Lower Mortality in Male Physicians of Chinese Medicine than Male Population in Taiwan

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Studies on the physicians’ health have paid less attention on the Chinese medicine than on the western medicine professionals. Like western medicine professionals, Chinese medicine physicians’ health condition is critical to the quality of care and patients’ safety. They also cared a large number of patients in many Asia societies. However, no data have been reported regarding the health problems associated with Chinese medicine physicians. The aim of this study was to examine the mortality patterns of a cohort consisting of 6109 male physicians of Chinese medicine who were followed from 1991 through 2003 in Taiwan. The analyses of female subjects were not included due to small sample size. We calculated the overall and cause-specific standardized mortality ratios (SMRs) and life expectancy of the study cohort using the death rates of some 11 millions of Taiwanese male population as reference. We found out that physicians of Chinese medicine experienced significantly lower death rate of mortality from all causes (SMR = 0.63, 95% CI: 0.57, 0.69), from malignant neoplasms (SMR = 0.69, 95% CI: 0.57, 0.82) and from cerebrovascular disease (SMR = 0.53, 95% CI: 0.38, 0.72). Additionally, they have longer life expectancy (ranged from 3 years to approximately 15 years). Our study is crucial to evaluate potential health risks associated with Chinese medicine physicians. Although this study did not reveal elevated death rate among Chinese medicine physicians, researchers and policy makers should not overlook other health problems that Chinese medicine physicians might have experienced. Chinese medicine Physicians; standardized mortality ratio; life expectancy; mortality rate; occupational epidemiology.

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Mortality patterns vary among various occupations and occupational cohorts provide opportunities to assess the health effects associated with specific jobs (Torre et al. 2005). Because physicians’ health status is critical to the quality of care and patients’ safety (Li et al. 2006), the health...
status and health behaviors of physicians in different countries have been the subject of epidemiological studies for decades (Williams et al. 1971; Doll and Peto 1976; Juel et al. 1999). Some studies reported lower mortality rates among physicians mainly due to physicians’ higher socioeconomic status and better health knowledge (Doll and Peto 2000; Lotufo et al. 2001; Doll and Hill 2004; Shin et al. 2005; Torre et al. 2005), however, medical professionals are also exposed to some specific risk factors, such as the hospital environment, stress, anxiety and possibly depression (Caplan 1994). In addition, physicians’ heavy workloads might jeopardize their proficiencies in performing care. It has been reported that higher risks of medical errors, adverse events, and unintentional failures were observed among interns with frequent extended-duration shifts (Landrigan et al. 2004; Barger et al. 2006). Moreover, it is not uncommon for physicians to be reluctant to seek health care from their colleagues. Consequently, physicians may tend to work through illnesses and inappropriately care for themselves, resulting in late presentation with serious illnesses (Thompson et al. 2001; Lin et al. 2008). Data regarding physician’s health status are mainly obtained from the studies of physicians of Western medicine. The health status of physicians of Chinese medicine has rarely been investigated.

In Taiwan, like physicians of Western medicine, physicians of Chinese medicine are college educated and are required to take a national examination in order to obtain license to practice medicine. Chinese medicine is an important form of formal health care and a large proportion of people seeking treatment from Chinese medicine in Taiwan. Approximately 18.8% of the population older than 15 years ever received the care of traditional Chinese medicine at least once in their lifetime (Division of Health Statistics 2002). The number of physicians of Chinese medicine per 10,000 people in Taiwan increased from only 1.26 in 1992 to 2.0 in 2006 (Division of Health Statistics 2006). Since the launch of the National Health Insurance (NHI) program in 1994, barriers to health cares have been greatly removed for those previously uninsured, which resulted in an increased health care demand (Lu and Hsiao 2003). The annual number of outpatient of Chinese medicine increased from 5,178,886 in 1996 to 6,142,829 in 2001, representing an increase of 18.6% (Division of Health Statistics 2002), which could reflect an increasing heavy workload of Chinese medicine in Taiwan. Therefore, it is necessary to know whether increased patient volume and the public satisfactory rate of health care have been achieved at the expense of Chinese medicine physicians’ health which is also critical to the quality of care.

There were very few studies that investigated the health of physicians of Chinese medicine. Sun et al. (1995) compared the lifestyles between physicians of Chinese medicine and physicians of Western medicine. A recent national study investigated the risk of hospitalization among physicians of Western medicine, but didn’t provide in physicians of Chinese medicine. In this study, we aimed to examine the risk of mortality and life expectancy for a cohort of Chinese medicine physicians in Taiwan between 1991 and 2003.

Materials and Methods

Study population

In Taiwan, physicians of Chinese medicine are college educated and required to pass a national examination in order to obtain license to practice Chinese medicine. Based on the medical personnel registry of the Taiwan Department of Health in 1991, we established a cohort of 7433 physicians of Chinese medicine with age of 25 years’ and above (6109 males and 1324 females). This ensures that the sample included only practitioners that were graduated from university, and had license to practice Chinese medicine.

We used registry data of the Taiwan Department of Health to link the identification numbers of the study population and identified 478 physicians who were deceased (463 men and 15 women) during 1991-2003. Because of small sample size, women were excluded from statistical analysis (Table 1).

The general male population in Taiwan with age 25 year and above in the same time period was used as a reference group. The mortality rates of the general population in Taiwan were also acquired from the Department of Health.
**Statistical analysis**

The age-standardized mortality ratio (SMR) for major causes of death and life expectancy were calculated for physicians of Chinese medicine. The Byar Approximation method was used to calculate the 95 percent confidence intervals (CI) (Breslow and Day 1994). The SMRs for all causes and major causes of death between 1991 and 2003 associated with Chinese medicine physicians were calculated under the Poisson assumption. The person-years observed for each study subject was accumulated from January 1991 to either the date of death (for the deceased subjects) or the last day of 2003 (for those still alive). The expected numbers of deaths in the cohort were calculated by applying respectively age-, calendar period-, and gender-specific deaths for the general population of Taiwan. SMRs were calculated by dividing the observed number of death by the expected number of death. The average annual population size of the general population was about 11 millions. The corresponding 95 percent confidence intervals (CI) were also calculated.

We considered five major causes of deaths plus all causes of deaths for analysis, according to the classification by the Department of Health in Taiwan. Five major causes of death were identified using the International Classification of Disease, 9th Revision (ICD-9) rubric, including: malignant neoplasms (ICD-9 codes: 140-165, 170-175, 179-208), cardiovascular disease (ICD-9 codes: 390-398, 410-414, 420-429), cerebrovascular disease (ICD-9 codes: 430-438), diabetes mellitus (ICD-9 codes: 250), and accidents (ICD-9 codes: E800-E807, E810-E19, E826-E838, E840-E858, E860-E888, E890-E949) (Table 3). For patterns of mortality by cause, we used the system diseases classification of ICD-9 (Table 2).

In this study, we also calculated the difference of life expectancies between male physicians of Chinese medicine and the general male population in Taiwan during 1991-2003. Because the subjects of study cohort were all older than 25 in 1991, their information on probability of death before 25 years was not known. We therefore used the data on probability of death before 25 years of the general population as proxy data in calculating the life expectancy of the study cohort.

**RESULTS**

The study population included 7433 Chinese medicine physicians. By 31 December 2003, 6955 subjects were still alive, 478 had died (including 463 men and 15 women), and no one was lost to follow-up. The mean age at death was 74.82 years old for the 463 deceased male subjects; the mean age for 5646 living male physicians of Chinese medicine was 48.24 years (Table 1).

Table 3 shows the SMRs and 95 percent CIs for all causes of death and five major causes of death. Compared with the general population, the overall SMR for all causes of death was 0.63 (95 percent CI: 0.57, 0.69). The cause specific SMRs for malignant neoplasms, cerebrovascular disease and accidents were also significantly lower than for the general population malignant neoplasms SMR = 0.69, \( p < 0.05 \), cerebrovascular disease SMR = 0.53, \( p < 0.05 \) and accidents SMR = 0.27,

### Table 1. Selected characteristics of the cohort of Chinese medicine physicians.

<table>
<thead>
<tr>
<th></th>
<th>Man</th>
<th>Women</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of subjects (n (%))</td>
<td>6,109 (82.2)</td>
<td>1,324 (17.8)</td>
<td>7,433 (100)</td>
</tr>
<tr>
<td>Alive subjects</td>
<td>5,646 (81.2)</td>
<td>1,309 (18.8)</td>
<td>6,955 (100)</td>
</tr>
<tr>
<td>Death subjects</td>
<td>463 (96.9)</td>
<td>15 (3.1)</td>
<td>478 (100)</td>
</tr>
<tr>
<td>Age (mean (SD))</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean age of alive subjects</td>
<td>48.24 (13.97)</td>
<td>42.06 (9.52)</td>
<td>47.08 (13.46)</td>
</tr>
<tr>
<td>Mean age of death subjects</td>
<td>74.82 (15.00)</td>
<td>59.80 (19.33)</td>
<td>74.35 (15.36)</td>
</tr>
</tbody>
</table>
Table 4 shows the difference in age-specific life expectancy by age between physicians of Chinese medicine and the general population. The life expectancy was much longer for these physicians than for the general population, and ranged from ten years to approximately 15 years for the 25-29 and 50-54 age groups. The life expectancy for physicians of Chinese medicine was longer than for the general population, irrespective of age and calendar year. Thus, physicians of Chinese medicine are considered to be a longer-living occupational group as compared to the general population in Taiwan.

**DISCUSSION**

The cohort for the present study constitutes a stable and homogeneous group. Most Chinese medicine physicians start their professions at the ages of 25-30 and are likely to be actively practice until they reach retirement. To evaluate the mor-
tality risk associated with the Chinese medicine physicians, the ideal reference group for these physicians of Chinese medicine would be physicians of Western medicine in Taiwan or other highly educated professional groups that are similar to physicians in all aspects (Lindeman et al. 1996). In previous studies, physicians were compared with the general population, with all occupationally active individuals, with other university graduates, or with certain professional groups (Williams et al. 1971; Doll and Peto 1976; Lindeman et al. 1996; Juel et al. 1999; Doll and Peto 2000; Lotufo et al. 2001; Doll and Hill 2004; Shin et al. 2005; Torre et al. 2005). We have chosen the general Taiwanese population because of the availability of data on major causes of deaths, and also because a large number of general population may yield reliable estimates of SMRs.

To the best of our knowledge, this is the first study that ever conducted to investigate the cause-specific mortality among physicians of Chinese medicine. Physicians and nurses are the object frequently investigated for their health, mainly because they are at the front lines of delivering health care services and their health is critical to the quality of care. However, previous literature might have overlooked the potential health problems of Chinese medicine physicians who also cared a large number of patients in many Asian societies. This study highlighted the necessity of monitoring the health status of Chinese medicine physicians.

Compared with the general population, the Chinese medicine physician population in Taiwan experienced apparently and significantly reduced risks of mortality from all causes. The findings were consistent with the findings from several mortality studies on physicians of Western medicine (Ullmann et al. 1991; Innos et al. 2002; Torre et al. 2005; Shin et al. 2005). The observed lower risks of all causes mortality in Chinese medicine physicians were also in light of the results from a Norwegian study reporting that the self-perceived health status of Norwegian physicians was as good as or better than that of the general population (Stavem et al. 2001). Additionally, Carpenter, Swerdlow and Fear (1997) examined patterns of mortality for hospital consultants and concluded that the consultants had low overall death rates. A recent Taiwanese study by Lin et al. (2008) also

<table>
<thead>
<tr>
<th>Year</th>
<th>25-29</th>
<th>30-34</th>
<th>35-39</th>
<th>40-44</th>
<th>45-49</th>
<th>50-54</th>
<th>55-59</th>
<th>60-64</th>
<th>65-69</th>
<th>70-74</th>
<th>75-79</th>
<th>80-84</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998</td>
<td>13.95</td>
<td>13.61</td>
<td>13.2</td>
<td>12.73</td>
<td>12.19</td>
<td>11.49</td>
<td>10.56</td>
<td>9.4</td>
<td>8.46</td>
<td>7.03</td>
<td>5.32</td>
<td>3.55</td>
</tr>
<tr>
<td>2001</td>
<td>12.4</td>
<td>12.11</td>
<td>11.74</td>
<td>11.3</td>
<td>10.69</td>
<td>10.09</td>
<td>9.4</td>
<td>8.53</td>
<td>8.23</td>
<td>6.54</td>
<td>4.64</td>
<td>3.45</td>
</tr>
</tbody>
</table>

The difference of life expectancy = life expectancy of Chinese medicine physicians minus that of general population.
noted that Taiwan’s physicians of Western medicine experienced significantly reduced age and sex standardized hospitalization ratios (SHRs) for all causes (SHR = 54.5, 95 percent CI: 53.4, 55.5). These results showed that both physicians of Western medicine and those of Chinese medicine had a lower risk of all causes mortality or morbidity compared to the general population.

As for the cause-specific analysis, our study noted that the reduced risk of death was marked for malignant neoplasms, cerebrovascular, and cardiovascular disease, which was consistent to the findings from previous studies of physicians of Western medicine. Previous studies showed that the risk of malignant neoplasms was strikingly lower among physicians than the general population (Carpenter et al. 1997; Juel et al. 1999; Innos et al. 2002; Torre et al. 2005). In 1997, Carpenter’s investigation also revealed that the SMR for malignant neoplasms among male physicians in England was 0.45 compared with the general population. Corresponding SMRs for male physicians were 0.46 in the United States (Torre et al. 2005), 0.40 in Estonia (Innos et al. 2002), and 0.73 in a Danish study (Juel et al. 1999). Our study also found a similar relative risk measure (SMR = 0.69). Additionally, previous studies also found that being a Western medicine physician was associated with a lower risk of mortality from cerebrovascular disease and cardiovascular disease. The corresponding SMRs for cerebrovascular disease and cardiovascular disease were 0.51 and 0.48, respectively, in the United States, and 0.61 and 0.68, respectively, in Estonia (Innos et al. 2002; Torre et al. 2005). Our study found a similar beneficial effect of being a physician of Chinese medicine on the risk of mortality from cerebrovascular disease, but the advantageous effect on cardiovascular disease was not statistically significant.

These advantageous effects on cerebrovascular and cardiovascular disease observed in the present study and in those previously reported were likely due to the professional knowledge of physicians who are more aware than others about health care, are of higher socioeconomic rank, and perhaps have relatively healthy lifestyles, such as lower smoking prevalence (Carpenter et al. 1997; Thompson et al. 2001; Steenland et al. 2004). Our previous study found that the prevalence rate of smoking was much lower among physicians of Chinese medicine than in the general population in Taiwan (10.7% vs. 45.8% in 2002) (Bureau of Health Promotion 2002). Similar to physicians of Western medicine, Chinese medicine physicians have abundant health knowledge and are of higher socioeconomic rank. Moreover, physicians of Chinese medicine like to use food, herbs and tonics as medication (Sun et al. 1995), which might also, at least to some extent, explain why physicians of Chinese medicine have lower mortality and longer life expectancy than the general population.

Despite the above consistency in findings, there was dissimilarity in the risk of suicidal death between studies of physicians of Western Medicine and Chinese medicine physicians. A recent U.S. proportionate mortality study analyzed death certificates and found that male physicians were more likely to die from suicide and accidents (Frank et al. 2000). An elevated risk of suicidal death among physicians of Western medicine can be attributable to high levels of stress associated with physicians’ job performance (WHO 1992; Juel et al. 1997; Lindeman et al. 1997; Juel et al. 1999; Hawton et al. 2001; Innos et al. 2002; Torre et al. 2005). Male physicians in Denmark have a 64% excess of suicide risk (Juel et al. 1999), and in the United States, an 84% excess of suicide risk (Torre et al. 2005). Unlike the data from previous studies, we did not note an increased risk of suicidal death in this study. Nonetheless, it should be noted that our risk estimate for suicidal death was based on only two suicidal deaths, resulting in an unreliable SMR estimate of 0.01. The reasons for a reduced risk of suicidal death noted in this study could be multifaceted. Occupational characteristics may differ greatly between physicians of Chinese medicine and Western medicine physicians. In Taiwan, physicians of Chinese medicine tend to be practitioners without emergency duty or responsibility for on call or shifts. Their patients are typically chronic disease who consult in a rather relaxed
attitude and use moderate traditional Chinese medicine to heal patients (Sun et al. 1995). Compared to physicians of Western medicine, physicians of Chinese medicine might have lesser stressors and rarely work overtime. Additionally, the suicidal mortality rate was very low in our data, which could be due, at least to some extents, that physicians who issued death certificates usually have a tendency to intentionally avoid issuing suicide as the underlying cause of death occurred to their colleagues (Schlicht et al. 1990). If the risk of suicidal mortality was truly dissimilar between Chinese medicine physicians and physicians of Western medicine, future studies should be conducted to investigate whether such difference is caused by dissimilarity in lifestyle or by work related health hazards between Western medicine physicians and Chinese medicine physicians.

The National Health Research Institutes (NHRI) of Taiwan reported that compared to the general population, between 1986-2001 the SMR was 0.56 (95 percent CI : 0.54, 0.59, p < 0.05) for death from all causes for physicians of Western medicine, and about 10 years lesser life expectancy than the general population (Chang 2002). In our study, physicians of Chinese medicine had lower risks of mortality and longer life expectancy as compared to the general population. In 1992, the World Health Organization recommended that the four cornerstones of health in the Victoria Declaration on heart health could decrease hypertension by 55 percent, stroke by 75 percent, diabetes by 50 percent, and tumor by 30 percent, and prolong life expectancy more than ten years (WHO 1992). These cornerstones include health-promoting dietary habits, a tobacco-free lifestyle, regular physical activity, and a supportive psycho-social environment, which are, in fact, similar to the healthy living principles adhered to by physicians of Chinese medicine (Sun et al. 1995).

Several limitations of this study need to be mentioned. Our study might overlook the health risks of Chinese medicine physicians. Most of these physicians have received higher education and are of higher socioeconomic rank than the general population, but the information on education and socioeconomic status in the comparison groups was not available to us so that adjustments for these potential confounders was not possible. The mortality rate in men generally decreases with increasing social class and educational level, and using the general population as a reference group may include persons with very poor health status. Hence, lower mortality among physicians may be simply attributable to the healthy worker effect (McMichael et al. 1986), which reflects that an individual must be relatively healthy in order to remain to be employable in a workforce, and thus both morbidity and mortality rates of the workforce are usually lower than the general population (Li and Sung 1999).

The other limitation is that the sample size of female Chinese medicine physicians is rather small, allowing no comparison between male and female physicians. Moreover, the small sample of female Chinese medicine physicians and the limited statistical power does not allow us to reach definitive conclusions about their mortality compared to Taiwanese women. Despite that, to the best of our knowledge, this is the first investigation ever conducted to study the risk of cause specific deaths for physicians of Chinese medicine. Results from this analysis can be sued to guide future investigations relating health hazards to the practice of Chinese medicine. Although this study did not reveal elevated death rate among Chinese medicine physicians, researchers and policy makers should not overlook other health problems that Chinese medicine physicians might have experienced. In addition to the analysis of mortality, it is also worthwhile to further investigate the incidence and prevalence of specific diseases for the practitioners of Chinese medicine.

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Conflict of interest: none declared.
References


