Indonesian Journal of Medicine (2024), 09(02): 105-117
Masters Program in Public Health, Universitas Sebelas Maret

Research
Open Access

Effectiveness of Acupuncture on the Quality of Life in Allergic Rhinitis Patients: Meta Analysis

I Gusti Bagus Panji Widiatmaja[1)], Setyo Sri Raharjo[2)], Vitri Widyaningsih[2)]

[1)]Master's Program in Public Health, Universitas Sebelas Maret
[2)]Faculty of Medicine, Universitas Sebelas Maret

ABSTRACT

Background: Allergic rhinitis (AR) is one of the most common health problems experienced by people around the world. WHO ARIA defines allergic rhinitis as a disorder of the nose accompanied by symptoms of sneezing, runny nose, itching, and nasal congestion e after the nasal mucosa is exposed to allergens mediated by immunoglobulin E (IgE). Many studies have proven the impact of acupuncture on the immune system. This study aims to examine and estimate the effectiveness of acupuncture therapy for allergic rhinitis patients based on the results of previous similar studies.
Subject and Method: This study is a systematic review and meta-analysis, with PICO as the following Population: allergic rhinitis patients. Intervention: acupuncture therapy. Comparison: sham/placebo acupuncture. Outcome: quality of life. The articles used in this study were obtained from several databases including Google Scholar, MEDLINE/PubMed, Science Direct, Hindawi, Europe PMC and Springer Link. These articles were collected for 1 month. The keywords to search for articles are as follows: "acupuncture for allergic rhinitis" OR "acupuncture for seasonal allergic rhinitis" OR "acupuncture for parenial allergic rhinitis" AND "quality of life" AND "randomized controlled trial". The article included in this study were a full text article with a randomized controlled trial (RCT) study design. Quality of life was measured using the Rhinitis Quality of Life Questionnaire (RQLQ). Meta analysis was written using PRISMA flow diagram and analyzed using Review Manager 5.4.
Result: A total of 9 RCT articles with a sample size of 2542 from Germany, Queensland, Victoria, China, and Korea were reviewed in this meta-analysis study. The results of data processing using the RevMan 5.4 application showed the effect of acupuncture therapy on the quality of life of allergic rhinitis patients. Acupuncture was able to lower RQLQ scores (improve quality of life), although it was not statistically significant. Allergic rhinitis patients who obtained acupuncture on average had a quality of life with an RQLQ score of 0.17 units, it was better than those getting sham acupuncture (SMD = -0.17; CI 95% = -0.40 to 0.05; p = 0.120).
Conclusion: There is an effect of acupuncture on the quality of life of allergic rhinitis patients.

Keywords: acupuncture, allergic rhinitis, quality of life, randomized controlled trial

Correspondence:
I Gusti Bagus Panji Widiatmaja. Master's Program in Public Health, Universitas Sebelas Maret. Jl. Ir. Sutami 36A, Surakarta 57126, Central Java, Indonesia. Email: guspanji13@gmail.com. Mobile: 082225074445.

Cite this as:
Widiatmaja IGBP, Raharjo SS, Widyaningsih V (2024). Effectiveness of Acupuncture on the Quality of Life in Allergic Rhinitis Patients: Meta Analysis. Indones J Med. 09(02): 105-117. https://doi.org/10.26911/theijmed.-2023.09.01.13.

© I Gusti Bagus Panji Widiatmaja. Published by Master's Program of Public Health, Universitas Sebelas Maret, Surakarta. Maret, Surakarta. This open-access article is distributed under the terms of the Creative Commons Attribution 4.0 International (CC BY 4.0). Re-use is permitted for any purpose, provided attribution is given to the author and the source is cited.

BACKGROUND

Allergic rhinitis (RA) is one of the most common health problems experienced by people around the world. *The World Health Organization Allergic Rhinitis and Its Impact on Asthma* (WHO ARIA) defines allergic rhinitis as a disorder of the nose accompanied by symptoms of sneezing, runny nose, itching, and nasal congestion after the nasal mucosa is exposed to allergens mediated by immunoglobulin E (IgE) (Soepardi, 2012; Bosquet, 2017). This disease is characterized by a condition of inflammation of the nasal mucosa due to hypersensitivity response mediated by immunoglobulin E (IgE), then triggered by exposure to inhalant allergens that cause nasal symptomatic disorders. Typical inhalant allergens that can cause allergic rhinitis include mites, house dust, flower pollen, grass, pet hair, and sometimes mold (Keith *et al.,* 2012).

Based on the classification, allergic rhinitis can occur seasonally or chronically, then based on the duration of the attack of allergic rhinitis is divided into *intermittent* or *persistent*, while the severity is divided into mild, moderate and severe. Allergic rhinitis is often associated with comorbid conditions such as atopic dermatitis, food allergies, nasal polyps and asthma (Bosquet, 2017). Exposure to allergens causes allergic symptoms of rhinitis, including sneezing, nasal pruritus, upper airway obstruction, rhinorhea, and itchy and watery eyes. If this condition is allowed to continue, it will have a significant impact on the quality of life of sufferers, such as sleep disorders, fatigue, depressed mood, work productivity, and cause disruption to children's teaching and learning process at school (Wallace *et al.*, 2008; Keith *et al.*, 2012). Allergic rhinitis is part of a systemic inflammatory process associated with other inflammatory conditions, including asthma, rhinosinusitis, and conjunctivitis. Most asthma patients (both allergic and non-allergic) also have rhinitis, while 10% to 40% of patients with allergic rhinitis have asthmatic comorbidities (Cruz *et al.*, 2007).

Allergic rhinitis has become a global health problem affecting up to 40% of the world's population (Singh, 2010; Abdulrahman, 2012). According to epidemiological study findings, allergic rhinitis cases affect 10% to 30% of Americans, which is about 60 million people, and can result in 3.5 million days of lost working productivity and 2 million days of school absences each year. The prevalence of allergic rhinitis in adults in Europe has been confirmed to range from 17% to 28.5%. Recent study has also shown that the prevalence of allergic rhinitis has increased particularly in countries where the prevalence was initially low (Garbo, 2013; Bosquet, 2017; Linton *et a.l*, 2021). It is reported that the prevalence of people suffering from allergic rhinitis in Thailand is around 20%, in China around 11.1-17.6%, in Japan around 10% and in New Zealand around 25% (Ariza, 2017; Zheng *et al.*, 2018). In Indonesia alone the prevalence of allergic rhinitis reaches 40% in children, 10-30% in adults, and allergic rhinitis often found in the age range of 15-30 years (Bosquet, 2017).

Allergic rhinitis is a global health problem that has a negative impact on the quality of life of the sufferers, especially in terms of considerable economic and social burdens. Negative impacts occur due to hospital visits and prolonged use of drugs. Long-term use of the drug can also cause side effects for people with allergic rhinitis. About 40% of the world's population is atopic, and allergic rhinitis is the most common of these atopic tendencies. The reported incidence of allergic rhinitis in western countries is 1.4-39.7%. Indirect costs due to allergic rhinitis are related to

absenteeism or result in employer losses that exceed costs for other common conditions such as migraines, diabetes, and asthma (Bousquet *et al.*, 2006; Ramírez & Jiménez *et al.*, 2012).

Management of allergic rhintis according to ASCIA (*Australasian Society of Clinical Immunology and Allergic*) can be conducted in several ways, namely avoiding contact with allergens and other triggering factors, pharmacological therapy, non-pharmacological therapy, immune therapy and desensitization (Simoens, 2012; Seedat, 2013). As is well known, pharmacological therapy is only given for rapid symptom reduction of perennial allergic rhinitis (PAR) and becomes less effective when repeatedly used in the long-term due to the development of tolerance to the drug. One type of pharmacological treatment includes antihistamine drugs that can overcome symptoms of sneezing, itching in the nose, but is less effective for treating symptoms such as nasal congestion (Seedat, 2013; Curin et al., 2018).

Acupuncture is one of the non-pharmacological therapies originating in China. Acupuncture is a component of Traditional Chinese Medicine (TCM) which in its early history was believed to be a medical science that worked based on the principle of redistribution of *Qi* or life energy. In TCM, illness is defined as an imbalance of Qi flow or a result of poor Qi. Acupuncture has long been used in TCM to treat allergic rhinitis and study on this treatment has shown mixed results. However, most frequent studies have only shown the clinical benefits of acupuncture against allergic rhinitis in simple terms (Choi *et al.*, 2013; Shiue *et al.*, 2016). A study in China has shown that acupuncture relieves the symptoms of perennial allergic rhinitis and improves the quality of life of sufferers. Thus, acupuncture can be a reasonable option for patients with relatively mild symptoms of allergic rhinitis who wish to minimize the use of medications and consider the cost of acupuncture therapy relatively acceptable (Feng *et al.*, 2015; Seidman *et al.*, 2015)

Several studies to prove the effectiveness of acupuncture against allergic rhinitis have previously been widely reported, one of which is a study conducted by Xue *et al* (2015), In the study, it was proven the significant effect of acupuncture therapy on reducing *Total Nasal Symtom Score* (TNSS) with a lasting effect. The study appears to be the most clinically significant finding. Consistent with these findings, acupuncture has been reported to be beneficial in a number of previous studies on allergic rhinitis including studies in children with perennial allergic rhinitis (PAR).

The data obtained in this study will be analyzed by systematic review and meta-analysis. Systematic review is a systematic review technique to synthesize findings from previous primary research. While meta-analysis is an epidemiological research design to systematically assess previous research and integrate the findings obtained to obtain quantitative conclusions. Both systematic review and meta-analysis are carried out as an effort to obtain comprehensive results by synthesizing the results of primary studies involving a large number of samples. Thus, this study was conducted to determine how effective acupuncture therapy is for allergic rhinitis patients compared to sham acupuncture (sham / placebo acupuncture).

SUBJECT AND METHOD

1. Study Design

Study data were obtained from several databases, including: MEDLINE / PubMed, Science Direct, Google Scholar, Hindawi,

Springer Link, BMC, Europe PMC. The search for literature used search keywords: "acupuncture for allergic rhinitis" OR "acupuncture for seasonal allergic rhinitis" OR "acupuncture for parenial allergic rhinitis" AND "quality of life" AND "randomized controlled trial".

2. Steps of Meta Analysis

The meta-analysis was conducted in 5 steps as follows:

1) Formulating study questions in PICO format (Population, Intervention, Control / Comparions, Outcome)
2) Searching for primary study articles from various electronic and non-electronic data such as PubMed, Google Scholar, Science Direct, SCOPUS and so on
3) Conducting screening to determine inclusion and exclusion criteria and conduct critical assessment
4) Extracting data from the main study and estimating the magnitude of the effect using the Revman 5.4 application
5) Interpreting the results and draw conclusions.

3. Inclusion Criteria

This study has inclusion criteria, including: Full paper article with Randomized Control Trial (RCT) study design, with a Mean value, and Standard Deviation (SD), The subjects in the study are patients with Allergic Rhinitis .

4. Exclusion Criteria

This study has exclusion criteria, including: RCT study using acupressure, herbs, moxibustion and transcutaneous electrical acupoint stimulation in the experimental group.

5. Operational Definition of Variables

The formulation of the study problem was conducted by considering the criteria - defined by using PICO, namely, Population: patients with allergic rhinitis , Intervention: Acupuncture therapy, Comparison: Sham / Placebo Acupuncture and Outcome: Quality of Life (RQLQ)

Acupuncture Intervention by inserting special needles (filiform needle) at acupuncture points (acupoints).

Sham or placebo acupuncture Intervention by piercing acupuncture needles but inserted superficially so as not to hit acupuncture points or use different acupuncture points, where these points tend not to have much different functions and uses.

The RQLQ score is a patient's condition based on the symptoms of allergic rhinitis that arise so that it can measure the patient's quality of life (QoL) level.

6. Study Instruments

The assessment of the quality of study articles was carried out using the Critical Appraisal Checklist for Case Control published by CEBM University of Oxford2014.

***7.* Data Analysis**

This study used the Review Manager application (RevMan 5.4) for data analysis. The data were analyzed based on variations across studies by determining the use of random effect analysis models. This study used I^2 to quantify dispersion. The results of data analysis are in the form of effect size values of study heterogeneity which later the results of the data that have been analyzed are interpetted in the form of a forest plot and a funnel plot.

RESULT

Primary studies related to the effect of acupuncture on allergic rhinitis in this study consisted of 9 articles from 3 continents, namely, 2 studies from the Australia, 4 from the Asia, and 3 studies from the Europe.

Article search was conducted using databases, based on PRISMA flow diagram that can be seen in Figure 1. Assessment of study quality was conducted qualitatively and quantitatively. The assessment of study quality using Critical Appraisal Checklist for

Case Control Study). In Table 1, each of the 12 questions is answered with answer choice: Yes with value of 1 and No with a value of 0. Following the quality assessment of the study, a total of 9 articles included in the quantitative synthesis process of the meta-analysis were analyzed using RevMan 5.4

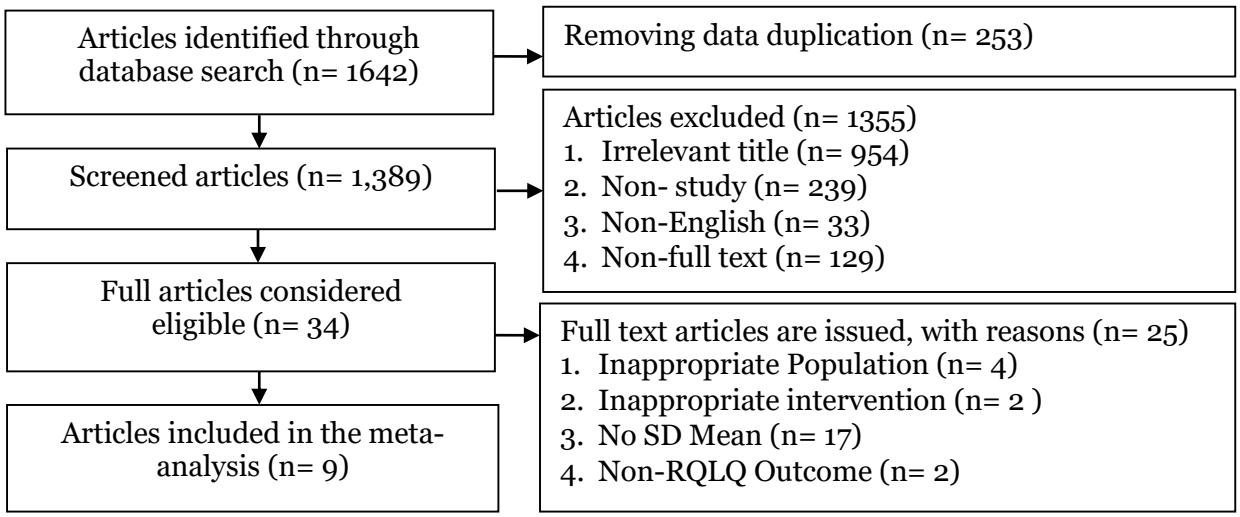

Figure 1. PRISMA flow diagram

Figure 2. Map of the Study Area

Table 1. Study Quality Assessment (Critical Appraisal)

Author (Year)	Question Criteria												Total
	1	2	3	4	5	6	7	8	9	10	11	12	
Adam et al. (2018)	1	1	1	1	1	1	1	1	1	1	1	1	12
Brinkhaus et al. (2008)	1	1	1	1	1	1	1	1	1	1	1	1	12
Brinkhaus et al. (2013)	1	1	1	1	1	1	1	1	1	1	1	1	12
Choi et al. (2012)	1	1	1	1	1	1	1	1	1	0	1	1	11
Li et al. (2016)	1	1	1	1	0	1	1	1	1	1	1	1	11
Mcdonald et al. (2016)	1	1	1	1	1	1	1	1	1	1	1	1	12
Mi et al. (2018)	1	1	1	1	1	1	1	1	1	1	1	1	12
Ortiz et al. (2018)	1	1	1	1	0	1	1	1	1	1	1	1	11
Xue et al. (2015)	1	1	1	1	0	1	1	1	1	1	1	1	11

Description of the question criteria:

1 = Are the issues discussed in the study clearly focused?
2 = Is RCT study method appropriate to answer research questions?
3 = Is sampling for experimental and control groups randomized?
4 = Are inclusion and exclusion criteria used?
5 = Are there enough study subjects to establish that the findings did not happen by chance?
6 = Whether the two groups could be compared at the start of the study??
7 = Whether objective and unbiased outcome criteria are used?
8 = Were objective actions or study subjects applying a 'blinding' system to which interventions were being obtained? Studies are ideal when using 'double blinded'?
9 = Is the effect size practically relevant?
10 = How accurate is the effect estimate? Is there a confident interval (CI)?
11 = Could there be a confounding factor that has not been taken into account?
12 = Are the results applicable to your study?

Description of the answer score:

0 = No
1 = Yes

Table 2. Summary of randomized controlled trial (RCT) primary study articles with each PICO (N=2,542)

Author (Year)	Country	Sample Size	P (Population)	I (Intervention)	C (Comparison)	O (Outcome)
Adam et al. (2018)	Germany	308	People aged 16-45 in Berlin (Female: 193, Male: 115)	Acupuncture Therapy with points LI 4, LI 11, LI 20, EXHN 3	Sham Acupuncture	RQLQ scores were measured at week 8
Brinkhaus et al. (2008)	Germany	981	Health Insurance Patients > 18 years	Acupuncture Therapy as per differentiation syndrome	Sham Acupuncture	RQLQ score, QoL (SF-36), clinical improvement, adverse events measured at 3rd month
Brinkhaus et al. (2013)	Germany	314	Patients recruited by doctors from an experimental center in Freiburg, Germany aged 16-45 years (Female: 195, Male: 119)	Acupuncture Therapy on points LI 4, LI 11, LI 20, EX-HN 3, EX-HN 8, GB 20, LV 3, ST 36, SP 6, BL 13	Sham Acupuncture	RQLQ and RMS scores were measured at week 16
Choi et al. (2012)	China and Korea	188	Moderate to severe allergic rhinitis patients aged > 18 years (Female: 119, Male: 69)	Acupuncture Therapy on points LI 4, LI 20, ST 2, ST 36, EX-1, GV 23	Sham Acupuncture: needles were inserted at non-acupuncture points that were 1–1.5 cm away from the acupoints	RQLQ, TNSS scores measured at week 4

Author (Year)	Country	Sample Size	P (Population)	I (Intervention)	C (Comparison)	O (Outcome)
Li et al. (2016)	Queen sland	73	Patients aged 18-45 years in Australia	Acupuncture Therapy on points EX-HN 3, LI 20, LI 4, ST 36, GV 23	Sham Acupuncture	RQLQ score, Serum immu-nological indi-cators; iTNSS measured at week 12
Mcdonald et al. (2016)	China	61	Patients suffering from allergic rhinitis selected from the ENT Department aged 18-65 years	Acupuncture therapy corresponds to the differentiation of the syndrome with the sensation of De qi	Sham Acupuncture	RQLQ, TNSS, QoL scores were measured at week 12
Mi et al. (2018)	Germany	314	Allergic rhinitis patients aged 16–45 years	Acupuncture Therapy on points LI 4, LI 11, LI 20, EX-HN 3, LU 7, ST 36	Sham Acupunc-ture, Check up, Setirizin Dihydro-chloride	RQLQ, RMS, QoL (SF-36) scores were measured at week 52
Ortiz et al. (2018)	Victoria	175	Adults between the ages of 18-70 in Melbourne	Acupuncture Therapy on points LI 20, EX-HN 3, GB 20, LU 9	Sham Acupuncture	RQLQ scores measured at week 4
Xue et al. (2015)	China	128	Patients aged 18-70 years in Chengdu University hospitals and campuses	Acupuncture Therapy on points LI 20, EX-HN 3, LI 4, ST 36, LI 11	Sham Acupuncture	RQLQ, VAS scores measured at week 8

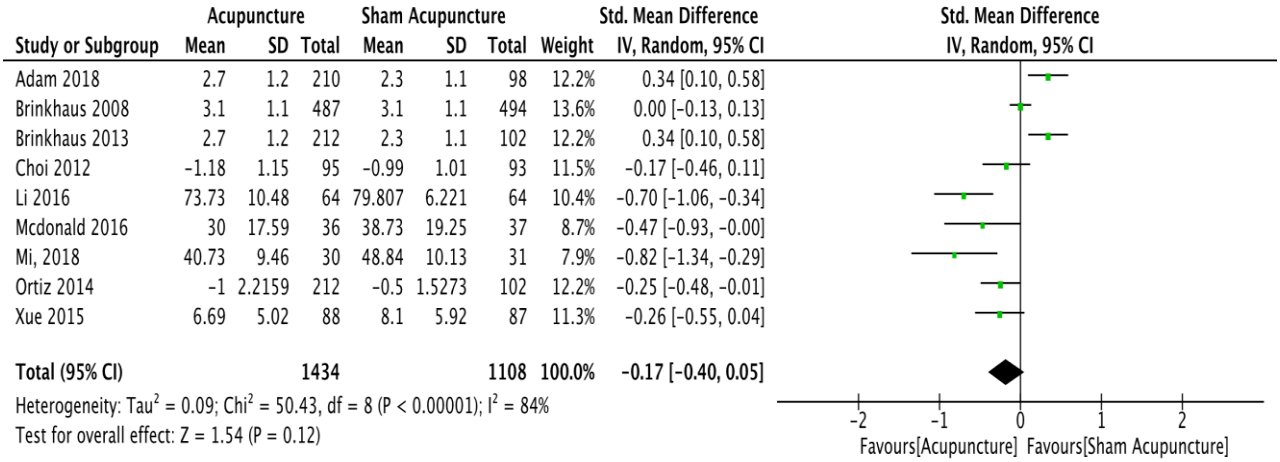

Figure 2. Forest plot of the effectiveness of acupuncture therapy toward quality of life

Forest plot in Figure 2 shows the effect of acupuncture therapy on the quality of life of allergic rhinitis patients. Acupuncture was able to lower RQLQ scores (improve quality of life), although it was not statistically significant. Allergic rhinitis patients who received acupuncture on average had a quality of life with an RQLQ score of 0.17 units better than those whos were getting sham acupuncture or sham acupuncture

(SMD = -0.17; 95% CI = -0.40 to 0.05; p = 0.120).

The forest plot also showed a high heterogeneity of effect estimates (I^2= 84%; p<0.001). Thus, the calculation of the average effect estimation was carried out with a random effect model approach.

.

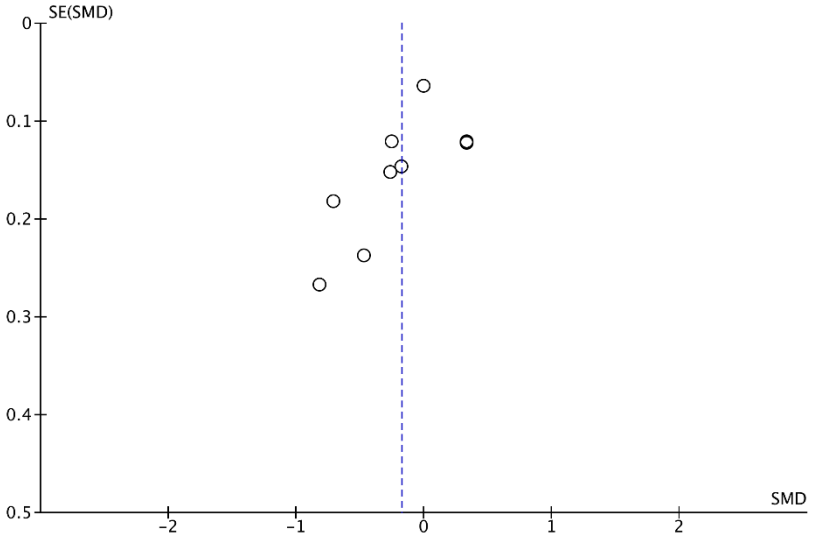

Figure 3. Funnel plot of effectiveness of acupuncture therapy on quality of life

The funnel plot in Figure 3 shows a distribution of more effect estimates on the left than on the right of the average estimates vertical line. Thus the funnel plot shows publication bias. Because the effect distribution for primary studies with a small sample in the funnel plot is located to the left of the average vertical line that is the same as the diamond shape in the forest plot which is also to the left of the vertical line of hypothesis 0, the publication bias tended to overestimate the effect.

DISCUSSION

Allergic rhinitis (RA) is a nasal symptomatic disorder induced after exposure to allergens characterized by symptoms of nasal congestion, sneezing, and itching. By type, allergic rhinitis is divided into intermittent and persistent, each of which has a prevalence ranging from 1% to 40% and 1% to 13% worldwide (Ozdoganoglu and Songu, 2012). In the case of allergic rhinitis, there is degranulation of IgE-mediated mast cells and the release of mediators, then causes a very rapid response and results in the person sneezing, itching of the palate, nasal congestion, runny nose, and may be associated with symptoms in the eyes such as itchy eyes, redness, watery eyes, and burning sensation. Inflammatory reactions with eosinophilic infiltration may occur at a later stage. Thus the symptoms inflicted by allergic rhinitis can affect a person's quality of life (Meltzer, 2016).

The main method of treatment of allergic rhinitis relies heavily on pharmacological treatment. The most commonly used drugs include corticosteroids, anti-histamine, mast cell stabilizers, and other types of drugs. This pharmacological treatment can temporarily relieve the symptoms of disorders of the nose, but it cannot completely cure allergic rhinitis. In addition,

the use of drugs has shown tremendous side effects such as drowsiness, dry mouth, and heart toxicity, one of which is caused by antihistamine drugs (Lehman et al., 2010). In addition to pharmacological treatment, there are other treatments that may be effective in the treatment of allergic rhinitis.

One of the non-pharmacological treatments used as a treatment of allergic rhinitis is acupuncture therapy. Acupuncture was developed from the science of Traditional Chinese Medicine (TCM) since 5000 years ago until today. This technique utilizes acupuncture points to stimulate meridian pathways that correspond to the body's energy flow. Acupuncture can also balance Yin and Yang yang which can improve a person's physical quality with high efficiency. It is reported from previous studies that acupuncture therapy is used by about 18% of allergic rhinitis patients (Chen, 2015; Feng et al., 2015).

This study is a systematic review and meta-analysis study that takes the topic of the effectiveness of acupuncture therapy on the sleep quality of allergic rhinitis patients. The independent variable analyzed was acupuncture therapy, while the dependent variable analyzed was the sleep quality of allergic rhinitis patients. The control group in the acupuncture study typically used placebo procedures, such as shallow needling and sham acupuncture/sham acupuncture that still provided therapeutic effects even though the effects are not as good as those shown by the original acupuncture therapy group. Therefore, this study used sham acupuncture for the control group. (Lund & Lundeberg, 2006).

This systematic review and meta-analysis study used studies that has controlled confounding factors, it can be seen from the inclusion criteria in this study which include the results of study in the form of the number of study subjects, mean value and standard deviation (SD) value. Confounding factor is an unavoidable factor in ra study, however it can be controlled. Confounding factors affecting the associations or effects of exposure to the incidence of a disease estimatedby the study is not the same as the associations or effects that actually occur in the target population, in other words, the results of the study are invalid (Murti, 2018).

The results of this systematic review and meta-analysis are presented in the form of forest plot and funnel plot. Forest plot display information from each study studied in a meta-analysis and estimates of overall study outcomes. Forest plots visually show the size of variation (heterogeneity) across study results (Murti, 2018). Funnel plot is a diagram in a meta-analysis used to demonstrate the possibility of publication bias, including: (1) Showing the association between the effect size of the study and the sample size or standard error of the effect size of the various studies studied; (2) Visually show the size of variation (heterogeneity); (3) Shows the association between the effect size of the study and the sample size of the various studies studied, which can be measured in different ways (Murti, 2018).

This study was conducted with the aim of increasing the generalization of findings and obtaining convincing conclusions from various similar study results regarding the effectiveness of acupuncture therapy on the sleep quality of allergic rhinitis patients. There were a total of 9 articles that had passed the screening stage through inclusion and exclusion criteria from a number of primary studies from 3 continents, including the Europe (4 studies in Germany), the Asia (2 studies in China and 1 study in Korea) and Australia (1 study in Queensland and 1 study in Victoria) which were then included in this systematic review

and meta-analysis. Subsequently, the number of study subjects, mean value and standard deviation (SD) value were combined and processed using the RevMan 5.4 application using the continuous method to analyze the standard mean difference (SMD).

The results of meta-analysis data processing using the RevMan 5.4 application of 9 primary randomized controlled trial (RCT) studies were used as a source of systematic review study and meta-analysis of the effectiveness of acupuncture therapy on the quality of life of allergic rhinitis patients. The total sample obtained from the 9 articles was 2542 samples, with the lowest sample range of 61 to the highest of 981. The age range of this study sample was at the age of 16-70 years. The results showed that there was an effect of acupuncture therapy on the quality of life of allergic rhinitis patients. Acupuncture therapy was able to lower RQLQ scores (improve quality of life), although it was not statistically significant. Allergic rhinitis patients who received acupuncture on average had a quality of life with an RQLQ score of 0.17 units better than those getting sham acupuncture (SMD = -0.17; CI 95%= -0.40 to 0.05; p= 0.120).

Based on the forest plot in Figure 2, it is discovered that 6 out of 9 studies studied showed the effect of acupuncture therapy on the quality of life of allergic rhinitis patients, although the final results of Revman 5.4 data processing showed results that were not statistically significant. Liu (2015) explained that acupuncture therapy affects allergic rhinitis patients. The mechanism of the therapeutic effects of acupuncture is also becoming clearer over time. Stimulation of acupuncture points can reduce immunoglobulins, regulate Th1/Th2 levels, inhibit the release of inflammatory mediators, and reduce inflammatory neuropeptides. So based on these mechanisms, acupuncture is considered to have a positive effect on allergic rhinitis patients.

In another study conducted by Zhang et al. (2020), the akupunctur is used to stimulate the ganglion sphenopalatina with the aim of regulating the balance between sympathetic and parasympathetic functions. The mechanism of action of sphenopalatina ganglion acupuncture in the treatment of allergic rhinitis includes 1) stimulation of sympathetic nerve fibers in the ganglion distribution area which causes narrowing of blood vessels, reduced blood flow to the nasal mucosa, reduced secretory glands, dilation of nasal passages, and reduced conca, thereby increasing ventilation and improving the symptoms caused by allergic rhinitis, (2) stimulating autonomic control of the central nervous which then stimulates bilateral nerves, thereby simultaneously regulating the bilateral nasal mucosa.

Based on the results of previous studies, acupuncture therapy is considered to have an effect on allergic rhinitis through several mechanisms of action. However, these results are inversely proportional to the results of this meta-analysis study. The final results of Revman 5.4 data processing in this study showed results that were not statistically significant. Adam et al. (2018) suggests that one of the causes of the study results that were not statistically significant was the patient's expectation and suggestion of the effects of acupuncture therapy. There may be insignificant differences between the acupuncture and sham acupuncture groups. This can be caused because the patient does not know the therapy given is real or fake acupuncture therapy (sham acupuncture).

This study found that the effect of acupuncture therapy on the quality of life of allergic rhinitis patients with a relatively small effect size. Adam et al. (2018) also elaborates that is is also possible that the group obtained sham acupuncture therapy

had higher expectations and suggestions for the intervention than the original acupuncture group, so that the effect of therapy in the sham acupuncture group also had almost equal or even higher significance than the original acupuncture group. In addition, another cause that can explain this is the size of the effect size of each primary study studied is very small in providing influence. The number of relevant primary study articles in the database that passed the screening stage of inclusion and exclusion criteria in this study was also still very limited (only 9 similar articles were found), so it was very influential on the final results of the study.

Currently, the main treatment of allergic rhinitis in clinical practice is the use of antihistamines and topical glucocorticoids intranasally in the nose. Application of Topical glucocorticoids topical intranasal is the treatment of choice for moderate and severe allergic rhinitis. Long-term use of glucocorticoids can cause dry nose, epistaxis, and other complications, and their incidence can reach 20%. In addition, drug therapy is not effective for some patients with moderate to severe allergic rhinitis (Seidman et al., 2015).

Pharmacological therapy has a good effect in improving the symptoms caused by allergic rhinitis, but the condition of allergic rhinitis is easy to recur and the side effects of drugs are relatively large. Therefore, non-pharmacological interventions such as acupuncture is obsulutely necessary to be promoted to relieve clinical symptoms and reduce the risk of side effects in rhinitis patients. Acupuncture can modulate the immune system and has been proposed as a useful complementary treatment for allergic rhinitis patients. Although the mechanism of action of acupuncture therapy against allergic rhinitis is not entirely clear at this time, the results of clinical studies show that acupuncture therapy has an effect comparable to treatment in patients with moderate to severe allergic rhinitis, and is safe without significant side effects. Currently, acupuncture acts as a complementary therapy in cases of allergic rhinitis, so the effect generated may not be as large as pharmacological therapy (Tan et al., 2012).

The results of this study also showed the existence of publication bias. The cause of publication bias was in highly variable sample size studies. The funnel plot shows publication bias. Because the effect distribution for primary studies with a small sample in the funnel plot lies to the left of the same average vertical line as the diamond shape of the forest plot which is also to the left of the vertical line of hypothesis 0, the publication bias tended to overestimate.

FUNDING AND SPONSORSHIP

This was no external funds.

AUTHOR CONTRIBUTION

I Gusti Bagus Panji Widiatmaja was the main researcher who selected topics, searched and collected study data. Setyo Raharjo and Vitri Widyaningsih analyzed the data and reviewed study documents.

CONFLICT OF INTEREST

There was no conflict of interest.

ACKNOLEDMENT

Researchers would like to send their gratitudes to all parties who have helped prepare this article and to database providers Google Scholar, MEDLINE / PubMed, Science Direct, Hindawi, Europe PMC and Springer Link.

REFERENCE

Abdulrahman H, Hadi U, Tarraf H, Gharagozlou M, Kamel M, Soliman A,

Hamad WA, et al. (2012). Nasal allergies in the Middle Eastern population: results from the "allergies in Middle East survey". Am J Rhinol Allergy. 26(6): S3–S23. http://dx.doi.org/10.-2500/ajra.2012.26.3836).

Adam D, Grabenhenrich L, Ortiz M, Binting S, Reinhold T, Brinkhaus B. (2018). Impact of acupuncture on antihistamine use in patients suffering seasonal allergic rhinitis: secondary analysis of results from a randomised controlled trial. Acupunct Med.36(3):139-145. doi: 10.1136/acupmed-2017-011382.

Astuti YW, Murti B, Prasetya H (2023). Meta analysis: Effectiveness of electroacupuncture in reducing anxiety and depression. Indones J Med. 08(03): 295-309. https://doi.org/10.26911/-theijmed.2023.08.- 03.07.

Bousquet J, Cauwenberge P, Khaled N (2006). Pharmacologic and anti-IgE treatment of allergic rhinitis ARIA update (in collaboration with GA2-LEN) Allergy. 61: 1086–1096. doi: 10.-1111/j.139899 95.2006.01144.x.

Chen S, Wang J, Bai P, Zhao Q, Tan C, Wang B, Zhang J, Zhao J (2015). Moderate and severe persistent allergic rhinitis treated with acupuncture: a randomized controlled trial. Zhongguo Zhen Jiu. 35(12):1209–13.

Choi SM, Park JE, Li SS. (2013). A multicenter, randomized, controlled trial testing the effect of acupuncture on allergic rhinitis: comment. Deutsche Zeitschrift fur Akupunktur. 56(4):33–4. https://doi.org/10.1111/all.12053.

Cruz AA, Popov T, Pawankar R. (2007). Common characteristics of upper and lower airways in rhinitis and asthma. ARIA update, in collaboration with GA(2)LEN. Allergy. 62(84):1–41. https://doi.org/10.1111/j.1398-9995.-2007.01551.x.

Curin M (2018). Next-generation of allergen- specific immunotherapies: molecular approaches. Curr Allergy Asthma Rep. 18(7):39. https://doi.org/10.100-7%2Fs11882-018-0790-x.

Feng S, Han M, Fan Y (2015). Acupuncture for the treatment of allergic rhinitis: a systematic review and meta-analysis. Am J Rhinol Allergy. 29(1):57–62. https://doi.org/10.2500/ajra.2015.29 .4116.

Garbo G, Tessema B, Brown SM. (2013). Complementary and integrative treatments: allergy. Otolaryngol Clin North Am. 46(3): 295–307. https://doi.org/-10.1016/j.otc.2012.12.005.

Keith PK, Desrosiers M, Laister T, Schellenberg RR, Waserman S (2012). The burden of allergic rhinitis (AR) in Canada: perspectives of physicians and patients. Allergy Asthma Clin Immunol. 8(1):7. https://doi.org/10.-1186/1710-1492-8-7.

Meltzer EO (2016). Allergic rhinitis: burden of illness, quality of life, comorbidities, and control. Immunol Allergy Clin North Am. 36(2): 235–48. https://-doi.org/10.1016/j.iac.2015.12.002.

Lehman JM, Blaiss MS (2010). Pharmacotherapy of Allergic Rhinitis[M]// Allergy Frontiers: Therapy and Prevention.

Liu Y (2015). Network construction and clinical efficacy observation of Yingxiang acupuncture for allergic rhinitis. Chengdu University of Traditional Chinese Medicine, Chengdu, China, M.S. thesis.

Lund I, Lundeberg T (2006). Are minimal, superficial or sham acupuncture procedures acceptable as inert placebo controls? Acupuncture in medicine. J British Med Acupunctr Soc. 24(1): 1315. https://doi.org/10.1136/aim.24-.1.13

Murti B (2018). Prinsip dan Metode Riset Epidemiologi. Edisi V. Program Studi Ilmu Kesehatan Masyarakat, Program Pascasarjana, Universitas Sebelas Maret. Surakarta. Bintang Fajar Offsite Colomadu, Karanganyar, Jawa Tengah.

Ozdoganoglu T, Songu M (2012). The burden of allergic rhinitis and asthma. Ther Adv Respir Dis. 6: 11–23. https://doi.org/10.1177/1753465811431975.

Pratiwi D, Werdiningsih Y, Matea A, Nareswari KP, Aryani ND (2022). The Correlation between Allergic Diseases and Systemic Lupus Erythematosus. Indones J Med. 07(01): 19-27. https://doi.org/10.26911/theijmed.2022.07.01.03.

Putri KE, Murti B, Prasetya H (2021). The effectiveness of acupuncture in insomnia patients: Meta analysis. Indones J Med. 6(1): 42–51. https://doi.10.26911/theijmed.2021.6.01.05.

Ramírez-Jiménez F, Pavón-Romero G, Juárez-Martínez LL, Terán LM (2012). Allergic Rhinitis. J Aller Ther. S5: 1–7. doi: 10.4172/2155-6121.S5-006.

Seedat RY (2013). Treatment of allergic rhinitis. Curr Allergy Clin Immunol. 26(1): 11–16. https://doi.10.1111/j.1398-9995.1994.tb 04246.x.

Seidman MD, Gurgel RK, Lin SY, Schwartz SR, Baroody fm, Bonner JR, Dawson DE, et al. (2015). Clinical practice guideline: allergic rhinitis. Otolaryngol Head Neck Surg. 152(1): S1-43. https://doi.org/10.1177/0194599814561600.

Shiue HS, Lee YS, Tsai CN, Chang HH (2016). Treatment of allergic rhinitis with acupoint herbal plaster: an oligonucleotide chip analysis. BMC Complement Altern Med. 16(1):436. https://doi.org/10.1186/s12906-016-1418-0.

Singh K, Axelrod S, Bielory L (2010). The epidemiology of ocular and nasal allergy in the United States, 1988-1994. J Allergy Clin Immunol. 126(4): 778–783.e6. https://doi.org/10.1016/j.jaci.2010.06.050.

Soepardi EA, Iskandar N, Bashiruddin J. (2012). Buku ajar Ilmu Kesehatan Telinga Hidung Tenggorokan Kepala dan Leher. Edisi Ke- 7, Jakarta: 106-110.

Tan G, Ma Y, Li H (2012). Long-term results of bilateral endoscopic vidian neurectomy in the management of moderate to severe persistent allergic rhinitis. Arch Otolaryngol Head Neck Surg. 138(5): 492–7. https://doi.org/10.1001/archoto.2012.284.

Wallace DV, Dykewicz MS, Bernstein DI et al. (2008). The diagnosis and management of rhinitis: an updated practice parameter. J Allergy Clin Immunol. 122(2): S1–S84. https://doi.org/10.1016/j.jaci.2008.06.003.

Xue CC, Zhang AL, Zhang CS, DaCosta C, Story DF, Thien FC (2015). Acupuncture for seasonal allergic rhinitis: a randomized controlled trial. Annals Allergy Asthma Immunol. 115(4): 317–324.e1. https://doi.10.1016/j.anai.2015.05.017.

Zhang J, Zhang Y, Huang X, Lan K, Hu L, Chen Y, Yu H (2020). Different Acupuncture therapies for allergic rhinitis: Overview of systematic reviews and network meta-analysis. Evidence-Based Complementary and Alternative Medicine. https://doi.org/10.1155/2020/8363027.