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# Interactions between traditional Chinese medicine and western drugs in Taiwan: A population-based study

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## ABSTRACT

**Background:** Drug–drug interactions have long been an active research area in clinical medicine. In Taiwan, however, the widespread use of traditional Chinese medicines (TCM) presents additional complexity to the topic. Therefore, it is important to see the interaction between traditional Chinese and western medicine.

**Objective:** (1) To create a comprehensive database of multi-herb/western drug interactions indexed according to the ways in which physicians actually practice and (2) to measure this database's impact on the detection of adverse effects between traditional Chinese medicine compounds and western medicines.

**Methods:** First, a multi-herb/western medicine drug interactions database was created by separating each TCM compound into its constituent herbs. Each individual herb was then checked against an existing single-herb/western drug interactions database. The data source comes from the National Health Insurance research database, which spans the years 1998–2011. This study estimated the interaction prevalence rate and further separated the rates according to patient characteristics, distribution by county, and hospital accreditation levels. Finally, this new database was integrated into a computer order entry module of the

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electronic medical records system of a regional teaching hospital. The effects it had were measured for two months.

**Results:** The most commonly interacting Chinese herbs were Ephedrae Herba and Angelicae Sinensis Radix/Angelicae Dahuricae Radix. Ephedrae Herba contains active ingredients similar to in ephedrine. 15 kinds of traditional Chinese medicine compounds contain Ephedrae Herba. Angelicae Sinensis Radix and Angelicae Dahuricae Radix contain ingredients similar to coumarin, a blood thinner. 9 kinds of traditional Chinese medicine compounds contained Angelicae Sinensis Radix/Angelicae Dahuricae Radix. In the period from 1998 to 2011, the prevalence of herb–drug interactions related to Ephedrae Herba was 0.18%. The most commonly prescribed traditional Chinese compounds were MA SHING GAN SHYR TANG (23.1%), followed by SHEAU CHING LONG TANG (15.5%) and DINQ CHUAN TANG (13.2%). The prevalence of herb–drug interactions related to Angelicae Sinensis Radix, Angelicae Dahuricae Radix was 4.59%. The most common traditional Chinese compound formula were TSANG EEL SAAN (32%), followed by HUOH SHIANG JENQ CHIH SAAN (31.4%) and SHY WUH TANG (10.7%).

Once the multi-herb drug interaction database was deployed in a hospital system, there were 480 prescriptions that indicated a TCM–western drug interaction. Physicians were alerted 24 times during two months. These alerts resulted in a prescription change four times (16.7%).

**Conclusion:** Due to the unique cultural factors that have resulted in widespread acceptance of both western and traditional Chinese medicine, Taiwan stands well positioned to report on the prevalence of interactions between western drugs and traditional Chinese medicine and devise ways to reduce their incidence. This study built a multi-herb/western drug interactions database, embedded inside a hospital clinical information system, and then examined the effects that drug interaction alerts had on clinician prescribing behaviour. The results demonstrated that western drug/traditional Chinese medicine interactions are prevalent and that western-trained physicians tend to change their prescribing behaviour more than traditional Chinese medicine physicians in their response to medication interaction alerts.

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## 1. Introduction

Today there is more interest than ever in the use of traditional Chinese medicines (TCM). Increasingly, patients are taking Chinese herbal supplements in combination with western drugs as part of their medical treatment regimens. With increasing use, however, comes the increased potential for adverse drug–drug interactions [1,2]. Despite this trend, however, TCM are still used only account for a small fraction of all drug prescriptions. Taiwan stands in a unique position to report on the nature and magnitude of interactions between traditional Chinese medicines (TCM) and western medicines because both types of medicines are widely and concurrently used.

Taiwan's National Health Insurance (NHI) system was implemented in 1995, and it started covering traditional Chinese medicines (TCM) in 1996. Taiwan's unique health insurance system, which gives patients the choice to access both traditional Chinese medicine alongside western medical treatment has allowed the use of TCM treatments to flourish. In 2012, the NHI expended NT\$ 565.5 billion on health-care in Taiwan. Traditional Chinese medicine accounted for 7%, or NT\$ 39.6 billion [3]. Most medical care institutions are contracted with the NHI system. In addition, the number of hospitals with a traditional medicine department has increased from 77 (13.9%) in 2009 to 90 (17.6%) in 2013 [4]. The high usage of traditional Chinese medicine and western medicine means that more and more patients are being

treated for the same disease using both styles. In central Taiwan especially, the percentage of patients using both TCM and western medicine in the treatment of the same disease was about 32.5% in 2009 [5]. It is likely then, that the opportunity for adverse TCM–western drug interactions exists. Such drug–drug interactions may result in severe complications which cause permanent damage or life-threatening events [6,7]. Therefore, more research into the frequency of TCM–western drug interactions is warranted.

Currently, robust software tools exist that allow health care providers to query for drug–drug interactions between western medicines [8–11]. Research has also been done in foreign countries on herb–drug interactions in the literature, including Chinese herbs [12–14]. However, Chinese herbal medicine in foreign countries is considered complementary and alternative medicine (CAM), so it is not regulated as a true medical drug. In Taiwan, traditional Chinese medicines are considered mainstream medications. Furthermore, the same Chinese herbal medicines have different usage patterns and indications in the East and in the West. For these reasons, traditional Chinese medicine and western drug interactions need to be studied separately in Taiwan.

Taiwan now has databases of Chinese herb–drug interactions for use within the country. One database, the “Query System of Herb-Drug Interactions,” was created by Chi Mei Medical Center in 2003 [15], and another, the “Web of Herb-Drug Interactions,” was built by the Department of Chinese Medicine and Pharmacy in the Ministry of Health and

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