

## Post 'Gorkha earthquake' Medical Problems of the Victims in Nepal

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### Abstract

Understanding the post-earthquake medical problems is essential for improving health interventions of the affected victims. 'Gorkha earthquake' that occurred in April-May, 2015 in Nepal, caused severe problems in people. Although some studies have been done regarding 'Gorkha earthquake', but no study studied the overall health status and medical problems of the victims from the earthquake in different parts of Nepal.

The main objective of this study was to study the health status and medical problems of the victims of earthquake that occurred in 2015 in Nepal. The cross-sectional study was done following 6 months' post-earthquake in 500 victims in 5 most affected districts (Sindhupalchok, Kathmandu, Dadhing, Bhaktapur, and Kavre) Nepal from November till April, 2016. Altogether 500 earthquake-affected subjects aged from 16 to 80 years of age living in the transitional shelters were included in this study. Only 10% took meals  $\geq 4$  times per day and 90% took meal  $\leq 3$  times per day. Regarding smoking habit, 85.40% consumed  $\leq 5$  cigarettes per day, 13% consumed 6-10 cigarettes per day, 1% consumed occasionally, and 0.60% never consumed cigarettes. Majority of the participants had musculoskeletal (36.74%) problems followed by respiratory problems (13.02%), neurological and psychological problems (11.62%), and eye problems (11.16%).

The general health, habits, nutritional intake of the people have been affected in the earthquake affected areas. It showed high musculoskeletal problems followed by respiratory problems, neurological and psychological problems, and eye problems. Data from this study may be used as basic information for health planning and future steps in health care preventive and therapeutic programs.

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### Introduction

A massive 7.8 magnitude devastating earthquake occurred in Nepal known as Gorkha earthquake on April 25, 2015 at 11:56 NST. It was followed by over 340 aftershocks with nearly 4 magnitudes till date.<sup>1</sup> After 'Gorkha earthquake', another major earthquake of 7.3 magnitude occurred on May 12, 2015 at 7:05 am

UTC, at southeast of Kodari, Nepal. The epicenter was on the border of Dolakha and Sindhupalchowk districts, and the tremors were felt as far as about 2400 km away from the epicenter.<sup>2</sup> Minutes later, another earthquake of 6.3 magnitude hit with its epicenter in Ramechhap which is on the east of Kathmandu.<sup>1</sup> These earthquakes were also felt in neighboring countries like Bangladesh, China and India. The earthquakes caused extensive damage to buildings and monuments with thousands of deaths and injuries. Over 8000 people have been confirmed dead, over 2500 injured and over 200,000 homeless.<sup>3</sup> Even those whose homes are still standing are sleeping in the streets and grounds

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as they are terrified by regular aftershocks as shown in Figure 1. Major cities including Kathmandu, have been badly damaged. Many historic buildings are collapsed, temples are ruined and the roads are destroyed.<sup>1</sup>



**Figure 1.** Consequences after the 'Gorkha Earthquake' in Nepal (pictures taken 6 months after the earthquake).

Characteristics	Total (%)
<b>Sex</b>	
Male	140 (46.66%)
Female	160 (53.33%)
Age of the participants	16-80 years
Mean age	35.66 ±16.90
<b>Marital status</b>	
Single	173 (34.60%)
Married	327 (65.40)
<b>Education</b>	
Uneducated	46 (9.20%)
Primary School	177 (35.40%)
High school	73 (14.60%)
University	204 (40.80%)
<b>Occupation</b>	
Farming	232 (46.40%)
Teaching	57 (11.40%)
Business	217 (43.40%)

**Table 1.** Characteristics of the patients.

The Government of Nepal (GoN) requested assistance from relief organizations to supply the sites.<sup>4</sup> The Nepal Humanitarian Country Team comprising UN, international organization, and nongovernmental organization (NGO) representatives had established coordination hubs in Kathmandu at the GoN National Emergency Operation Center, the UN office, and the humanitarian staging area at Tribhuvan International Airport. Government from different nations like India, Pakistan, Australia, UK and People's Republic of China had launched an extensive humanitarian relief and rescue operation including blankets, medicines, and safe drinking water, to support affected populations.<sup>4</sup> Nevertheless, none of these organizations studied the medical and health problems after this disaster.

Understanding basic post-earthquake medical problems is essential for developing health interventions of the earthquake affected

people. Although some studies have been done regarding 'Gorkha earthquake', but no study studied the overall health status and medical problems of the victims from the earthquake in different parts of Nepal.<sup>5-12</sup> Hence, this study reveal the health status and medical problems of individuals affected by the devastating earthquake which occurred during April-May, 2015 in Nepal.

### Materials and methods

The epidemiological cross-sectional study was done at 5 different districts of Nepal from November, 2015 till April December 30, 2016. Altogether 500 subjects aged 16 to 80 years of age living in the transitional shelters community were included in earthquake-affected areas. The sites were: Sindhupalchok, Kathmandu, Dadhing, Bhaktapur, and Kavre. The study included an interview and general physical examination.

Interview and general examination Ethics approval was taken from institutional Review committee (IRC) of Kathmandu University School of Medical Sciences (KUSMS). All participants were requested to sign an informed consent document before participating. Two medical doctors performed the interview and general examination. Statistical analyses were conducted using Statistical PASW® Statistics 20.0 (SPSS, Chicago, IL, USA). Descriptive statistics were done to see the different parameters with the level of significance ( $\alpha$ ) = 0.05.

### Results

Table 1 shows the characteristics of the participants. Majority of the participants were married (65.40%). The education of the participants showed University degree (40.80%) followed by primary school education (35.40%) and high school (14.60%), whereas uneducated were 9.20%. The main occupations of the participants were farming (46.40%) followed by business (43.40%) and then teaching (11.40%). Mean age of the participants was 35.66±16.90. The total number of male and female and in different sites with mean ages (Table 2). There was no significant difference of age among different sites (p=0.26).

Table 3 shows the habit of the participants. Regarding the number of meals taking by the participants, 10% took meals ≥4

times per day, and 90% took meal ≤3 times per day. Regarding alcohol consumption, 87.80% never consumed alcohol, 9.80% consumed occasionally, 2% consumed weekly and 0.40% consumed daily. Regarding smoking habit, 85.40% consumed ≤5 cigarettes per day, 13% consumed 6-10 cigarettes per day, 1% consumed occasionally, and 0.60% never consumed cigarettes.

Sites	Male	Female	Total (%)	Mean age ±SD	P-value
Sindulpachok	43 (18.85%)	57 (20.95%)	100 (20%)	37.03 ±16.13	0.26
Kathmandu	49 (21.49%)	51 (18.75%)	100 (20%)	36.04 ±18.37	
Dadhing	38 (16.66%)	62 (22.79%)	100 (20%)	36.87 ±16.15	
Bhaktapur	50 (21.92%)	50 (18.38%)	100 (20%)	36.04 ±18.36	
Kavre	48 (21.05%)	52 (19.11%)	100 (20%)	35.66 ±16.96	
Total	228 (45.6%)	272 (54.4%)	500 (100%)	36.87 ±16.95	

**Table 2.** Number of subjects in different sites (districts). *Significant difference at p<0.05.*

Habits	Total (%)
Number of meals	
≥ 4 times per day	50 (10%)
≤ 3 times per day	450 (90%)
Alcohol consumption	
Never	439 (87.80%)
Occasionally	49 (9.80%)
Weekly	10 (2%)
Daily	2 (0.40%)
Smoking	
≤ 5 cigarettes per day	427 (85.40%)
6-10 cigarettes per day	65 (13%)
Occasionally	5 (1%)
Never	3 (0.60%)

**Table 3.** Habits of subjects.

Medical problems	Total (%)
Medical problems of the subjects	
No medical problems	285 (57%)
Yes	215 (43%)
Musculoskeletal problems	79 (36.74%)
Respiratory problems	28 (13.02%)
Neurological problems	25 (11.62%)
Eye problems	24 (11.16%)
Cardiovascular problems	18 (8.37%)
Dermatological problems	15 (6.97%)
Psychiatric/ psychological problems	14 (6.51%)
Diabetes	12 (5.58%)

**Table 4.** Past and present medical problems in subjects (N=500).

Table 4 shows the past and present medical history and problems in total subjects. Regarding medical problems, 57% had no medical problems, whereas 43% had medical problems. Majority of the participants had musculoskeletal (36.74%) problems followed by respiratory problems (13.02%), neurological and psychological problems (11.62%), and eye problems (11.16%). Less common medical problems include cardiovascular problems (8.37%), dermatological problems (6.97%), psychiatric problems (6.51%) and diabetes (5.58%).

## Discussion

April-May 2015 earthquakes were the worst natural disaster in the history of Nepal since the Nepal-Bihar earthquake which occurred in 1934.<sup>1</sup> This study provides information about the status of the general health and related behavior of individuals affected by earthquakes. Earthquake results in deaths of people which can be instantaneous, rapid, or delayed.<sup>13</sup> Instantaneous death may be due to crushing injuries to the head or chest, external or internal hemorrhage. Rapid death occurs within minutes or hours and can be due to asphyxia from dust inhalation or chest compression, hypovolemic shock, or environmental exposure (e.g., hypothermia). Delayed death occurs within days and can be due to dehydration, hyperthermia, hypothermia, crush syndrome, wound infections, or postoperative sepsis.<sup>14,15</sup>

Huge amounts of dust are generated during earthquake when buildings are damaged or collapsed, and dust are clogged the air passages and the lungs. Burns and smoke inhalation from fires used to be major hazards after an earthquake.<sup>16-18</sup> In this study, majority of the 57% the people had medical problems where majority of the participants had musculoskeletal (36.74%) problems followed by respiratory problems (13.02%), neurological and psychological problems (11.62%), and eye problems (11.16%). The high musculoskeletal problems may be due to that trauma or injuries to body caused from earthquake, respiratory problems may be due to the dust inhalation or chest compression, neurological and psychological problems may be due to stress, and eye problems may be due to dust. Pradhan et al.<sup>12</sup> studied the types of ocular injuries

sustained in the earthquake in Nepal from April to July 2015. There were 59 earthquake victims visiting ocular hospital with 64 affected eyes due to 5 cases of bilateral involvement. In addition, they found that closed globe injury was most frequent (23 cases), compared to open globe injuries (8 cases). 24 patients (38%) presented with a visual acuity <3/60 in their affected eye, while, 15 patients (23%) had a visual acuity of <3/60 at follow-up.

Another study done in Dhulikhel hospital on cutaneous effects following 4 months of the earthquake in a tertiary care center of Nepal.<sup>7,8</sup> It was reported a total of 7326 patients presented to the dermatology department over a period of 4 months following the major shock. Among them, a total of 3833 patients (52.32%) had direct or indirect dermatoses following earthquake. More cutaneous diseases occurred de novo, but flare up of pre-existing cutaneous diseases were also evident. Eczema (photodermatitis, allergic contact dermatitis, atopic dermatitis and seborrheic dermatitis) was the common cause (20.6%).

Shrestha et al.<sup>9</sup> studied on hepatitis E virus (HEV) exposure in Nepalese blood donors after large earthquakes in earthquake affected regions (Kathmandu, Bhaktapur and Kavre). They found that 3.2% of donors were HEV IgM positive and 2 donors were positive for HEV antigen. Overall, 41.9% of donors were HEV IgG positive. Higher HEV IgG and IgM prevalence was observed in donors who reported eating pork, likely an indicator of zoonotic transmission. Previous exposure to HEV in Nepalese blood donors is relatively high.

Some factors related to the earthquake may cause long-term more adverse effects on health, i.e. low education, smoking habit and alcohol consumption, less nutrition, and inaccessible to medical treatment.

Liu et al. investigated 1 year after the Wenchuan, Southwest China earthquake for assessment of the oral health of the victims and to compare it with survey data from before the earthquake.<sup>19</sup> A temporary housing, community-based study was conducted. This study included a total of 1495, 65-74-year-old subjects, 740 countries and 755 rural, 753 men and 742 women. Oral hygiene practice, stress, tobacco abuse and nutritional intake had gone into an adverse trend right after the earthquake attack, similarly to what observed in our study. They also

found that perceived stress of the victims worsens the health of the victims.

Prevention and control efforts need to be multidisciplinary and should include public education programs and rehabilitation.<sup>20</sup> The results from this present study indicate that there is a necessity to strengthen a professional oversight and involvement of authorities to improve the health of these victims. Data from this study may provide basic information for health authorities and health professionals for planning and prevention strategies for better health of the earthquake affected victims.

### Conclusions

The general health, habits, nutritional intake of the people have been affected in the earthquake affected areas. It showed high musculoskeletal problems followed by respiratory problems, neurological and psychological problems, and eye problems. Data from this study may be used as basic information for health planning and future steps in health care preventive and therapeutic programs.

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### Declaration of interest

The authors report no conflict of interest.

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