Morbidity pattern and impact of rehabilitative services in earth quake victims of Kashmir, India

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Abstract

Background: The Kashmir earthquake also known as South Asia earthquake, hit both sides of Jammu & Kashmir on October 8th 2005 and was quite devastating with official toll of deaths being 73,276 in Pakistan Administered Kashmir (POK) and 1,360 deaths in the Indian administered Kashmir. The injured registering on the two sides were around 100,000 and 6,300 respectively. This was followed by a series of aftershocks on both sides for another 3 weeks

Method: A follow up (retrospective) survey was conducted by the Department of Community Medicine SKIMS, Srinagar in collaboration with National Institute of Orthopedically Handicapped (NIOH), Kolkata, immediately after the devastating earthquake of October 2008 that hit Kashmir (Jammu & Kashmir- India) and northern parts of India with the objectives to know the nature of the injuries, magnitude of disabilities, rehabilitative services provided, and service satisfaction. Addresses of earthquake victims registered with various health institutions, Tertiary Care Centre, orthopaedic hospital, district hospital and Composite Regional Centre (CRC)(through which rehabilitative services were provided initially) were collected and referral details, if any, to various health institutions. They were visited at their residence and interviewed for the desired information as per proforma by a team comprising of a doctor, physiotherapist, prosthetist and orthotist by making house to house survey in the earthquake areas. An effort for non registered injured victims, if any in the locality, was also made with health or district authorities to trace non registered injured persons

Results: The study shows that majority of injured were young adults and adolescent females, and primarily upper extremities, cervical spine and head were injured. The severely injured were shifted within 12-24 hrs to referral hospitals. In 2/3rd of affected families, single member was injured, whereas in 1/3rd at least two were injured. The case fatality rate was <1% because of low prevalence of crush injuries, and quick medical relief/management of the injured. A significant number of seriously injured victims (40%) required rehabilitative services and assistive devices. Probably a quick intervention by medical rehabilitative services, including facility of assistive aids and necessary customised prosthetics and orthotics first time in such disaster, has resulted in high client satisfaction, early restoration of functional and psychological status of the injured victims.

Conclusion: A collective effort by various public and private agencies with timely response at referral hospitals to various injuries reduced the frequency and chances of major disabling conditions. Intervention by CRC for providing assistive devices has also significantly helped in bringing back the functional and psychological status of the injured victims. Proper inter-sectorial coordination, better managerial skills, training of community volunteers (NGOs), and professionals on disaster management may further reduce the injury related disability and its impact. There is need of updating medico-surgical disaster management training for health care workers on continuous basis at various levels

Key words: Earthquake, injuries, victims, rehabilitative services, satisfaction.

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Introduction

The Kashmir earthquake, also known as South Asia earthquake, hit both sides of Jammu & Kashmir on October 8th 2005 (registered as 7.6 on Richter scale) and was quite devastating, with official death toll being 73,276 (some estimates being around 100,000) in Pakistan Administered Kashmir (POK) and 1,360 deaths (some estimates being around 1,800) in the Indian administered Kashmir. The injured registering on the two sides were around 100,000 and 6,300 respectively. This was followed by a series of aftershocks on both sides (estimates up to few hundreds) for another 3 weeks.(1) The worst hit areas on Indian side of Kashmir were southern and western parts (District Baramullah, Kupwara and pooch). Tens of thousands were rendered homeless. Maximum damage and destruction to the property was in Tehsil Uri followed by Tangdar.(1) Fifteen hundred houses were destroyed in Uri alone. About 90% of the families living in the town with a population of only 30,000 were affected by the quake.

Earthquakes caused high mortality result from trauma, asphyxia, acute respiratory distress (due to dust) or hypothermia, but they are better known for various types of other injuries in the initial weeks, ranging from minor injuries to fractures, and internal injuries to crush syndromes. Simultaneous damage to health facilities with interruption in basic health care leads to delayed referrals thereby increasing risk of death and disability.(6) The injuries need to be addressed in time, for better functional restoration and to reduce psychological impact of any post traumatic disability that arises among such people.

In any earthquake what is important is the scale and speed with which the administration responds to save precious lives and restores the infrastructure and brings back the normalcy. It is also important to make and keep a database for all types of injuries and their referrals, not only to know the type and magnitude of injuries for planning and organizing various rehabilitative services but also to keep a follow up for future rehabilitative action and to take preventive measures. It also helps in making comparisons and provides answers for certain questions/quarries.(3) The present study attempts to look at the earthquake injury data to get an insight into the type, magnitude and pattern of injuries following an earthquake and the rehabilitative services offered. The study analyses and critically examines the issues of management and impact of timely medical rehabilitative intervention.

Materials and Method

The survey was planned and supervised by the Department of Community Medicine, SKIMS, Srinagar, in collaboration with National Institute of Orthopedically Handicapped (NIOH), Kolkata. The objective was to make a descriptive epidemiological analysis on the injuries and disabilities resulting from the earthquake of such magnitude and assess patient satisfaction on rehabilitative services provided to the disabled.

The main affected areas in the north Kashmir were three Tehsils, namely Uri (District Baramullah) and Tehsil Karnah and Tangdar (District Kupwara). The other districts that had reported injuries were Srinagar, Anantnag and Pulwama Districts from Kashmir valley and Poonch and Rajori district from Jammu region.

Records from the civil administrative authorities, district authorities of all the affected areas, hospital records from the tertiary and secondary level care health institutions (including orthopedic hospital and composite resource centre (CRC, Srinagar) were collected to know the total number of injuries and referrals for surgical and medical treatment from the site of earthquake to health institutions. The information on patients registered or referred to various health institutions was collected by a team comprising of doctor, physiotherapist, prosthetist and orthatist to collect all relevant information on details of injury, treatment, rehabilitative services and other information as per pre-tested proforma. The team also made intensive house to house search in three badly hit Tehsils of north Kashmir families of injured, to further probe on injuries, services and other known injured in the locality that were not

registered with health or district authorities. It took ten intensive visits for the team to complete all the far off/remote places between March and April 2006 to locate the injured people, both referred and treated in different hospitals at the time of earthquake and with minor injuries not referred.

A last follow up of these injured cases was done by three team members to ascertain present status of injuries and rehabilitative management.

Results

Table-1 showing earthquake injury magnitude, treatment and referral.

Number of injuries reported, treated and referred to different health institutions		***From severely hit areas N (%)**	**From other areas**	**Overall**
1	No with injuries reported	2105 (80.15)	516 (19.84)	2621
2	Patients with Injuries / medical health problems of different nature referred to secondary or tertiary level hospitals	1203 (57.14)	163 (31.58)	1366
3	Minor Injuries / health problems managed locally	902 (64.36)	353 (78.58)	1255

- **District Baramulla (Uri), district Kupwara (Tangdar, Karnah)**

Out of 2,621 cases who received various injuries (as per records of different hospital and health institutions), 1,366 (52.11%) were referred to different health institutions of Kashmir valley. 2105 of total injured cases were from the three surveyed Tehsils constituting about 80%. Of the 2105 cases, 1203 cases (57.14%) were shifted to city of which 429 (35.66 %) cases had injuries that needed surgical, orthopaedic intervention with some rehabilitation services. We have been able to trace only 266 cases during follow up.

Table-2. District wise distribution of injured who could be traced from severely hit

Number of injuries reported, treated and referred to different health institutions		***From severely hit areas N(%)**	**From other areas N(%)**	**Overall**
1	No with injuries reported	2105 (80.15)	516 (19.84)	2621
2	Patients with Injuries / medical health problems of different nature referred to secondary or tertiary level hospitals	1203 (57.14)	163 (31.58)	1366
3	Minor Injuries / health problems managed locally	902 (64.36)	353 (78.58)	1255
4	Of those referred to secondary/tertiary level care who actually received major surgical/ orthopedic intervention	429 (35.66)	35 (21.47)	464
5	Those who could be traced and followed in detail after one year	266	Nil	

District	Tehsil	No (%)	Male (%)	Female (%)
Kupwara	Karnah	96 (36)	30 (31.25)	66 (68.75)
	Tangdhar	28 (10.52)	13 (46.42)	15 (53.57)
Baramullah	Uri	130 (48.87)	52 (40)	78 (60)
	Pattan	4 (1.50)	2 (50)	2 (50)
Others areas		8 (3.00)	3 (37.50)	5 (62.50)
Total		266 (100)	100 (37.59)	166 (62.40)

In the initial phase all the 429 patients, from severely hit earth quake areas with injuries requiring surgeries at different referral hospitals of Srinagar were also registered by team from Composite Resource Centre (CRC), Bemina, Srinagar, to follow them up for various rehabilitative services. One hundred forty one cases (32.86%) did not need any rehabilitative support or device. Of the rest 288, only 266 could be located and followed in their homes after one year. Majority i.e. 130 cases (48.87%) were from Tehsil Uri followed by 96 cases (36%) from Tehsil Karnah and 28 cases (10.52%) from Tehsil Tangdar, rest being other areas of district Baramullah. More females were injured in the disaster than males (62% vs. 38%). Percentage of males was greater from Uri (52 %) and Tangdar (13 %) as compared to Karnah where the percentage of female (39.75%) was high.

Table-3 Socio-demographic characteristics of 266 cases that were traced.

Type of house	No	Percent
Pucca stone	244	91.72
Pucca brick	10	3.75
Kuccha	12	4.51

No of stories		
Single story	214	80.45
Double storey	44	16.54
Multiple stories	8	3.0

Income (Rs/month)	No	%
< 1,000.00	159	59.77
1,001-3,000.00	81	30.45
3,001-5,000.00	16	6.01
>5,001.00	10	3.75
Family members		
<3	39	14.66
4-6	99	37.21
7 or more	126	47.36
Occupation		
Govt service	6	2.25
Agriculture labour	89	33.45
Student	68	25.56
House wife	59	22.18
Others	44	16.54

The entire injured population belonged mainly to rural border areas and 91.7 % were having Pucca houses made of stone, and the rest were Kucha brick or mud houses with 80.4 % of them being double storied and another 16.4 % as three storied (a usual trend in Uri and Kupwara where such houses are constructed on different terrains). The average family size was 6.8, with almost 48% families having 7 or more members and 37% families with 4-6 members. Almost 60% belonged to families with monthly income < Rs 1,500/p.m and another 15% up to Rs 3,000/p.m. More that 1/3rd of the injured was agricultural labours (33.45 %) and just over 1/5th were house wives (22.18%), and about 26% were students. More than 2/3rd cases were the lone family member injured in that house whereas in another 20%, at least two members of the same family were injured. Another 12% had either three or more family members injured

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Table-4. Age and sex distribution of the injured population.

Age	Male		Female		Total	
	No	Percent	No	Percent	No	Percent
< 5 yrs	4	4.0	10	6.02	14	5.26
6-15 yrs	38	38.0	16	9.63	54	20.30
16-25 yrs	18	18.0	41	24.69	59	22.18
26-45 yrs	23	23.0	67	40.36	90	33.83
46-55yrs	12	12.0	18	10.84	30	11.27

Females outnumbered males, 61% to 39%, of the injured. About 55% were adolescents, young adults and adults in the age group of 16-45 yrs followed by 20% in 5-15 yrs and 11.27 % above 46 yrs. Among males 38% school going children suffered injuries, followed by young adults. Amongst females, it was mainly young adult females (33.83%) and adult girls (22.18 %).

Table-5. Main body part injured.

Body part		No	Percent
Lower limb	Left	65	21.10
	Right	75	24.35
	Both	17	5.51
Upper limb	Left	26	8.44
	Right	23	7.46
	Both	2	0.64
Spine		38	12.33
Head		41	13.31
Chest		3	0.97
Abdomen		3	0.97
Others		15	4.87

Lower limb injuries were the commonest (50.96%), followed by upper limb (16.54%), head (13.31%) and spine (12.33%). Almost 1/4th (24%) of injured had been shifted/referred to or treated at specialized tertiary level hospitals, 31% at district hospitals and rest in the army or other hospitals.

Table-6. Mode of injuries and shifting time.

Mode of injury	**No**	**Percent**
• Direct hit by debris	95	35.71
• House collapse	152	57.14
• Jump from building	13	4.88
• Others	6	2.25
Total	266	
Shifting time		
• 12-24 hrs	123	46.24
• 24-48 hrs	94	35.33
• 48-72 hrs	49	18.42

The house collapse was the common cause of injury in 57.16% cases, while 35.71% injured as a result of being hit by debris. Forty six percent of the injured were shifted to hospital within 12-24 hrs, another 35% within 24-48 hrs and by the end of 72 hrs all the injured had been transferred to hospitals. Thirty nine percent of the injured had been rescued by local people, 32% by army/police and the rest by the Medical team.

Table-7. Showing Spinal injury and associated signs /symptoms following earth quake injury

S.no	**Spinal part injured**					**Spine injury associated with**			**Other symptoms**						
	Cervical	Dorsal	Lumber	Sacral	Others	Head injury	Soft tissue injury	Other bony injury	Unconscious	Vomiting	Retention of urine	Loss of skin sensation	Loss of moments	Weakness in lower limbs	Others
No	4	7	8	4	0	8	4	3	8	0	2	2	0	3	0
%	1.5	2.63	3.00	1.5		3.00	1.5	1.12	3.0		0.75	0.75		1.12	

Out of the 266 cases, 38 cases (12.33%) received spinal injuries, dorsal and lumber segment involvement was seen in 2.63% and 3.0%, respectively, with 1.5% having cervical and sacral injury each; 5.62% had associated head or body injury along with spinal injury. Only 2.6% were having other medical symptoms. 2/3rd (67.0%) cases of spinal injuries were brought by the family or local people and another 13.0% were brought by medical team. Rest of the cases with spinal injuries were brought by police or other people.

Table-8. Length of stay in the hospital of referred patients.

	Medical/conservative intervention		**Surgical/Orthopaedic intervention**	
	For Minor	For Major	For Simple	For Compound
% of total injured	42.4	5.2	50.7	26.9
Average stay	1.41 days ±1.10	4.92 days ±1.62	2.6 days ±0.84	13.25 days ±4.6

Around 43% of the referred patients for medical management from various areas had minor medical problems with only 5% having problems needing admission. Fifty percent of the referred cases for surgical management were admitted for a short stay and 1/4th of the injured had major surgical/orthopaedic problems requiring long stays for 1-2 weeks.

Table-9. Assistive aid provided / appliance/brace fitted

S.no		**Item**	**No**	**Percent**
1	Type of assistive aid	Crutches/sticks	85	31.95
2		Spinal brace (customized)	8	3.0
3		Wheel chair	10	3.75
4		Prosthesis	2	0.75
5		Fracture bracing	2	0.75
		Others	1	0.37
1	Type of appliance /brace fitted	ASH	6	2.25
2		Spine Corset	2	0.75
3		Cervical collar	3	1.12
4		Traction	8	3.0
5		Custom made brace	7	2.63
6		Others	18	6.76

About 32% of the affected received crutch/stick, 3% spinal brace, 4% wheel chair, 0.75% prosthesis and fracture brace each, 2.25% received ASH, 1.12% cervical collar and 3% were put on traction.

Table-10. Qualitative Follow up assessment of services and future need

Service character	**Assessment scale**	**No**	**Percent**
Quality	Good	220	82.70
	Satisfactory	27	10.15
	Un-satisfactory	19	7.14
Promptness	Timely	254	95.48
	Late	5	1.87
	No service	7	2.63
Attitude of service providers	Good	208	78.19
	Indifferent	4	1.50
	Bad	54	20.30
Rehabilitative assistance /aid provided	Proper	240	90.22
	Improper	26	9.77
Impact of rehabilitative services	Yes	258	96.99
	No	8	3.00
Follow up	Yes	240	90.22
	No	26	9.77
Present need of rehabilitation	Rehabilitation / assistive aid	13	4.88
	Rehab Therapy	225	84.58
	Counselling /guidance	251	94.36
	Socioeconomic rehabilitation	233	87.59

Qualitative assessment of services

While assessing services, 82.70% responded to have received good quality care and 96% responded that the services were timely, 78.8% persons categorized attitude of service providers as good and 20% felt their attitude was bad; 90 % believe that rehabilitative assistance/aid provided were proper and 97% felt the impact of rehabilitative service as beneficial. While 95% still felt that counseling and guidance needed to be continued, 5% felt a further need of rehabilitative aid. Surprisingly the majority (87%) believe that economic aid is more important and the priority.

Table-11. Present condition of patient.

Condition	No	Percent
Good	186	69.92
Fair	70	26.33
As it is	10	3.75
Deteriorated	Nil	-

Condition of 70% of treated victims was good and 26% were fairly placed. Only 3.7% were as they were at the time of injury and 90.5% had received rehabilitative assistance and necessary rehabilitation aid. About 90% are still using the rehab aid and 97.3% confirmed the positive impact of rehab services on overall management and their routine work. 90% of the injured were under follow up, 85% are on physiotherapy, 95% are receiving counseling and guidance and 87% felt socioeconomic rehabilitation (assistance) a need. About 5% demanded rehab assistive aid.

Discussion

Earthquakes are known to cause mass deaths and injuries with their devastating effect on infrastructure and civil structure. However nature, extent of injuries and mortality varies with different intensities and locations. The present study discusses injury pattern of earthquake of 7.6 to 8 on Richter scale that makes it a major earthquake similar to the intensity as that of 2001 Gujarat earthquake.[(2)]

The epicenter of this earthquake being Azad Kashmir (POK), the major impact in the form of mortality and morbidity was on that side of Kashmir. But almost 1,300 people perished and 4,500 were injured in Jammu and Kashmir that flattened or damaged 32,000 houses. A final report from this part of Kashmir reported approximately 1,400 deaths and 6,270 injuries in a 'at risk' population of 3.1 million (comprising of main Tehsils in four districts of Kashmir, adjacent to the line of control (LOC) or where earthquake tremors were mainly felt). The estimated injury prevalence was 0.27/1000 population and mortality rate of 0.45/1000 population. Entrapment was the single most significant factor associated with death or injury. The victims probably suffered a protracted death due to non availability of help and support for immediate rescue operations. Comparing these figures to Gujarat earthquake with almost similar intensity, the mortality and injury were 20,000 deaths and 166,000 injuries of which 20,717 were of serious nature.[(4)] Negligible case fatality rate (<1%) was similar to that case fatality rate in Gujarat earthquake.

The nature of the injuries

The pattern and the nature of injuries reported in this study do not show any predilection to socioeconomic characteristics of the population. However, we observed that youth and young adults mostly sustained injuries whereas the women, elderly and very young had succumbed to death. This is attributable to the timing of the earthquake when mostly women and young adults are awake and are busy in preparing for days routine while elderly and very young ones are still in the bed. The youth may have also suffered the injuries while trying to rescue or save their dear ones. Mostly the injuries were of upper and lower limbs followed by spinal injuries that describe the struggle efforts made during earthquake in providing safety or rescue to self and others. This can further be substantiated by the fact that the main cause of injuries was direct hit by debris followed by house collapse. About 46% had suffered upper limb injuries and 25% spine or head injuries.

There is a lot of similarity in the age, sex and body part involvement of various injuries suffered by the victims to that of Gujarat earthquake. However, severity of injuries being different is probably owing to the dissimilar housing structure (type and material being different in two places).[(5)] The nature, severity and body part involvement if available guides the hospital authorities towards

preparedness of services. Only 1/3rd (32%) of the families had more than one person injured during the earthquake, indicating that a good number of people might have left their houses for their daily routine. Crush injuries were of insignificant magnitude. Fitting of appliances or assistive aids in almost 50 % of physical injuries describes the fact that almost half of the injuries have been of complicated or compound nature and need such services in said situation.

The services provided

Despite a lot of infrastructural damage and collapse of civil structure, including some damage to sub-district Hospital, Uri and other peripheral institutions in the earthquake hit areas, the main District hospitals at Baramullah and Kupwara remained functional and majority of the simple injuries were tackled locally. It seems that the principal of triage had been applied successfully in handling various injuries and only 1/4th of injuries of serious nature had to be shifted to major referral/tertiary hospitals. Some of the major injuries were also managed by army hospital. One of the important finding was that almost 50% of seriously injured were shifted to referral hospital within 24hrs and up to 80% by 72 hrs, whereas in many earthquakes 80-90% injured are shifted within 12 hrs. The difficult location, distance, prevailing situation and the terrain might be delaying factors in transportation. This can be considered as a quick response and therefore has been an important factor in bringing case fatality rate < 1 %. Even this miniscule of mortality following trauma is attributable to pre-existing aetiology rather than nature of injury. Since 1/4th of severely injured had an average hospital stay of about 2 weeks, this had an important ramification on determining/making bed availability during earthquake disaster in referral hospitals.[3]

Rehabilitation services, prescription of assistive aid, fabrication and fitting of appliances to almost 50% injured during acute stage and in time had been an important factor in preventing long standing major disabilities. This shows the need to keep a close liaison with rehabilitative services (rehabilitative units/departments-PMR) for better outcome. In fact emergency trauma services established in disasters need to coordinate with rehabilitative units. This was further substantiated by the fact that >95% of cases have improved and are in good condition. None of the injured has deteriorated after discharge from hospital and just 3% have the same condition what was at the time of discharge, attributable to quick and timely response for rehabilitation of injured persons with disability from national agency (NIOH) through local Composite Regional Centre (CRC). Not much information is available for various earthquake injuries on this aspect.

The qualitative assessment

Qualitative assessment of the medical services as viewed by the affected (with injuries) revealed that the services have been timely and prompt. Provision of rehabilitative services has been proper and beneficial. But what is also important is to be humane and polite in providing such services. In about 20% of cases, the attitude of service providers was not good enough. Better communication skills and approach is required from the caregiver to discuss areas of rehabilitative services or use devices by people who become physically compromised with earthquake injuries. Exposure and sensitization on such areas for service provider in the methods of handling patient with injuries and accompanying mob during such natural disaster remains an important priority. The follow up services of injuries especially requiring rehabilitative services is another important area that needs to be strengthened as in this study 90% cases felt that counselling or guidance and about 85% persons felt that medical rehabilitation measures need to continue till full recovery or restoration is attained.

Conclusion

A collective effort in shifting of injured people by various public and private agencies to various referral hospitals reduces frequency and chances of major disability. Provision of timely assistive devices helps significantly in bringing back the functional and psychological status of injured victims. Medico-surgical disaster management training for health care workers at various levels and incorporation of early (timely) rehabilitative measures in a comprehensive manner on continuous basis have much better impact on the final outcome of injury status.

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