



Prescriptions of traditional Chinese medicine, western medicine, and integrated Chinese–Western medicine for allergic rhinitis under the National Health Insurance in Taiwan



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ABSTRACT

Ethnopharmacological relevance: Allergic rhinitis has long been a worldwide health problem with a global growth trend. The use of traditional Chinese medicines alone or integrated Chinese–Western medicines for its treatment is quite common in Taiwan. Respiratory diseases account for the majority of outpatient traditional Chinese medicine treatment, while allergic rhinitis accounts for the majority of respiratory diseases. We hereby conduct a comparative analysis between traditional Chinese medicine treatments and western medicine treatments for allergic rhinitis in Taiwan. The results of the analysis on the prescription difference of traditional Chinese medicine and western medicine treatments would be helpful to clinical guide and health policy decision making of ethnopharmacological therapy.

Materials and methods: Patients diagnosed as allergic rhinitis with diagnostic code 470–478 (ICD-9-CM) were selected as subjects from 2009–2010 National Health Insurance Research Database based on the claim data from the nationwide National Health Insurance in Taiwan. This retrospective study used Chi-Square test to test the effects of gender and age on visit of traditional Chinese medicine, western medicine, and integrated Chinese–Western medicine treatments.

Results: A total of 45,804 patients diagnosed as allergic rhinitis with ICD-9-CM 470–478 were identified from 2009–2010 NHIRD. There were 36,874 subjects for western medicine treatment alone, 5829 subjects for traditional Chinese medicine treatment alone, and 3101 subjects for integrated Chinese–Western medicine treatment. Female patients were more than male in three treatments. 0–9 years children had the highest visit frequency in western medicine and integrated Chinese–Western medicine groups, while 10–19 years young-age rank the highest in traditional Chinese medicine group. The Chi-square test of independence showed that the effects of gender and age on visit of three treatments were significant.

Conclusions: The prescription drugs of western medicine treatment alone were almost for relieving the symptoms of allergic rhinitis. That leads to the little difference between 2009 and 2010. The same phenomenon occurs in integrated Chinese–Western medicine. However, the prescription drugs of traditional Chinese medicine treatment vary considerably. Multiple-composition medicine been replaced by single-composition medicine implied that syndrome differentiation and treatment were used and the synergistic effects of multiple-composition medicine were no longer suitable for the most patients of 2010.

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1. Introduction

Following the change of lifestyle, the global asthma population has been increased by 45% yearly. It is estimated that about three hundred million people are suffering from asthma. Allergic rhinitis

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is considered one of the dangerous factors of asthma, because it very often coexists with asthma in the same patient according to the findings of epidemiological research (Matthew et al., 2003). Allergic rhinitis has long been a global health problem. As previous researches showed, the incidence of respiratory allergies is about 20–30% with a global growth trend associated with the quick changes of industrial progress, modern lifestyle, and ecological environment (Bezerra et al., 2014). Moreover, allergic rhinitis has the highest prevalence of all allergic respiratory diseases and

affects over 12 million people (20%) of the UK population and 400 million people (5.6%) worldwide (Horizon Scanning Centre, 2013). As for the incidence of allergic rhinitis in Taiwan, the prevalence is approximately 20–30% and increases annually (Yang and Chen, 2012).

The clinical definition of allergic rhinitis is a nasal symptom induced by IgE antibody mediated inflammatory reaction by exposing to allergens. Even if allergic rhinitis is generally not a severe disease, it will interfere with patients' quality of life and performance of work and learning. Modern medical researches have developed a considerable knowledge of allergic rhinitis and have found efficacious treatments for the disease. In addition to avoiding exposure to allergens, controlling diet and environmental, western medicine treatments include medical treatment, hyposensitization treatment, and surgical treatment (Lee, 1985). As for traditional Chinese medicine treatment, syndrome differentiation and treatment have been proven efficacious against allergic rhinitis. In addition, previous researches show that integrated Chinese–Western medicine treatments for allergic rhinitis are effective measures without obvious side effect (Chen et al., 2007). Some researches even suggest that the performance of integrated Chinese–Western medicine treatments is better than western medicine treatments (Xue et al., 2006; Guo and Liu, 2013). According to the study on 1996–2001 National Health Insurance Research Database (NHIRD), which is based on the claim data of National Health Insurance (NHI) in Taiwan, respiratory diseases account for the majority of outpatient traditional Chinese medicine treatment (Chen et al., 2007).

Taiwanese have always believed traditional Chinese medicines have slower effects but more safety, while western medicines have quicker effects but more side effects (Chen et al., 1999; Kang et al., 1994; Long et al., 2001). Accordingly, patients with chronic or recurrent diseases frequently seek not only western medicine treatment but also traditional Chinese medicine treatment or integrated Chinese–Western medicine treatment. The dual-track treatment has become prevalent ever since Taiwan's NHI included reimbursement of traditional Chinese medicines in 1995. Taiwan's NHI initiated by central government in 1995 is compulsory for the whole population to have an equal chance to join and to meet the demand of health. As a preceding research on the habit of medicine consumption of outpatients of medical centers in Taiwan showed, 72.7% patients accepted both traditional Chinese medicine treatments and western medicine treatments (Chen et al., 2008a, 2008b). However, the study conducted research by questionnaire survey and did not evaluate the influence factors and difference of medications prescriptions of traditional Chinese medicine treatments and western medicine treatments. Furthermore, many researches have conducted epidemiology study or utilization of traditional Chinese medicine by exploring NHIRD in recent years (Chen et al., 2007, 2008a, 2008b; Lai et al., 2008). Unfortunately, these study did not simultaneously compare traditional Chinese medicine treatments alone, western medicine treatments alone, and integrated Chinese–Western medicine treatments. This study would like to explore the three treatments for allergic rhinitis to know if there exist specific treatment guidelines for prescribed medications or inclination for personal therapy.

2. Materials and methods

On the basis of the claim data from Taiwan's NHI, the National Health Research Institutes (NHRI) constructed NHIRD in 1998 to support academic and non-profit organizations to undertake medical researches. This study used allergic rhinitis patients of 2009–2010 NHIRD as research sample. We classified allergic

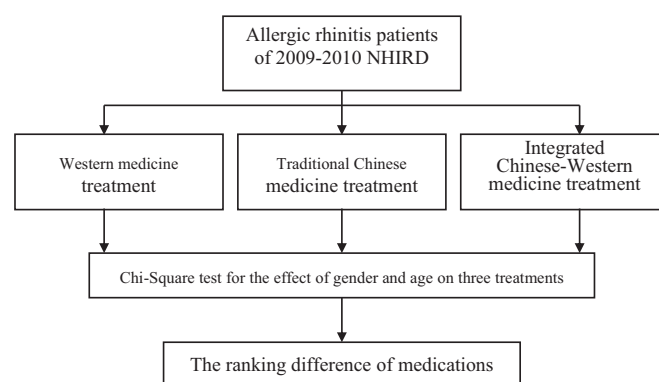


Fig. 1. The research scheme.

rhinitis patients into three groups: traditional Chinese medicine treatment alone, western medicine treatment alone, and integrated Chinese–Western medicine treatment. This study analyzed the distinctions of demographic characteristic and medical use patterns among the three groups. Because Taiwan's National Health Insurance only reimburses extract Chinese medicines, prescription patterns analysis of this study excluded raw medicinal substances and other herb medicines.

Patients diagnosed as allergic rhinitis with diagnostic code 470–478 (ICD-9-CM) were selected as subjects. The statistical analysis software SAS 9.13 was employed for data analysis. Chi-Square test was utilized to test the effects of gender and age on visit of traditional Chinese medicine treatment, western medicine treatment, and integrated Chinese–Western medicine treatment. Finally, medications prescribed by the three treatments were ranked and compared. The research scheme of this study is shown as Fig. 1.

3. Results and discussion

3.1. Analysis of gender and age

A total of 45,804 patients diagnosed as allergic rhinitis with ICD-9-CM 470–478 were selected from 2009 to 2010 NHIRD. There were 36,874 subjects for western medicine treatment alone, 5829 subjects for traditional Chinese medicine treatment alone, and 3101 subjects for integrated Chinese–Western medicine treatment.

The average age of western medicine treatment group was 32.79 ± 21.77 , with 17,205 male (46.66%) and 19,669 female (53.34%). Among traditional Chinese medicine group, the average age was 30.15 ± 18.55 , with 2589 male (44.42%) and 3240 female (55.58%). As for integrated Chinese–Western medicine group, the average age was 26.90 ± 19.57 , with 1477 male (47.63%) and 1624 female (52.37%). A chi-square test of independence was performed to examine the effect of gender on treatments. The relation between these two variables was significant ($p=0.0024$) shown as Table 1.

The peak age of allergic rhinitis patients treated by western medicines was 0–9 years of age (19.08%), followed by 10–19 years of age (14.49%). The peak age of allergic rhinitis patients treated by traditional Chinese medicines was 10–19 years of age (21.74%), followed by 30–39 years of age (16.52%). The peak age of allergic rhinitis patients treated by integrated Chinese–Western medicines was 0–9 years of age (24.51%), followed by 10–19 years of age (21.22%). A chi-square test of independence was performed to examine the effect of age on treatments. The relation between these two variables was significant ($P<0.0001$), shown as Table 2.

Table 1
Distribution and chi-square test of allergic rhinitis patients treated by western medicines, traditional Chinese medicines, and integrated Chinese–Western medicines on gender in 2009–2010.

Western medicine (N=36,874)			Traditional Chinese medicine (N=5829)		Integrated Chinese–Western medicine (N=3101)		Total (N=45,804)		χ^2
Gender	Count	%	Count	%	Count	%	Count	%	
Male	17,205	46.66	2589	44.42	1477	47.63	21,271	46.44	12.0769
Female	19,669	53.34	3240	55.58	1624	52.37	24,533	53.56	$p=0.0024$

3.2. Analysis of prescription drugs

As Table 3 showed, the top 10 prescription drugs of western medicine treatment in 2009 and 2010 were almost decongestant agents (pseudoephedrine) including antihistamine, paracetamol (acetaminophen), and medications for suppressing cough and dissolving phlegm to relieve the symptoms of allergic rhinitis. Ambroxol, pseudoephedrine, dexchlorpheniramine, and cyproheptadine ranked as 5th, 6th, 9th, and 10th in 2009 dropped out of the top 10 of 2010 rankings. Fexofenadine, eprazinone, antihistamines for systemic use, and mometasone ranked as 4th, 6th, 7th, and 9th in 2010 from outside the top 10 in 2009. Opium derivatives fell to 10th place in 2010 from 3rd place in 2009.

As Table 4 showed, among the top 10 prescription medicines of traditional Chinese treatment, Shin Yee Ching Fay Tang (multiple-composition, see Table 5) ranked first while Bay Mu (*Fritillaria thunbergii* Miq., bulb) ranked 10th in 2009 had surprisingly dropped out of the top 10 of 2010 rankings. Besides, Tsan Tuay (*Cryptotympana pustulata* Fabricius, slough) and Gan Tsau (*Glycyrrhiza uralensis* Fisch., rhizome) ranked as 5th and 10th in 2010 from outside the top 10 in 2009. It is inferred that because syndrome differentiation and treatment were used according to traditional Chinese medicine theory, it makes all the difference in medications used. For effective communication by Latin scientific botanical name (Chan et al., 2012), the cross reference of traditional Chinese medicine name to botanical plant name was indicated in Table 5.

As for integrated Chinese–Western medicine treatment, Tsan Tuay (*C. pustulata* Fabricius, slough), opium derivatives, and Bai Zu (*Angelica dahurica* Benth., root) ranked 8th, 9th, and 10th respectively in 2009 were replaced by Bay Mu (*F. thunbergii* Miq., bulb, 7th), Gan Tsau (*G. uralensis* Fisch., rhizome, 9th), and Tsang Err Zu (*Xanthium sibiricum* Patr., fruit, 10th) in 2010, shown as Table 6.

In recent years, various researches proved that taking Chinese medicines and western medicines at the same time would be at the risk of severe drug–drug interactions (Fugh-Berman, 2000). Although many mechanisms of drug–drug interaction between Chinese medicines and western medicines are not clear enough, most of these come from the change of pharmacodynamics (absorption, distribution, and metabolism of drug) to enhance or decrease effects by combining use of Chinese medicines and

Table 3
The top 10 medications of allergic rhinitis treated by western medicines in 2009–2010.

Rank	2009		2010	
	Medications	%	Medications	%
1	Pseudoephedrine combinations	6.99	Paracetamol (acetaminophen)	7.09
2	Paracetamol (acetaminophen)	6.67	Pseudoephedrine combinations	7.01
3	Opium derivatives	5.51	Mequitazine	2.42
4	Cetirizine	4.64	Fexofenadine	2.33
5	Ambroxol	4.04	Cetirizine	2.21
6	Pseudoephedrine	2.93	Eprazinone	1.50
7	Mequitazine	2.67	Antihistamines for systemic use	1.24
8	Loratadine	2.54	Loratadine	1.21
9	Dexchlorpheniramine	2.43	Mometasone	1.09
10	Cyproheptadine	2.22	Opium derivatives	1.08

Table 4
The top 10 medications of allergic rhinitis treated by traditional Chinese medicines in 2009–2010.

Rank	2009		2010	
	Medications	%	Medications	%
1	Shin Yee Ching Fay Tang	5.19	Shin Yee San	4.76
2	Shau Ching Long Tang	4.61	Shau Ching Long Tang	3.97
3	Shin Yee San	4.22	Tsang Err San	3.07
4	Tsang Err San	3.62	Bai Zu	2.59
5	Jel Girng	2.63	Tsan Tuay	2.47
6	Gir Girng Tang	2.50	Gir Girng Tang	2.39
7	Yu Shing Tsao	2.38	Tsang Err Zu	2.33
8	Bai Zu	2.31	Yu Shing Tsao	2.17
9	Tsang Err Zu	2.17	Jel Girng	2.02
10	Bay Mu	2.08	Gan Tsau	1.94

western medicines. Among integrated Chinese–Western medicine, the ranks of medications in 2009 and 2010 have little difference. However, combined use of pseudoephedrine and Mar Huang (*Ephedra sinica* Stapf, herb) or Shau Ching Long Tang

Table 2
Distribution and chi-square test of allergic rhinitis patients treated by western medicines, traditional Chinese medicines, and integrated Chinese–Western medicines on age in 2009–2010.

Age	Western medicine (N=30,503)		Traditional Chinese medicine (N=4914)		Integrated Chinese–Western medicine (N=2593)		Total		χ^2
	Count	%	Count	%	Count	%	Count	%	
0–9	7035	19.08	815	13.98	760	24.51	8610	18.80	673.79 $p < 0.0001$
10–19	5342	14.49	1267	21.74	658	21.22	7267	15.87	
20–29	4885	13.25	955	16.38	389	12.54	6229	13.60	
30–39	5443	14.76	963	16.52	460	14.83	6866	14.99	
40–49	5042	13.67	850	14.58	362	11.67	6254	13.65	
50–59	4559	12.36	586	10.05	265	8.55	5410	11.81	
≥60	4568	12.39	393	6.74	207	6.68	5168	11.28	

Table 5

Botanical plant name of traditional Chinese medicine name.

Traditional Chinese medicine name	Botanical plant name
Bai Zu	<i>Angelica dahurica</i> Benth., root
Bay Mu	<i>Fritillaria thunbergii</i> Miq., bulb
Gan Tsau	<i>Glycyrrhiza uralensis</i> Fisch., rhizome
Gir Girn Tang (multiple-composition)	<i>Pueraria lobata</i> (Wild.) Ohwi, root <i>Ephedra sinica</i> Stapf, herb <i>Cinnamomum cassia</i> Presl, twig <i>Paeonia lactiflora</i> Pall., root <i>Glycyrrhiza uralensis</i> Fisch., rhizome <i>Zingiber officinale</i> Rosc., rhizome <i>Ziziphus jujuba</i> Mill., fruit
Jel Girng	<i>Platycodon grandiflorum</i> (Jacq.) A.DC., root
Shau Ching Long Tang (multiple-composition)	<i>Ephedra sinica</i> Stapf, herb <i>Paeonia lactiflora</i> Pall., root <i>Asarum sieboldii</i> Miq., root <i>Glycyrrhiza uralensis</i> Fisch., rhizome <i>Zingiber officinale</i> Rosc., rhizome <i>Cinnamomum cassia</i> Presl, twig <i>Schisandra chinensis</i> (Turcz.) Baill., fruit <i>Pinellia ternate</i> (Thunb.) Breit., tuber <i>Magnolia biondii</i> Pamp., flower <i>Lilium lancifolium</i> Thunb., bulb <i>Ophiopogon japonicus</i> (Thunb.) Ker-Gawl., tuber Pharmaceutical Gypsum <i>Cimicifuga heraclei folia</i> Kom., rhizome <i>Eriobotrya japonica</i> (Thunb.) Lindl., leaf <i>Gardenia jasminoides</i> Eills, fruit <i>Scutellaria baicalensis</i> Georgi., root <i>Anemarrhena asphodeloides</i> Bunge, rhizome
Shin Yee Ching Fay Tang (multiple-composition)	<i>Magnolia biondii</i> Pamp., flower <i>Angelica dahurica</i> Benth., root <i>Cimicifuga heraclei folia</i> Kom., rhizome <i>Akebia quinata</i> (Thunb.) Decne., stem <i>Glycyrrhiza uralensis</i> Fisch., rhizome <i>Ligusticum sinense</i> Oliv., rhizome and root <i>Saposhnikovia divaricata</i> (Turcz.) Schischk., root <i>Ligusticum chuanxiong</i> Hort., rhizome <i>Asarum sieboldii</i> Miq., root
Tsan Tuay	<i>Cryptotympana pustulata</i> Fabricius, slough
Tsang Err San (multiple-composition)	<i>Xanthium sibiricum</i> Patr., fruit <i>Magnolia biondii</i> Pamp., flower <i>Angelica dahurica</i> Benth., root <i>Mentha haplocalyx</i> Briq., herb <i>Allium macrostemon</i> Bge., stem <i>Asarum sieboldii</i> Miq., root <i>Xanthium sibiricum</i> Patr., fruit
Tsang Err Zu	<i>Houttuynia cordata</i> Thunb., herb
Yu Shing Tsao	

(multiple-composition, see Table 6) in Zong Yee Fang Jee (TCM formulae) will enhance nervous system excitement, accelerated heartbeat, sudden hypertension, and insomnia due to the drug–drug interactions (Muittari and Mattila, 1979).

4. Conclusions

While previous research showed that males have a higher probability of incurring allergic rhinitis than females do (deShazo and Kemp, 2013). This research on the 2009–2010 NHIRD showed that the number of female patients was more than that of male no matter whether treated with traditional Chinese medicines ($F:M=1.25:1$), western medicines ($F:M=1.14:1$), or integrated Chinese–Western medicines ($F:M=1.09:1$). Furthermore, 0–9 years old children had the highest visit frequency in western medicine

Table 6

The top 10 medications of allergic rhinitis treated by integrated Chinese–Western medicines 2009–2010.

Rank	2009		2010	
	Medications	%	Medications	%
1	Shin Yee Ching Fay Tang	3.33	Shin Yee Ching Fay Tang	2.83
2	Pseudoephedrine combinations	3.01	Pseudoephedrine combinations	2.43
3	Shau Ching Long Tang	2.97	Paracetamol (acetaminophen)	2.28
4	Shin Yee San	2.61	Shau Ching Long Tang	2.15
5	Paracetamol (acetaminophen)	2.47	Shin Yee San	1.93
6	Cetirizine	2.20	Tsang Err San	1.91
7	Tsang Err San	2.13	Bay Mu	1.85
8	Tsan Tuay	1.77	Cetirizine	1.71
9	Opium derivatives	1.74	Gan Tsau	1.52
10	Bai Zu	1.53	Tsang Err Zu	1.40

and integrated Chinese–Western medicine groups, while 10–19 years young-ages ranked the highest in traditional Chinese medicine group. It is suggested that younger patients accounted for a greater proportion in allergic rhinitis.

The prescription drugs of western medicine treatment alone were almost for relieving the symptoms of allergic rhinitis. That leads to the little difference between 2009 and 2010. The same phenomenon occurred in integrated Chinese–Western medicine. Except opium derivatives, three of the four western medicines in 2009 top 10 list, pseudoephedrine combinations, paracetamol (acetaminophen), and cetirizine, were remained in 2010 top 10 list.

However, the prescription drugs of traditional Chinese medicine treatment varied considerably. Especially, Shin Yee Ching Fay Tang (multiple-composition, see Table 5) ranked first in 2009 had surprisingly dropped out of the top 10 of 2010 rankings. The fact that multiple-composition medicine was replaced by single-composition medicine implied that syndrome differentiation and treatment were used and the synergistic effects of multiple-composition medicine were no longer suitable for the most patients of 2010. In conclusion, the assessment of prescription pattern of traditional Chinese medicine treatment provides a preliminary inference, which deserves further research.

Author disclosure statement

The authors declare that there are no conflicts of interest.

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