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Review Article

A Literature Review of Randomized Controlled Trials on Tobacco Cessation Using Auricular Acupuncture and Auricular Acupressure

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ABSTRACT

This study aimed to analyze auricular acupressure and auricular acupuncture used in smoking cessation research by analyzing published randomized controlled trials. Eight databases (PubMed, Cochrane, EMBASE, CNKI, CiNII, KMbase, KISS, OASIS) were searched until December 2021, and 21 out of 1,919 studies met inclusion criteria. Data on the treatment site, time, frequency, period, and outcomes were analyzed. Lung (MA-IC1) and Ear Shenmen (MA-TF1) were the most used acupoints. The number of treatments varied between a minimum of 2 to a maximum of 24, and treatment duration varied between a minimum of 2 weeks to a maximum of 8 weeks. Cigarette consumption and smoking cessation rate were the most studied outcome, followed by multiple other psychological indications.

Introduction

Smoking, referring to the act of smoking tobacco, is an activity that is considered a personal preference. However, since it was confirmed that smoking causes various conditions/diseases and that smokers who quit often experience withdrawal symptoms, smoking has been recognized as a chronic condition/disease facilitated by "nicotine dependence" [1]. Smoking is a major risk factor for cancer, cardiovascular disease, and respiratory disease [2]. The direct and indirect socioeconomic cost of smoking was reported to be 185.2 billion dollars in 2012, accounting for 1.8% of global gross domestic product (data from 152 countries) [3]. The incidence of smoking in Korea has been decreasing over the last decade from 27.5% of the national population in 2010, to 20.6% in 2020 [4]. Nevertheless, smoking is the cause of 58,000 deaths yearly in Korea, and its socioeconomic cost reaches 12 trillion won each year [5].

Smoking cessation is a recommendation the world over. In Korea, various anti-smoking campaigns have been implemented, including the use of health risk warning photos, increasing tobacco tax, and strengthening regulations on cigarette advertising and promotion. In the US, an approach welcomed by patient focus groups is a source of medical care including complementary medicine together with conventional medicine [6], whereby anti-smoking acupuncture should be considered an option covered by healthcare providers.

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Quitting smoking is defined as the act of stopping smoking. Following smoke cessation, as the nicotine concentration in the body decreases, the effects of tobacco abstinence (anger, anxiety, depression, difficulty concentrating, impatience, insomnia, and restlessness) peak in the 1st week and last for 2–4 weeks [7].

In 2014, Cochrane published a systematic review related to various acupuncture therapies Among them, auricular acupuncture and auricular acupressure were determined to have the strongest effect on smoking cessation in a short period of time, however these studies were not free from bias [8].

This study reviewed anti-smoking acupuncture practices up to December 2021 by reviewing literature on auricular acupuncture and auricular acupressure.

Materials and Methods

Data sources and search strategy.

A comprehensive literature search in domestic and foreign electronic databases was conducted up to December 2021. Records from PubMed, Excerpta Medica database (EMBASE), Cochrane Library, Citation Information by NII (CiNii), China National Knowledge Infrastructure (CNKI), Korean Medical database (KMBASE), Korean Studies Information Service System (KISS) and Oriental Medicine Advanced Searching Integrated System (OASIS) were analyzed.

The search terms were "smoking," "quit," and "ear," "auricular," and "acupressure," "acupuncture" to cover the intervention methods. Depending on the characteristics of each search engine, additional languages were used. Details of the search strategy used in each electronic databases are described in Supplement 1.

Inclusion and exclusion criteria

The individuals in the study were those who wished to quit smoking, regardless of age. The intervention included stimulation of the auricular acupoints. "Auricular acupuncture" or "Ear acupuncture" describes a method in which a needle was directly inserted into the auricle and removed within a few hours, and "Auricular acupressure" or "Ear acupressure" signified acupressure where small objects such as seeds were taped to the skin to stimulate the auricle (without piercing) for more than one night.

The inclusion criteria included: (1) randomized controlled trials (RCT) in people who wanted to quit smoking; (2) a control group that included one or more of the following: a sham treatment group, a simple observation group, or an active control group; (3) auricular acupuncture or auricular acupressure adopted as an intervention method;

The exclusion criteria included: (1) literature review, case reports, observational studies, non-human experimental studies; (2) RCTs where the evaluation method was not clearly presented; (3) RCTs where the results were described inaccurately; (4) RCTs written in languages other than English, Korean, Chinese, or Japanese;

Study selection

After performing database searches, duplicate literature was excluded by two Korean medicine doctors who also performed the process of selection by assessing the titles and abstracts. Then full paper texts were assessed and in cases without an agreement, a supervisor made the final decision.

Data analysis

Analysis of the characteristics of selected studies

The studies were analyzed according to their treatment method, time, frequency, and period. Acupoints that indicated treatment sites were also included. In the treatment method, not only were the types of treatment divided into auricular acupressure and auricular acupuncture, but the accompanying treatment was also described and classified.

Analysis by outcome measures

The outcome measures of acupuncture and acupressure treatments aimed to cease smoking including the comparison between the intervention group and the control group were analyzed. Only studies with numerical outcomes were included.

Results

Study selection and description

A total of 1,919 studies were retrieved from the databases and 1,357 articles were screened after duplicates were excluded. There were 1,133 studies excluded following screening of the abstracts and 203 articles were excluded following screening of the full text. There were 21 RCTs reviewed, and of these, 16 studies were written in English, 3 studies were written in Chinese, and 2 studies were written in Korean (Fig. 1). Extracted data such as treatment

Records identified through database searching (n = 1,919)
1) PUBMED (n = 250)
2) EMBASE (n = 428)
3) CENTRAL (n = 139)
4) CiNii (n = 48)
5) CNKI (n = 687)
6) KMBASE (n = 78)
7) KISS (n = 264)
8) OASIS (n = 25)

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Records after duplicates removed (n = 1,357)

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Records screened (n = 1,357) → Total records excluded (n = 1,133)

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Full-text articles assessed for eligibility (n = 224) → Full-text articles excluded with reasons (n = 203)

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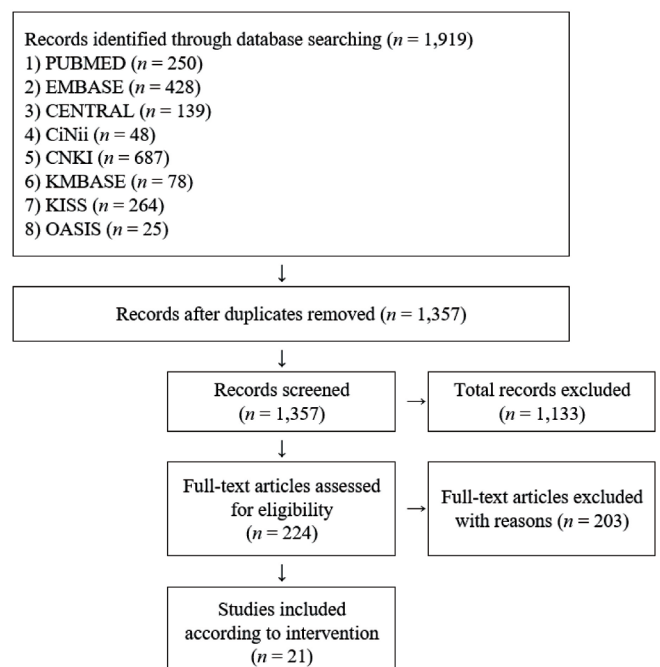Studies included according to intervention (n = 21)

Fig. 1. Study selection and exclusion flow chart.

method, time, frequency, period, sites, and outcome measures are described in Table 1 [9-29].

Treatment groups of selected studies

There were 3 cases of auricular acupuncture alone, 13 cases of auricular acupressure alone, 1 case of acupuncture and auricular acupressure combined, and 4 cases of acupuncture plus auricular acupressure with electroacupuncture. In all studies using auricular acupuncture and auricular acupressure together, auricular acupressure was applied following auricular acupuncture treatment.

Fine acupuncture needles were used for auricular acupuncture treatment. For auricular pressure, treatment tools were classified in various ways including a sterile 36-gauge 0.5-inch (0.2 × 13 mm)

Table 1. Characteristics of Selected Studies.

Author [ref] (y)	Type of study	Treatment method	Treatment site (acupoints)	Treatment time	Treatment frequency	Treatment period	Outcome measure
Silva [9] (2014)	RCT	Auricular acupressure	Ear shenmen, kidney, sympathetic, thirst	Not recorded	2 times/wk	5 wk	FTND Cigarette consumption
Kang [10] (2005)	RCT	Auricular acupressure	Ear shenmen, lung, mouth	Not recorded	Not recorded	4 wk	Smoking cessation rate Desire to Smoke
Wu [11] (2007)	RCT	Auricular acupuncture	Ear shenmen lung, mouth, sympathetic	Not recorded	1 time/wk	8 wk	Smoking cessation rate HHWQ
Lamontagne[12] (1980)	RCT	Auricular acupuncture	Lung, point zero	20 min	1 time/wk	2 wk	Smoking cessation rate
Bier [13] (2002)	RCT	Auricular acupuncture	Ear shenmen, sympathetic, lung, kidney, liver	30 min	4 times/wk	5 wk	Smoking cessation rate Effective rate
Zhang [14] (2013)	RCT	Auricular acupressure	Ear shenmen, lung, mouth, hunger, liver	3 session/d	Not recorded	8 wk	Smoking cessation rate Cigarette consumption QOL
Lee [15] 2017	RCT	Auricular acupressure	Ear shenmen, lung, subcortex, hunger, stomach, mouth	Not recorded	1 time/wk	6 wk	FTND Self efficacy for smoking cessation Cigarette consumption
Wing [16] (2010)	RCT	Auricular acupressure	Ear shenmen, lung, mouth, brain	At least 3 times/d	1 time/wk	3 wk	MPSS
Li [17] (2009)	RCT	Auricular acupressure	Ear shenmen, lung, stomach, mouth, adrenal, endocrine	2-3 min/ session, 3-5 session/d	3 times/wk	20d	Effective rate
Ayse [18] (2011)	RCT	Auricular acupressure	Not recorded	Not recorded	Not recorded	3 wk	FTND BDI Cigarette consumption
Kwon [19] (2015)	RCT	Auricular acupressure	Ear shenmen, thirst, hunger, lung, mouth, subcortex	5 d	1 time/wk	2 wk	Cigarette consumption Desire to Smoke
Machovec [20] (1978)	RCT	Auricular acupressure	Not recorded	Not recorded	Not recorded	Not recorded	Effective rate
Seok [21] (2006)	RCT	Auricular acupressure	Ear shenmen, thirst, hunger, trachea, brain	3 d (frequently press)	2 times/wk	2 wk	Cigarette consumption FTND Desire to Smoke
Li [22] (2011)	RCT	Auricular acupressure	Ear shenmen, lung, trachea, mouth	3-5 min/ session 2-3 session/d	3 times/wk	8 wk	Cigarette consumption
Chai [23] (2019)	RCT	Auricular acupressure	Ear shenmen, endocrine, subcortex sympathetic, lung, stomach	3-5 min/d	3 times/wk	8 wk	Smoking cessation rate FTND HSI
Wang [24] (2018)	RCT	Auricular acupressure	Ear shenmen, endocrine, subcortex sympathetic, lung, stomach, mouth	20 sec/1-2 h	2 times/wk	8 wk	Smoking cessation rate FTND MNWS

Table 1. (continued).

Author [ref] (y)	Type of study	Treatment method	Treatment site (acupoints)	Treatment time	Treatment frequency	Treatment period	Outcome measure
Waite [25] (1998)	RCT	EA + Auricular acupuncture + Auricular acupressure	Lung	Acupuncture: 20 min Acupressure: As long as possible (press when experience the desire to smoke)	Not recorded	Not recorded	Smoking cessation rate
Yeh [26] (2009)	RCT	EA + Auricular acupuncture + Auricular acupressure	Ear shenmen, lung, stomach, mouth, endocrine	Acupuncture: 20 min Acupressure: 1 min/session 3–5 session/d	1 time/wk	6 wk	Smoking cessation rate Cigarette consumption
Steiner [27] (1982)	RCT	Acupuncture + Auricular acupressure	Lung, mouth	not recorded	2 times/wk	2 wk	Cigarette consumption
He [28] (1997)	RCT	EA + Auricular acupuncture + Auricular acupressure	Ear shenmen, mouth, lung, trachea, hunger, endocine	Acupuncture: 20 min Acupressure: 100 press/ session 4 session/d	2 times/wk	3 wk	Cigarette consumption
He [29] (2001)	RCT	EA + Auricular acupuncture + Auricular acupressure	Lung, trachea, mouth	Acupuncture: Not recorded Acupressure: 4 session/d	2 times/wk	3 wk	Smoking cessation rate

BDI, Beck Depression Inventory; EA, Electroacupuncture; FTND, Fagerstrom Nicotine Dependence Test; HHWQ, Hughes and Hatsukami's Nicotine Withdrawal Symptom Score; HIS, Heaviness of Smoking Index; MNWS, Minnesota Nicotine Withdrawal Scale; QOL, Quality of Life; RCT, randomized controlled trials; SCL90, Symptom Checklist-90.

acupuncture needle fixed with tape, ion pellets fixed with tape, and seeds of plants (such as Semen vaccaria, and Semen sinapis albae) fixed with tape. In all studies using auricular acupressure (in which the treatment method was mentioned), alternate targeting of the left and right auricle was adopted.

In the analysis for auricular acupuncture and auricular acupressure, MA-IC1 was used the most frequently (17 studies), MA-TF1 ranked second (15 studies), and Mouth (MA-IC5) ranked third (13 studies). When auricular acupuncture and auricular acupressure were analyzed separately, MA-IC1 was used the most in both groups, followed by MA-TF1. Detailed acupuncture points used for auricular acupuncture and auricular acupressure are described in Table 2.

Classification of the number of studies through treatment points, frequency, and period

Regarding the number of acupuncture points used for treatment, 6 points were the most common (5 studies). There were 4 studies that used 4 or 5 points. The maximum number of acupoints used

Table 2. Acupoints Used for Smoking Withdrawal Symptoms Relief.

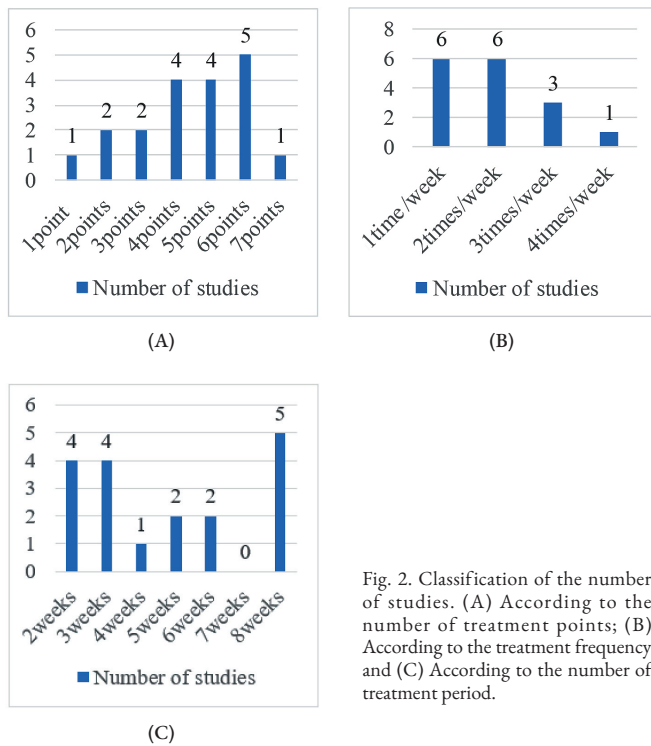| Acupoints	N
Lung	17
Ear Shenmen	15
Mouth	13
Sympathetic	5
Hunger	5
Stomach	5
Subcortex	4
Endocrine	4
Trachea	4
Thirst	3
Kidney	2
Brain	2
Liver	2
Adrenal	1
Point zero	1

(A)

(B)

(C)

Fig. 2. Classification of the number of studies. (A) According to the number of treatment points; (B) According to the treatment frequency and (C) According to the number of treatment period.

Control group and outcome domains

As a control group, sham treatment was most often used. Psychological techniques such as counseling and education, Western medicine treatments such as nicotine replacement therapy, and transcutaneous electrical nerve stimulation are were also used. Studies with an untreated group as a control group were also included (Table 3 [9-29]). The results included smoking cessation rate, cigarette consumption based on daily smoking volume, efficacy rate and psychological indicators. Psychological indicators included smoking cessation questionnaires such as Fagerstrom Nicotine Dependence Test (FTND), Hughes and Hatsukami's Nicotine Withdrawal Symptom Score (HHWQ), Heaviness of Smoking Index, and Minnesota Nicotine Withdrawal Scale were used. The Short Form Health Survey 36 was used to measure Quality of Life, the Beck Depression Inventory (BDI), a depression related questionnaire, and the Symptom Checklist-90 were employed to assess psychiatric symptoms. Among the psychological indicators, FTND was the most frequently used (6 cases). Overall, the tobacco consumption index and smoking cessation index were used most often (10 cases; Table 4).

Discussion

Smoking not only causes various conditions and diseases, but is also associated with high economic costs. Thus, global anti-smoking campaigns aim to prevent/stop people smoking. Nevertheless, many people smoke. A report released by the World Health Organization in 2020, determined that 22.3% of the world's population were smokers and 36.7% were men and 7.8% were women [30]. The main reasons why quitting smoking is difficult are due to the withdrawal symptoms experienced by the individual

was 7 and the minimum number was 1 point (Fig. 2A). As for the frequency of treatment, 6 studies used treatment once a week and 6 studies used treatment twice a week (Fig. 2B). The period of treatment was observed to be a minimum of 2 weeks and a maximum of 8 weeks. The largest proportion of studies treated for 8 weeks (5 studies; Fig. 2C).

Table 3. Comparisons and Results of Studies.

Author [ref] (y)	Intervention (n)	Comparison (n)	Outcome measure	Results (intervention vs. comparison)	p	Adverse events (intervemtion vs comparison)
Silva [9] (2014)	Auricular acupressure (21)	Sham auricular acupressure (9)	1) FTND 2) Cigarette consumption	1) 2.2 ± 1.1 vs. 2.7 ± 1.6 2) 14.3 ± 7.0 vs. 16.7 ± 4.4	1) p = 0.563 2) p = 0.114	Not recorded
Kang [10] (2005)	Auricular acupressure (159)	Sham auricular acupressure (79)	1) Smoking cessation rate 2) Desire to Smoke	1) 0.6% vs. 0% 2) 1.83 ± 0.8432 vs. 1.84 ± 0.8466	1) Not recorded 2) p = 0.1497	Not recorded
Wu [11] (2007)	Auricular acupuncture (59)	sham auricular acupuncture (59)	1) Smoking cessation rate 2) HHWQ	1) 27.1% vs. 20.3% 2) 3.0 ± 2.7 vs. 3.7 ± 3.0	1) p = 0.517 2) p = 0.03	31 vs. 44
Lamontagne [12] (1980)	Auricular acupuncture (25)	Counseling (25)	1) Smoking cessation rate	1) 29% vs. 20%	1) Not recorded	0 vs. 0
Bier [13] (2002)	Auricular acupuncture (12)	Sham auricular acupuncture + education (20)	1) Smoking cessation rate	1) 21% vs. 22.4%	1) p = 0.17	0 vs. 0
Zhang [14] (2013)	Auricular acupressure (11)	Sham auricular acupressure (8)	1) Smoking cessation rate 2) Cigarette consumption 3) QOL	1) 5% vs. 0% 2) 10.61 ± 7.56 vs. 12.32 ± 5.47 3) 48.83 ± 5.44 vs.48.05 ± 4.55	1) p = 0.635 2) p = 0.397 3) p = 0.612	1 vs. 5

Table 3. (continued).

Author [ref] (y)	Intervention (*n*)	Comparison (*n*)	Outcome measure	Results (intervention vs. comparison)	*p*	Adverse events (intervemtion vs comparison)
Lee [15] 2017	Auricular acupressure (27)	Sham auricular acupressure (26)	1) FTND 2) Self efficacy for smoking cessation 3) Cigarette consumption	1) 2.56 ± 1.97 vs. 2.46 ± 1.48 2) 5.71 ± 5.81 vs. 3.00 ± 3.51 3) 12.33 ± 5.28 vs. 17.31 ± 6.73	1) $p > 0.05$ 2) $p < 0.05$ 3) $p < 0.05$	Not recorded
Wing [16] (2010)	Auricular acupressure (38)	Sham auricular acupressure (32)	1) MPSS	1) 8.97 ± 3.06 vs. 8.93 ± 3.65	1) Not recorded	0 vs. 0
Li [17] (2009)	Auricular acupressure (69)	Sham auricular acupressure (67)	1) Effective rate	1) 76.81 vs. 32.84	1) $p < 0.01$	0 vs. 0
Ayse [18] (2011)	Auricular acupressure (24)	Sham auricular acupressure (23)	1) FTND 2) BDI 3) Cigarette consumption	1) 3.7 ± 2.9 vs. 3.9 ± 2.8 2) 6.9 ± 7.7 vs. 6.1 ± 9.0 3) 15.7 ± 9.6 vs. 12.8 ± 10.8	1) $p < 0.05$ 2) $p < 0.05$ 3) $p < 0.05$	Not recorded
Kwon [19] (2015)	Auricular acupressure (29)	Sham auricular acupressure (27)	1) Cigarette consumption 2) Desire to Smoke	1) 6.50 ± 4.78 vs. 8.15 ± 4.08 2) 2.07 ± 0.90 vs. 2.41 ± 1.02	1) $p < 0.05$ 2) $p < 0.05$	Not recorded
Machovec [20] (1978)	Auricular acupressure (12)	Sham auricular acupressure (12)	1) Effective rate	1) 66% vs. 25%	1) Not recorded	Not recorded
		Untreated (12)		1) 66% vs. 17%	1) Not recorded	
Seok [21] (2006)	Auricular acupressure (45)	Untreated (45)	1) Cigarette consumption 2) FTND 3) Desire to Smoke	1) 7.35 ± 3.03 vs. 27.53 ± 9.76 2) 3.57 ± 0.83 vs. 9.66 ± 1.08 3) 2.60 ± 0.49 vs. 4.66 ± 0.47	1) $p < 0.05$ 2) $p < 0.05$ 3) $p < 0.05$	Not recorded
Li [22] (2011)	Auricular acupressure (57)	Counseling (62)	1) Cigarette consumption	1) 30.8 ± 9.6 vs. 24.2 ± 8.6	1) $p > 0.05$	0 vs. 0
		Untreated (55)		1) 30.8 ± 9.6 vs. 20.4 ± 11.8	1) $p > 0.05$	
Chai [23] (2019)	Auricular acupressure (100)	Transcutaneous electrical nerve stimulation (100)	1) Smoking cessation rate 2) FTND 3) HSI	1) 23% vs. 19% 2) 5.82 ± 3.22 vs. 5.55 ± 3.02 3) 3.41 ± 1.84 vs. 3.33 ± 1.76	1) $p < 0.05$ 2) $p < 0.05$ 3) $p < 0.05$	0 vs. 0
		Nicotine replacement therapy (100)		1) 23% vs. 18% 2) 5.82 ± 3.22 vs.5.01 ± 3.03 3) 3.41 ± 1.84 vs. 3.01 ± 1.74	1) $p < 0.05$ 2) $p < 0.05$ 3) $p < 0.05$	
Wang [24] (2018)	Auricular acupressure (67)	Nicotine replacement therapy (70)	1) Smoking cessation rate 2) FTND 3) MNWS	1) 32.00% vs. 46.00% 2) 5.82 ± 3.22 vs. 5.55 ± 3.02 3) 8.64 ± 7.26 vs. 7.55 ± 6.70	1) Not recorded 2) $p < 0.05$ 3) $p < 0.05$	2 vs. 2
Waite [25] (1998)	EA + Auricular acupuncture + Auricular acupressure (37)	Sham EA + Sham auricular acupuncture + Sham auricular acupressure (35)	1) Smoking cessation rate	1) 12.5% vs. 0.0%	1) $p = 0.055$	8 vs. 3
Yeh [26] (2009)	EA + Auricular acupuncture + Auricular acupressure (30)	Sham EA + Sham auricular acupuncture + Sham auricular acupressure (29)	1) Smoking cessation rate 2) Cigarette consumption	1) 13.3% vs. 13.7% 2) 10.17 ± 8.28 vs. 13.41 ± 8.33	1) Not recorded 2) $p = 0.14$	Not recorded
Steiner [27] (1982)	Acupuncture + Auricular acupressure (11)	Sham acupuncture + Sham auricular acupressure (12)	1) Cigarette consumption	1) 13.9 ± 1.6 vs. 19.0 ± 2.9	1) $p < 0.001$	Not recorded

Table 3. (continued).

Author [ref] (y)	Intervention (*n*)	Comparison (*n*)	Outcome measure	Results (intervention vs. comparison)	*p*	Adverse events (intervemtion vs comparison)
He [28] (1997)	EA + Auricular acupuncture + Auricular acupressure (22)	Sham EA + Sham auricular acupuncture + Sham auricular acupressure (11)	1) Cigarette consumption	1) 12.3 ± 2.0 vs. 15.5 ± 2.8	1) *p* > 0.05	Not recorded
He [29] (2001)	EA + Auricular acupuncture + Auricular acupressure (26)	Sham EA + Sham auricular acupuncture + Sham auricular acupressure (18)	1) Smoking cessation rate	1) 30.7% vs. 0%	1) Not recorded	Not recorded

BDI, Beck Depression Inventory; EA, Electroacupuncture; FTND, Fagerstrom Nicotine Dependence Test; HHWQ, Hughes and Hatsukami's Nicotine Withdrawal Symptom Score; HIS, Heaviness of Smoking Index; MNWS, Minnesota Nicotine Withdrawal Scale; QOL, Quality of Life; RCT, randomized controlled trials; SCL90, Symptom Checklist-90

Table 4. Outcome Domains of the Studies.

Outcome domains	*N*
Psychological scale	15 [FTND (6), Desire to Smoke (3), HHWQ (1), QOL (1), MPSS (1), BDI (1), HIS (1), MNWS (1)]
Cigarette consumption	10
Smoking cessation rate	10
Effective rate	2

BDI, Beck Depression Inventory; FTND, Fagerstrom Nicotine Dependence Test; HHWQ, Hughes and Hatsukami's Nicotine Withdrawal Symptom Score; HIS, heaviness of smoking index; MNWS, Minnesota Nicotine Withdrawal Scale; MPSS, Mood and Physical Symptoms Scale; QOL, Quality of Life; SCL90, Symptom Checklist-90

and the desire to smoke because of their addiction to nicotine. To ease these withdrawal symptoms, nicotine replacement therapy (providing nicotine without using cigarettes), pharmacotherapy such as varenicline and bupropion (used to improve abstinence), and counseling are recommended [31].

In the Diagnostic and Statistical Manual of Mental Disorders, 5th edition, tobacco withdrawal criteria (for daily use of tobacco for several weeks or more) includes at least four of the following signs and symptoms: irritability, frustration, anger, anxiety, difficulty concentrating, increased appetite, restlessness, depressed mood, insomnia within 24 hours of abrupt cessation of tobacco use, or reduction in the amount of tobacco use [32]. Short-term smoking cessation has been reported to cause not only physical symptoms such as changes in systolic blood pressure, but also to induce negative mood and cognitive decline [33].

Auricular acupressure is a nonpharmacological intervention. It treats a wide range of conditions through the application of pressure to acupoints [34]. The various therapeutic effects can be delivered by pressing a specific acupuncture point in order to decrease tissue adhesion, promote relaxation and regional blood circulation, increase parasympathetic nerve activity and intramuscular temperature along with reduction in neuromuscular

excitability [35].

There are many mechanisms responsible for the effect of auricular acupuncture and auricular acupressure. In the case of relaxation, the auricular branch of the vagus nerve is stimulated during treatment, leading to an increase in parasympathetic nerve activity and modification of both autonomic and central nervous system activity [36]. The representative acupoints for relaxation are MA-TF1 and Sympathetic (MA-AH6), and auricular acupressure applied to auricular acupoints has various positive effects including improvement in quality of sleep, and reduced blood pressure [37-39]; auricular acupuncture also reduces symptoms of depression [40].

We believe the reason MA-TF1 and MA-AH6 are the most commonly used acupuncture points, besides the Lungs (MA-IC1) and MA-IC5, is because of the direct connection of these acupoints with breathing and relaxation which may be related to the treatment of the psychological symptoms associated with smoking withdrawal.

Various numerical psychological indicators were used in addition to the numbers which directly related to the amount of smoking. Among these indicators, questionnaires designed for smoking cessation such as FTND and HHWQ, and psychological indicators such as BDI and SCL-90, were used. Measuring tools related to

smoking cessation not only measure amounts of smoked cigarettes per day, but also include psychometric indicators such as nicotine dependence, craving, withdrawal symptoms, self-efficacy, and quality of sleep [41]. BDI measures symptoms of depression [42] and SCL-90 is a questionnaire that evaluates the overall level of mental health, including depression [43]. This highlights the relationship between smoking cessation and mental status.

Treatment methods specifying the acupoints, treatment time, frequency of treatments, and duration of treatment period significantly influence the efficiency of acupuncture [44]. The treatment time of each study was different, but due to the characteristic of the auricular acupressure, it is considered that treatment was continuously performed except for the replacement time. Therefore, the stability of auricular acupressure can be determined due to the fact that there were no serious side effects (even though treatment has been continuously performed during the study period of up to 8 weeks). The side effects of auricular acupuncture are similar to those of body acupuncture, and the efficacy and stability of auricular acupuncture, and auricular acupressure have been previously reported [45].

Most of the RCT studies reported that auricular acupuncture and auricular acupressure were effective compared with the control group. However, only 9 of the 21 studies showed statistical significance i.e., $p < 0.05$. One study determined that nicotine replacement therapy was more effective than auricular acupressure [24], and one study reported that auricular acupressure was more effective than transcutaneous electrical nerve stimulation but less effective than nicotine replacement therapy [23].

This study has several limitations. Firstly, the risk of bias of the RCTs included in this review was not assessed. Secondly, due to linguistic limitations, the databases used were limited to English, Chinese, and Korean studies. Finally, we did not conduct quality evaluation to determine the level of the selected literature.

Conclusion

In the 21 RCT studies reviewed, many authors were aware of the importance of psychological aspects of smoking cessation treatment, and to treat tobacco withdrawal symptoms more studies used auricular acupressure than auricular acupuncture on auricular acupoints, and electronic acupuncture was typically an additional intervention. Auricular acupoints were mainly selected from two categories: directly related to breathing, such as MA-IC1, MA-IC5 and Trachea (MA-IC2), and related to mental health, such as Ear Shenmen (MA-TF1) and MA-AH6. The number of treatments varied between 2 and 24, and the treatment duration ranged from 2 weeks to 8 weeks. Cigarette consumption and smoking cessation rate were the most commonly used outcomes, but other psychological indicators were also assessed using scales such as FTND, HHWQ, QOL, MPSS, and BDI.

Author Contributions

Conceptualization: MGJ. Methodology: MGJ. Formal investigation: SL and DL. Data analysis: MJK, SYC, WSS, JHK and BG. Writing original draft: MGJ. Writing – review and editing: YCP, YHB, SSN and BKS.

Conflicts of Interest

There are no conflicts of interest regarding the publication of this manuscript.

Ethical Statement

This research did not involve any human or animal experiments.

Data Availability

All relevant data are included in this manuscript.

Supplementary Material

Supplementary material is available at https://doi.org/10.13045/jar.2022.00185.

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