstract] OR inpatient's [Title/Abstract] OR inpatients [Title/Abstract] OR inpatients' [Title/Abstract] |
| | #2 | ("Bupropion" [MeSH Terms] OR "varenicline" [MeSH Terms]) OR "tobacco use cessation" [MeSH Terms]) OR "smoking cessation" [MeSH Terms] |
| | #3 | (Cessation [Title/Abstract]) OR quit* [Title/Abstract]) AND smoking [Title/Abstract] |
| | #4 | Tobacco control [Title/Abstract] |
| | #5 | #1 AND (#2 OR #3 OR #4) |
| LILACS | #1 | ("Health personal" [MeSH Terms] OR "health personal" [All Fields] OR "inpatients" [MeSH Terms] OR "inpatients" [All Fields] OR "inpatient" [All Fields]) OR ("outpatients" [MeSH Terms] OR "outpatients" [ Title/Abstract] OR "outpatient" [ Title/Abstract]) |
| | #2 | ("Bupropion" [MeSH Terms] OR "varenicline" [MeSH Terms]) OR "tobacco use cessation" [MeSH Terms]) OR "smoking cessation" [MeSH Terms] |
| | #3 | #1 AND #2 |
| Clinical Trials | | (Health personnel OR Medical Staff OR Nursing Staff) AND (Smoking Cessation) AND (Phase 3 OR Phase 4) |

| Database | Search Query |
|---|---|
| Cochrane DB of systematic reviews | St1: health personnel: ti, ab, kw or "patient": ti, ab, kw and "smoking cessation treatment": ti, ab, kw or "tobacco control": ti, ab, kw (Word variations have been searched)<br>St2: "physician": ti, ab, kw or "caregiver": ti, ab, kw or "patient": ti, ab, kw and tobacco use cessation: ti, ab, kw or quit smoke: ti, ab, kw (Word variations have been searched) |

*Data extraction*

The following data were extracted from each study independently by two reviewers: Author name, year and location of publication, study aim and design, participant characteristics, including age, gender and smoking behaviors, sample size and smoking cessation rate, type of intervention, main outcome measure, variables examined as predictors reported and effect estimates for the association [e.g. odds ratios (OR), risk ratios (RR) and 95% confidence intervals (CI)].

*Information to be extracted*

The following data were extracted from each study independently by two reviewers: Author name, year and location of publication, study aim and design, participant characteristics (including age and gender), sample size type of intervention, type of medical staff support, type of measure outcome and cessation rate.

*Appraisal of individual studies*

The Downs and Black Checklist assessed the quality of randomized controlled and non-controlled trials [8]. The maximum score was 26 and we used a cut-off of 19 to identify studies with good quality methodology. Studies were included in the review irrespective of their rating of quality. We intended to stratify studies by quality, if sufficient studies were identified. Quality assessment was conducted by two independent reviewers, who discussed any discrepancies until agreement was met.

*Statistical analysis*

The Quality Assessment Tool for Quantitative Studies of Effective Public Health Practice Project was used by 2 independent reviewers to identify the bias of each studies [12]. Any disagreement between these reviewers was resolved by consensus. If disagreements persist, then these had been resolved by a third reviewer.

The characteristics of included studies, and their findings were presented individually. We intended to perform meta-analysis if at least two studies assessing a similar intervention were identified, where the outcome measures could be combined.

*Ethical issues*

The research complies with regulations on research ethics for a systematic review.

## 3. Results

*Study selection*

There were 8938 articles had been identified to the screen in this study. After the stage of screening (8482 studies) and eligibility (54 studies), only 17 studies had included for the reviewed. 12 studies had assessment to the meta-analysis.

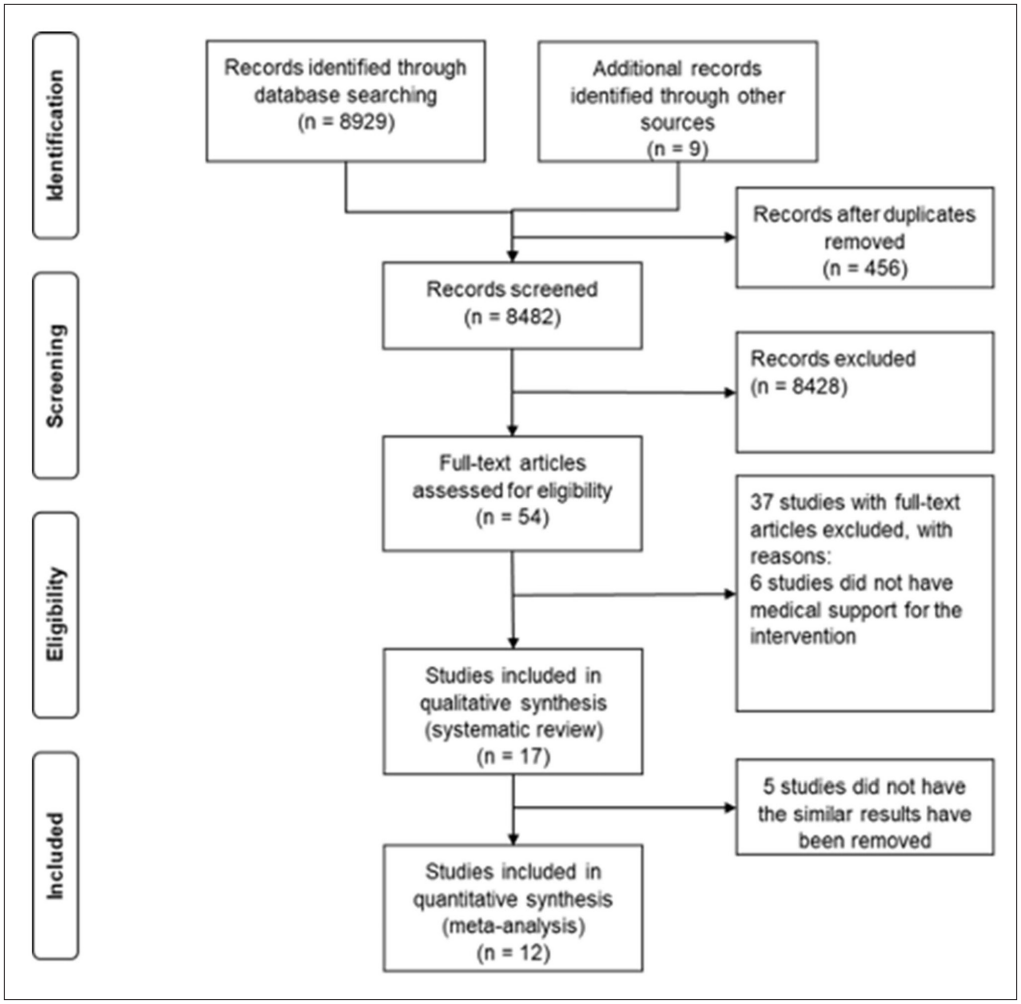


**Fig.2.** *Flowchart showing article selection*

*Quality assessment*

The median D&B score was 23 (range from 17 to 26) for all full-text studies and it was considered to be of high quality.

*Characteristics of the included studies*

In table 2, the reviews had chosen 17 intervention studies. There were 7/17 (41.2%) studies used the randomized control trial study design. All of the studies were from low - or middle-income countries but which is standout of the result is that almost of studies (12/17, 70.6%) were from Asia (China = 6, Indonesia = 2, India = 2, Syria = 1, and Malaysia = 1). Over all, total base-line sample size in this review was 6951 participation. Almost half of the studies (8/17, 47.0%) experienced the small base-line sample sizes (< 300) participated in the studies, while the ranged of sample size of selected studies was from 30 to 1378. Among the 17 included studies, the age of study subjects were 18 years and above. One study witnessed the recruitment of smoking parent of young children from age 0 - 5. The number of used the counseling intervention studies were higher than the number of combined intervention studies (counseling and pharmacies), 12 studies compared to 5 studies in order.

**Table 2.** *Summary of included studies*

| Author, Year | Methods | Participants | Intervention | Primary outcome |
|---|---|---|---|---|
| Danilo Antonio Baltieri, 2009 [13] | *Study design:* Pharmacological trial<br>*Follow-up time:* 3 months<br>*Blinding:* Double-blind | *Base-line sample:* 155<br>*Sample size finished the follow-up time:* 85<br>*Study population:* male alcohol-dependent outpatients patients aged 18 years<br>*Country:* Brazil | *Type of intervention:* Counseling and pharmacotherapy in three groups (placebo, naltrexone and topiramate)<br>*Type of medical staff support:* Doctor provided standardized brief cognitive behavioral interventions | Differences in cigarettes smoked between the start and the end of the study:<br>Naltrexone group: 3.57 (± 6.33)<br>Topiramate group: 9.20 (± 7.86)<br>Placebo group: 1.29 (± 6.27) |
| Renata Cruz Soares de Azevedo, 2010 [14] | *Study design:* Clinical trial<br>*Follow-up time:* 6 months<br>*Blinding:* None | *Base-line sample:* 353<br>*Sample size finished the follow-up time:* 201<br>*Study population:* Current smokers aged 18 years or older<br>*Country:* Brazil | *Type of intervention:* Intervention group: Counseling in 2 groups (low-intensity and high- intensity intervention)<br>Control group: Usual care<br>*Type of medical staff support:* Psychologists, nurses and occupational therapist play the role as smoking-cessation counselors | Abstinence rate (7-day point prevalence abstinence):<br>Usual care group: 20/76 (26.3%)<br>Low-intensity intervention group: 45/108 (41.7%)<br>High- intensity intervention group: 48/107 (44.9%) |
| Katherine Everett-Murphy, 2010 [15] | *Study design:* Quasi-experimental design<br>*Follow-up time:* 9 to 10 months<br>*Blinding:* None | *Base-line sample:* 814<br>*Sample size finished the follow-up time:* 627<br>*Study population:* Pregnant smokers aged 18 - 30 years old<br>*Country:* South Africa | *Type of intervention:*<br>Intervention group: Counselling 5As<br>Control group: None<br>*Type of medical staff support:* Midwives were trained to use the ACOG 5As Guideline for brief smoking cessation counseling methods | The primary outcome measure was quitting, defined as a urinary cotinine level below 100 ng/ml - Intention to treat analysis (those lost to follow up, classified smokers)<br>Intervention group (n = 358): 5.8%<br>Control group (n = 269): 0.5% |
| Nawi Ng, 2010 [16] | *Study design:* Randomized clinical trial<br>*Follow-up time:* 6 months<br>*Blinding:* None | *Base-line sample:* 71<br>*Sample size finished the follow-up time:* 56<br>*Study population:* Type 2 diabetes male aged 18 years and over<br>*Country:* Indonesia | *Type of intervention:*<br>Control group: Doctor's advice<br>Intervention group: Cessation clinic<br>*Type of medical staff support:* Doctor with educational materials graphically depicting diabetes complications related to tobacco use and visual illustrations of the way tobacco reduced circulation causing these complications | 7-day point prevalence abstinence, assessed at 6 months following the initial intervention<br>Control group (n = 33): 30.3%<br>Intervention group (n = 38): 36.8% |

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|---|---|---|---|---|
| Kenneth D. Ward, 2012 [17] | *Study design:* Randomized controlled trial<br>*Follow-up time:* 12 months<br>*Blinding:* Single blind | *Base-line sample:* 269<br>*Sample size finished the follow-up time:* 205<br>*Study population:* Smoking patients aged 18 to 65 years old<br>*Country:* Syria | *Type of intervention:*<br>Intervention group: Physician counselling based on 5 A's and sustain release Nicotine<br>Control group: Physicians advice based on 5 A's and sustain release placebo<br>*Type of medical staff support:* Physicians were trained to deliver a brief '5A'-based intervention (ask, advise, assess, assist arrange) | No self-reported smoking and carbon monoxide < 10 p.p.m. following a grace period of two weeks after the scheduled quit day:<br>6 months<br>Placebo (n = 135): 14.1%<br>Nicotine (n = 134): 13.4%<br>12 months<br>Placebo (n = 135): 11.9%<br>Nicotine (n = 134): 12.7%<br>No self-reported smoking for the seven days preceding the follow-up visit and carbon monoxide < 10 p.p.m.<br>6 months<br>Placebo (n = 135): 19.7%<br>Nicotine (n = 134): 14.2%<br>12 months<br>Placebo (n = 135): 14.8%<br>Nicotine (n = 134): 20.1% |
| Pei Ru Lin, 2013 [18] | *Study design:* Pilot randomized controlled trial<br>*Follow-up time:* 12 months<br>*Blinding:* Single-blind | *Base-line sample:* 126<br>*Sample size finished the follow-up time:* 92<br>*Study population:* Outpatient male aged 40 - 60 years old<br>*Country:* China | *Type of intervention:*<br>Intervention group: Counselling<br>Control group: None<br>*Type of medical staff support:* A health warning by physicians | 7-day quitting point prevalence rates at 6 months:<br>Intervention group (n = 74): 21.6%<br>Control group (n = 52): 5.8% |
| KR Thankappan, 2013 [19] | *Study design:* Pilot randomized controlled trial<br>*Follow-up time:* 6 months<br>*Blinding:* None | *Base-line sample:* 224<br>*Sample size finished the follow-up time:* 196<br>*Study population:* Male diabetic patients aged 18 years and above<br>*Country:* India | *Type of intervention:*<br>Intervention group: 5 'A's and 5 'R's counselling by doctors<br>Control group: 5 'A's and 5 'R's counselling by non-doctor health professional<br>*Type of medical staff support:* The doctors and diabetes educators selected to counsel patients in the study sites were initially given training on the harm of tobacco for diabetes patients | 7-day smoking abstinence at 6 months<br>Intervention group (n = 98): 14.3%<br>Control group (n = 98): 59.2% |

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|---|---|---|---|---|
| Goedele M.C Louwagie, 2014 [20] | *Study design:* Randomized controlled trial<br>*Follow-up time:* 6 months<br>*Blinding:* None | *Base-line sample:* 409<br>*Sample size finished the follow-up time:* 313<br>*Study population:* Adult patients initiating tuberculosis aged 18 years and above<br>*Country:* South Africa | *Type of intervention:*<br>Intervention group: Brief motivational<br>Control group: None<br>*Type of medical staff support:* Lay health-care workers received 3 days' in-depth training in tobacco cessation and brief MI for tobacco cessation from an experienced brief MI counsellor and trainer | Biochemically verified 6-month sustained abstinence<br>Intervention group (n = 205): 11.7%<br>Control group (n = 204): 5.4% |
| Abu S. Abdullah, 2015 [21] | *Study design:* Randomized Controlled Trial<br>*Follow-up time:* 6 months<br>*Blinding:* Single-blind | *Base-line sample:* 318<br>*Sample size finished the follow-up time:* 180<br>*Study population:* Smoking parents or caregivers had children aged 5 years or younger<br>*Country:* China | *Type of intervention:*<br>Intervention group: brief advice to quit smoking in-person counseling<br>Control group: None<br>*Type of medical staff support:*<br>Community health workers received a 3-day practicum training | Smoking hygiene practices within the household as reported by the subjects at 6 months<br>Intervention group: (n = 98): 62.2%<br>Control group: (n = 82): 45.1%<br>Reduction in children's urine cotinine concentrations<br>Intervention group(n = 98): 0.03 ± 0.065<br>Control group(n = 82): 0.087 ± 0.027 |
| Lei Wu, 2015 [22] | *Study design:* non-randomized clinical trial<br>*Follow-up time:* 12 months<br>*Blinding:* None | *Base-line sample:* 547<br>*Sample size finished the follow-up time:* 407<br>*Study population:* male smokers aged 18 years and above<br>*Country:* China | *Type of intervention:*<br>Intervention group: Face-to-face counseling in combination with four follow-up telephone counselling<br>Control group: Face-to-face counseling<br>*Type of medical staff support:* Physicians provided individual face-to-face based on Prochaska's transtheoretical model and on the 'five A's' (ask, advise, assess, assist and arrange), lasting at least 30 min | In 12-month follow-up<br>7-day point prevalence:<br>Intervention group (n = 398): 26.4%<br>Control group (n = 149): 14.8%<br>6-month continuous abstinence:<br>Intervention group (n = 398): 19.6%<br>Control group (n = 149): 10.7%<br>12-month continuous abstinence:<br>Intervention group (n = 398): 13.6%<br>Control group (n = 149): 8.7% |
| Bin Jiang, 2015 [23] | *Study design:* Prospective observational study<br>*Follow-up time:* 6 months<br>*Blinding:* None | *Base-line sample:* 924<br>*Sample size finished the follow-up time:* 733<br>*Study population:* Current smokers aged 17 to 79 years old.<br>*Country:* China | *Type of intervention:*<br>Intervention group: Received counseling and varenicline<br>Control group: Counseling only<br>*Type of medical staff support:*<br>Physician adopted a non-directive approach based on the Prochaska transtheoretical model | 6-month follow-up for:<br>7-day point prevalence abstinence rate<br>Intervention group (n = 272): 34.7%<br>Control group (n = 527): 23.1%<br>3- month continuous abstinence rate<br>Intervention group (n = 272): 31.3%<br>Control group (n = 527): 18.2% |

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|---|---|---|---|---|
| Lei Wu, 2016 [24] | *Study design:* Non-randomized controlled trail<br>*Follow-up time:* 12 months<br>*Blinding:* None | *Base-line sample:* 547<br>*Sample size finished the follow-up time:* 407<br>*Study population:* Current smokers, male, aged 18 years or above<br>*Country:* China | *Type of intervention:* Intervention group: Face-to face counseling and follow-up telephone counselling Control group: Face-to face counseling<br>*Type of medical staff support:* Physician provided individual face-to-face counseling based on Prochaska's transtheoretical model and the five 'A' (ask, advice, assess, assist and arrange) lasting at least 30 min | 12 months follow-up<br>7-day point prevalence<br>Intervention group (n = 398): 26.4%<br>Control group (n = 149): 14.8%<br>6-month continuous abstinence<br>Intervention group (n = 398): 19.6%<br>Control group (n = 149): 10.7% |
| Mark Nichter, 2016 [25] | *Study design:* Randomized controlled trial<br>*Follow-up time:* 12 months<br>*Blinding:* None | *Base-line sample:* 101<br>*Sample size finished the follow-up time:* 56<br>*Study population:* Patients with tuberculosis<br>*Country:* Indonesia | *Type of intervention:*<br>Intervention group: doctor's message<br>Control group: family member support<br>*Type of medical staff support:* Doctor delivered tuberculosis-specific quit smoking messages (5As) | Abstinence rate at 6 months<br>Intervention group (n = 31): 73%<br>Control group (n = 29): 71%<br>There was no statistics significant of abstinence rate at 12 months |
| Sui Chee Fai, 2016 [26] | *Study design:* Before and after intervention studies<br>*Follow-up time:* 6 months<br>*Blinding:* None | *Base-line sample:* 176<br>*Sample size finished the follow-up time:* 176<br>*Study population:* Smoker patients aged 18 years and above<br>*Country:* Malaysia | *Type of intervention:*<br>Pharmacotherapy initiation<br>*Type of medical staff support:*<br>Pharmacists, doctors and nurses (Unclear) | Outcome measure:<br>Abstinence rates after 6-month follow-up: 75/176 (42.6%) |
| Raul Mejia, 2016 [27] | *Study design:* Randomized clinical trial<br>*Follow-up time:* 12 months<br>*Blinding:* None | *Base-line sample:* 1378<br>*Sample size finished the follow-up time:* 933<br>*Study population:* Smoking patients aged 18 years and above<br>*Country:* Argentina | *Type of intervention:*<br>Intervention group: 5-As counselling bye physician<br>Control group: Physician<br>*Type of medical staff support:* Physician consisted of two 3-hour sessions based on the course "Rx for Change: Clinician-Assisted Tobacco Cessation" | Abstinence rate at 6-month<br>Intervention group (n = 750): 17.0%<br>Control group (n = 628): 15.1%<br>Abstinence rate at 12-month<br>Intervention group (n = 750): 24.1%<br>Control group (n = 628): 23.0% |

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|---|---|---|---|---|
| Changxi Zhou, 2017 [28] | *Study design:* Non-randomized controlled trial<br>*Follow-up time:* 6 months<br>*Blinding:* None | *Base-line sample:* 509<br>*Sample size finished the follow-up time:* 415<br>*Study population:* Male smokers aged 30s to 40s years old with chronic diseases<br>*Country:* China | *Type of intervention:*<br>Intervention group: Physician advice (based on 5A and 5R) and took either bupropion hydrochloride or varenicline tartrate<br>Control group: Physician advice based on 5A and 5R<br>*Type of medical staff support:* Physician provided free individual counseling and follow-up interviews with brief counseling | 6-month follow-up<br>7-day point-prevalence abstinence rate<br>Intervention group (n = 219): 30.1%<br>Control group (n = 290): 26.6%<br>1-month continuous abstinence<br>Intervention group (n = 219): 28.8%<br>Control group (n = 290): 25.2%<br>3-month continuous abstinence<br>Intervention group (n = 219): 26.9%<br>Control group (n = 290): 21.4% |
| Pranav Singh, 2018 [29] | *Study design:* Randomized controlled trial<br>*Follow-up time:* 4 months<br>*Blinding:* Double blind | *Base-line sample:* 30<br>*Sample size finished the follow-up time:* 30<br>*Study population:* Current smokers aged 18 years and above<br>*Country:* India | *Type of intervention:*<br>Intervention group: Physicians advice based on 5 A's and sustain release Bupropion 300 mg<br>Control group: Physicians advice based on 5 A's and sustain release placebo<br>*Type of medical staff support:* Physician provided intensive counseling | Absence of smoking for past 7 days after 16 weeks<br>Intervention group (n = 15): 53.3%<br>Control group (n = 15): 20.0% |

*Bias assessment*

Table 3 reported the information about the controlling bias in selected studies. What is standout of the results is that most had strong moderate control of bias, whereas the blinding bias is the weakest control of all studies.

**Table 3.** *Bias assessment control of reviewed studies (n = 12)*

| Author, Year | Selection bias | Study design | Confounders | Blinding | Data collection method | Withdrawals and dropouts |
|---|---|---|---|---|---|---|
| Danilo Antonio Baltieri, 2009 [13] | Moderate | Strong | Strong | Strong | Strong | Strong |
| Renata Cruz Soares de Azevedo, 2010 [14] | Strong | Strong | Strong | Moderate | Strong | Moderate |
| Katherine Everett-Murphy, 2010 [15] | Moderate | Moderate | Strong | Moderate | Strong | Moderate |
| Nawi Ng., 2010 [16] | Strong | Strong | Strong | Strong | Moderate | Strong |
| Kenneth D. Ward, 2012 [17] | Moderate | Strong | Strong | Strong | Strong | Strong |
| Pei Ru Lin, 2013 [18] | Moderate | Strong | Strong | Moderate | Moderate | Moderate |
| KR Thankappan, 2013 [19] | Moderate | Strong | Strong | Weak | Moderate | Strong |
| Goedele M.C Louwagie, 2014 [20] | Strong | Strong | Strong | Moderate | Strong | Moderate |
| Abu S. Abdullah, 2015 [21] | Strong | Strong | Strong | Strong | Strong | Moderate |
| Lei Wu, 2015 [22] | Moderate | Moderate | Weak | Weak | Moderate | Moderate |
| Bin Jiang, 2015 [23] | Moderate | Moderate | Strong | Moderate | Moderate | Strong |
| Lei Wu, 2016 [24] | Moderate | Strong | Strong | Moderate | Strong | Moderate |
| Mark Nichter, 2016 [25] | Moderate | Moderate | Weak | Weak | Moderate | Moderate |
| Sui Chee Fai, 2016 [26] | Strong | Strong | Moderate | Weak | Moderate | Strong |
| Raul Mejia, 2016 [27] | Weak | Strong | Strong | Moderate | Moderate | Weak |
| Changxi Zhou, 2017 [28] | Moderate | Moderate | Strong | Moderate | Moderate | Strong |
| Pranav Singh, 2018 [29] | Strong | Strong | Strong | Moderate | Strong | Strong |

**Key questions answer**

*The abstinence rates*

The proportion of successful smoking cessation in 6 months follow-up were range from 11.7% [20] to 62.2% [21] for the intervention group. In 12 months follow-up, the abstinence rate range from 13.6% [22] to 73% [25].

*Type of supporting medical staff*

The significant information is that the popularly of medical staff support the intervention was the physicians (8/17, 47.1%) and doctor (5/17, 29.4%).

*The follow-up times*

What stand out is that there were two study had the follow up time was 3 or 4 months [14, 27], while most of the studies did the follow-up time in 6 months (7/17, 41.2%) and 12 months (7/17, 41.2%).

*The predictors*

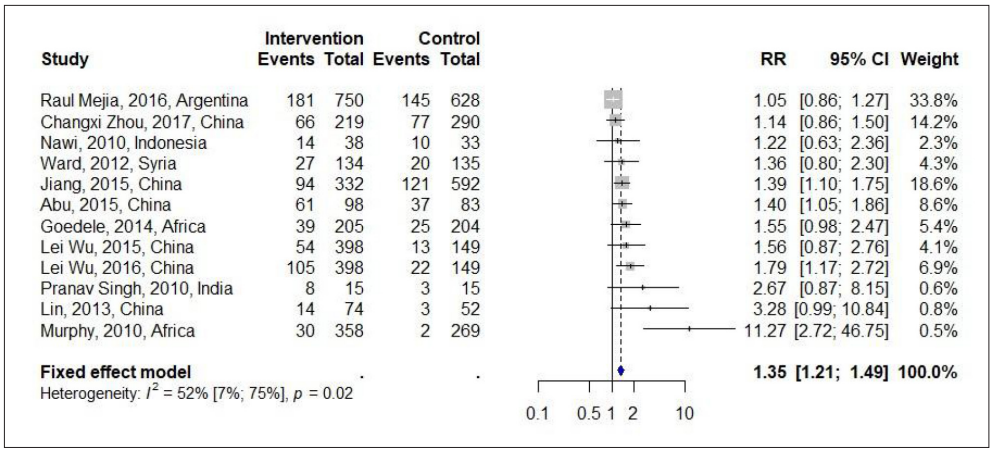
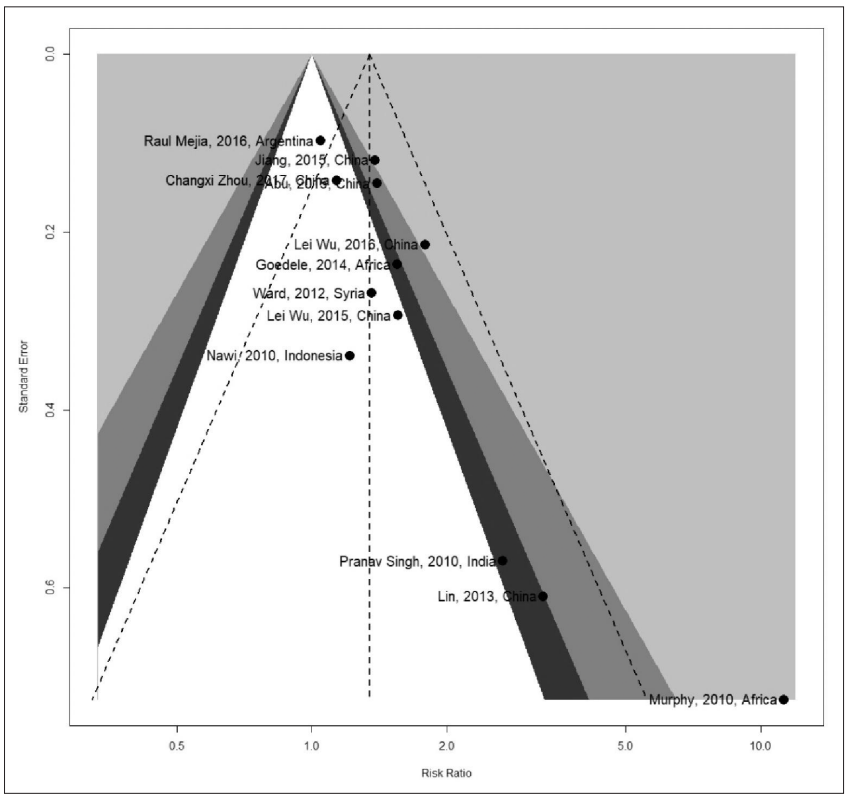



**Fig.3.** *The forest plot about the effective smoking cessation with supporting from medical staff (n = 12)*

Graph 3 insulated the information of the meta-analysis of 12 studies with the similar study results. Over all, the risk ratio witnessed the trend higher than 1, which mean most of studies prove that the supporting of medical staff had increased the effective of smoking cessation.




*t = 4.0891, df = 10, p-value = 0.002182*

**Fig.4.** *Funnel plot (n = 12)*

Alternative hypothesis: asymmetry in funnel plot
Sample estimates:
bias = 2.14702179 se.bias = 0.52506387 slope = -0.08137862
Visual inspection of the funnel plot revealed almost all has no publication bias

**Table 4.** *Meta-regression analysis between the prevalence of successful smoking cessation people among the sample size studies and predicted factor (n = 12)*

| | Estimate (β) | SE | p-value |
|---|---|---|---|
| Behavioral intervention (Yes/No) | 0.18 | 0.11 | 0.099 |
| Randomized controlled trial design study (Yes/No) | 0.12 | 0.08 | 0.161 |
| Blinding methods (Yes/No) | -0.45 | 0.23 | 0.046 |
| 6 months follow-up (Yes/No) | 0.14 | 0.12 | 0.261 |
| 12 months follow-up (Yes/No) | 0.01 | 0.12 | 0.966 |
| Study in Asian regions (Yes/No) | 0.13 | 0.11 | 0.259 |
| Baseline sample size | 0.00 | 0.00 | 0.089 |
| 7-day prevalence measure main outcome (Yes/No) | -0.5 | 0.22 | 0.026 |
| Supporting of physician (Yes/No) | 0.54 | 0.27 | 0.044 |
| Recruitment study subjects were male only (Yes/No) | -0.27 | 0.15 | 0.069 |

In general, there were 3 factors associated with the main outcome of studies: Using blinding methods, measurement the outcome by 7-day prevalence abstinent rate and supporting of physician. The using blinding methods and measurement the outcome by 7-day prevalence abstinent rate would make decrease the effective of intervention studies (Table 4).

## 4. Discussion

Over all, we had conducted the review among 6951 participation of 17 studies. Our research had point out there were 2 types of smoking cessation intervention in had been done in health facilities in LMICs (behavioral counseling; combine pharmacotherapy and counseling intervention). The most striking results to emerge from the review is that the blinding bias is the weakest control of all studies.

Following answer the key questions, what were surprise to find is the fact that supporting of physician can make a great impact for the smoking counseling successful which did not report by Akanbi (2019) [30]. One obvious reason why this finding is significant statistic is that, in LMICs, patient in hospital have to follow physician's medical order for treatment. This meant that they could be set up a following behavior in their mindset. In addition, by received the suggestion of quitting smoke from the physician, they can accept to do it is easier than taking counseling from a non-medical professional, which may not suitable.

There are, indeed, several negative predictors affected to effective of SC had been found in our review. Conducting the blinding design might make negative effect to the relationship between physician and patience because physician in LMICs often building the trust and friendly with their patients. If asking them try to ignore the effective might cause of the intervention for their patients, their might not completely agree to corporate for the SC program which might affect the outcome of the program. Another disadvantage predictor is the measure outcome by 7-day prevalence. Because of the short time predict of quitting success, it may make the study subjects caught off guard, which might relapse, with smoking. One solution for this problem is prolonging the time measure the outcome, which can combine with the effective of physician advice of

SC to maintain the quitting smoking behavior.

There are some limitations in our review. As the focus of the study was on review the intervention studies in LMICs there is a possibility there is some likelihood that dissimilar evaluations would have arisen if the focus had been on English literatures. Another downside factor regarding our methodology is about the heterogeneity of intervention studies that affected to our Meta analysis results.

One main gap in our evident is that we failed to find a link between predictors of demographic of study subjects to the smoking cessation rate but this may depend on the studies had been chosen for the review. Although performant was not ideal, we still believe that if there are more studies report the same results so there can be enough of studies for database to use the meta-analysis.

Future systematic review research needs to dominate by a large randomized controlled study conducted in LMICs with each type of intervention. The smoking population needs to clearly identify each groups of predictors of smoking cessation. Measurement the outcome should not use the 7-day prevalence as the main standards. For the comparison, it's need to be classify at least 2 groups: Had medical staff support and do not have.

## 5. Conclusions

17 studies had included for the reviewing. 12 studies had assessment to the meta-analysis. The proportion of successful smoking cessation in 6 months follow-up were range from 11.7% to 62.2% for the intervention group. In 12 months, follow-up, the abstinence rate ranges from 13.6% to 73%. The popularly of medical staff support the intervention was the physicians (8/17, 47.1%) and doctor (5/17, 29.4%). The evidence from our study suggests that the abstinence rate can be affected by the supporting of medical staff follow the SC program in low and middle-income countries.

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