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## Original article

# A contrast study of the traumatic condition between the wounded in 5.12 Wenchuan earthquake and 4.25 Nepal earthquake

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## ABSTRACT

**Purpose:** 5.12 Wenchuan earthquake and 4.25 Nepal earthquake are of the similar magnitude, but the climate and geographic environment are totally different. Our team carried out medical rescue in both disasters, so we would like to compare the different traumatic conditions of the wounded in two earthquakes.

**Methods:** The clinical data of the wounded respectively in 5.12 Wenchuan earthquake and 4.25 Nepal earthquake rescued by Chengdu Military General Hospital were retrospectively analyzed. Then a contrast study between the wounded was conducted in terms of age, sex, injury mechanisms, traumatic conditions, complications and prognosis.

**Results:** Three days after 5.12 Wenchuan earthquake, 465 cases of the wounded were hospitalized in Chengdu Military General Hospital, including 245 males (52.7%) and 220 females (47.3%) with the average age of  $(47.6 \pm 22.7)$  years. Our team carried out humanitarian relief in Katmandu after 4.25 Nepal earthquake. Three days after this disaster, 71 cases were treated in our field hospital, including 37 males (52.1%) and 34 females (47.9%) with the mean age of  $(44.8 \pm 22.9)$  years. There was no obvious difference in sex and mean age between two groups, but the age distribution was a little different: there were more wounded people at the age over 60 years in 4.25 Nepal earthquake ( $p < 0.01$ ) while more wounded people at the age between 21 and 60 years in 5.12 Wenchuan earthquake ( $p < 0.05$ ). The main cause of injury in both disasters was bruise by heavy drops but 5.12 Wenchuan earthquake had a higher rate of bruise injury and crush injury ( $p < 0.05$ ) while 4.25 Nepal earthquake had a higher rate of falling injury ( $p < 0.01$ ). Limb fracture was the most common injury type in both disasters. However, compared with 5.12 Wenchuan earthquake, 4.25 Nepal earthquake has a much higher incidence of limb fractures ( $p < 0.01$ ), lung infection ( $p < 0.01$ ) and malnutrition ( $p < 0.05$ ), but a lower incidence of thoracic injury ( $p < 0.05$ ) and multiple injury ( $p < 0.05$ ). The other complications and death rate showed no significant differences.

**Conclusion:** Major earthquakes of the similar magnitude can cause different injury mechanisms, traumatic conditions and complications in the wounded under different climate and geographic environment. When an earthquake occurs in a poor traffic area of high altitude and large temperature difference, early medical rescue, injury control and wounded evacuation as well as sufficient warmth retention and food supply are of vital significance.

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## 1. Introduction

An earthquake of Richter 8.0 occurred at 14:28 on May 12, 2008 in Wenchuan, Sichuan Province, China, which caused a great casualty. Chengdu Military General Hospital is located at in the suburb of Chengdu, the capital of Sichuan Province and is only 50 km to the earthquake area. The hospital started to receive the wounded on that afternoon; in total, 1268 cases were hospitalized here and

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rich experience of earthquake emergency rescue has been collected. After that, a National Emergency Medical Rescue Team was set up in this hospital authorized by the government, which played an important role in the rescue of Lushan earthquake in 2013. A strong earthquake of Richter 8.1 occurred at 14:11, April 25, 2015 in Nepal. The National Emergency Medical Rescue Team/Medical Team of Chengdu Military General Hospital set off on April 27 for humanitarian relief, along with medical equipment and related materials. The field hospital started to receive wounded people on April 28, and till the leaving on May 15, a total of 267 earthquake wounded patients were treated, including 71 hospitalized cases and 44 surgeries. As 5.12 Wenchuan earthquake and 4.25 Nepal earthquake have the similar magnitude, a contrast study was made to compare the injury mechanisms, traumatic conditions, complications and prognosis of the wounded.

## 2. Materials and methods

### 2.1. Basic information of two disasters

The magnitude of 5.12 Wenchuan earthquake is Richter 8.0 while 4.25 Nepal earthquake is Richter 8.1; besides the two earthquakes had the similar characteristics of high intensity, huge destructive power, wide stricken areas, large casualties, serious damage to the transportation infrastructures and incredible difficulties in rescue (Table 1).

### 2.2. Clinical data

In total, 1268 cases of earthquake injuries were rescued and treated in Chengdu Military General Hospital after 5.12 Wenchuan earthquake. During the first three days after the attack of the earthquake, 803 cases were received. After that another 465 cases were admitted and treated in this hospital, including 245 males (52.7%) and 220 females (47.3%), aged from 1 to 93 years, mean (47.6 ± 22.7) years. The National Emergency Medical Rescue Team/Medical Team of Chengdu Military General Hospital treated 71 cases of earthquake injuries in Nepal after the occurrence of 4.25 Nepal earthquake, including 37 males (52.1%) and 34 females (47.9%), aged from 3 to 90 years, mean (44.8 ± 22.9) years.

### 2.3. Inclusion and exclusion criteria

The devastated areas of 5.12 Wenchuan earthquake were located along both sides of Longmen Mountains. Chengdu Military General Hospital is located in the east of Longmen Mountains, only 50 km to the disaster area. Moreover the roads have not been destroyed by the earthquake. As a result, the wounded from the east side of Longmen Mountains were sent to our hospital in the first 3 days and those from the west side were delayed to 3 days after the earthquake. For 4.25 Nepal earthquake, the National

Emergency Medical Rescue Team/Medical Team of Chengdu Military General Hospital started to treat the wounded on April 28 2015, 3 days after the earthquake. Thus, only the wounded treated three days after the earthquakes were included in this study. All of the out-patients were excluded.

### 2.4. Statistical analysis

SPSS version 16.0 packages were used for data entry and statistical analysis. Continuous variables were expressed as mean ± standard deviation ( $\bar{x} \pm s$ ). Comparison between two groups was conducted by chi-square test and  $p < 0.05$  was regarded as statistically significant.

## 3. Results

### 3.1. Age distribution of the wounded

The average age of the wounded in 5.12 Wenchuan earthquake was (47.6 ± 22.7) years while (44.8 ± 22.9) years in 4.25 Nepal earthquake, revealing no statistical difference ( $p > 0.05$ ), but a further analysis showed significant difference in age distribution. The detailed results are shown in Table 2.

### 3.2. Traumatogenic factors

The main traumatogenic factor in both earthquakes was bruise by heavy drops. But the incidence of bruise and crush injuries in 5.12 Wenchuan earthquake was much higher than that in 4.25 Nepal earthquake ( $p < 0.05$ ), which on the contrary had a higher rate of falling injury ( $p < 0.01$ ). But it is interesting that falling from a height showed no significant difference between two groups (Table 3).

### 3.3. Traumatic conditions

Limb fracture was the most common injuries in two groups, though it has a much higher incidence in 4.25 Nepal earthquake (66.2% vs 38.3%,  $p < 0.01$ ). Chest injury and multiple injury were significantly lower in 4.25 Nepal earthquake than in 5.12 Wenchuan earthquake ( $p < 0.05$ , Table 4).

### 3.4. Complications and prognosis

Lung infection and malnutrition (serum albumin < 30 g/L or prealbumin < 200 mg/L) had a higher incidence in the wounded of 4.25 Nepal earthquake. There was no obvious difference in other complications and mortality between two groups (Table 5).

**Table 1**

Comparison of the general information between 5.12 Wenchuan earthquake and 4.25 Nepal earthquake.

General condition	4.25 Nepal earthquake	5.12 Wenchuan earthquake
Time	14:11, 25th, Apr 2015	14:28, 12th May 2008
Magnitude (Richter)	8.1	8.0
Depth of hypocenter (km)	20	14
Epicentral distance to capital city (km)	200	133.8
Number of death	8786	69,227
Number of injury	22,303	374,643
Main architectural structure	mud-brick or stone-brick	Brick-concrete
Altitude (m)	1400	500
Air temperature during earthquake (°C)	6–28	18–29

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