ORIGINAL ARTICLE

DISEASE PATTERN IN EARTHQUAKE AFFECTED AREAS OF PAKISTAN: DATA FROM KAGHAN VALLEY

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Background: In 2005 northern parts of Pakistan were hit by an earthquake of magnitude 7.6 on rector scale. Fatima Memorial Hospital established a Primary Health care centre in village of Jared in Kaghan valley. The objective of the study was to find the pattern of different diseases presetting to health centre. **Methods:** All cases between August 2006 and December 2008 were included from the daily outpatient record of the centre. Data was analyses using SPSS-17. Frequency of different diseases and groups of diseases in different age groups, sexes and time of the year were the main outcome variables. **Results:** Total number of patients was 22,122 with a mean age of 26±16 years. The number of female patients was 12,634 (57.1%) and males were 9,488 (42.9%). The single most common condition in the study period was viral upper respiratory tract infection (5,042, 23%), followed by Scabies (3,757, 17%), Acid Peptic Disease (3,157, 14.3%), Urinary Tract infection (1,197, 5.4%) and Hypertension (n=933, 4.2%). There was a high number of young patients with urinary tract infection and hypertension. **Conclusion:** Communicable diseases like viral respiratory tract infection and scabies were the most common infections. Acid peptic disease was the most common non-communicable medical problem. Except eye conditions, all diseases were more common in summer and rainy season.
Keywords: Disease pattern, 2005 earthquake, earthquake affected areas, Pakistan

INTRODUCTION

In October 2005, northern areas of Pakistan were hit by an earthquake of magnitude of 7.6 on rector scale claiming more than 75,000 human lives. Many civil society and health care organisations participated in initial rescue for victims and providing first aid. Earthquakes are disasters which cause a lot of musculoskeletal injuries initially and changes in disease pattern later on because of destruction of water and sanitation system and altered living conditions. Climate of the affected area also plays a role in disease pattern after an earthquake as dysentery was found common after a summer earthquake in Egypt while respiratory diseases were common after a winter earthquake in China.[1,2] Moreover, acute exacerbations of chronic conditions have also been reported after earthquakes.[3] Earthquakes have also been implicated in causing fatal arrhythmias in admitted patients, acute myocardial infarction and pulmonary embolism.[4,5] In the aftermath of an earthquake there is need for dialysis and renal care because of crush syndrome.[6] Depression, post-traumatic stress disorder and peptic ulcer disease are known to increase in incidence after an earthquake.[7,8] Water-borne infections spread because of lack of clean water supply and skin diseases flare up.[9] Admissions in hospitals increase in the initial phase but later on most of issues present at primary health care level and pattern of disease at tertiary care level does not represent actual disease pattern in affected areas.[10] It has also been noted that health workers in the earthquake affected areas do not attend their jobs and engage in working for their own families which further affect the relief work.[11] Studies have shown that in earthquake affected areas health care providers are not sensitised to needs of elderly and guidelines for such situations are not present.[12] Small relief camps which mushroom after earthquake shave been shown to have bad health outcomes.[13]

This study is a compilation of the available data about disease patterns in different age groups, both sexes and time of the year. The purpose of this compilation is to present scientifically the common diseases to health authorities for appropriate allocation of resources and for future planning and to share the data with scientific community.

MATERIAL AND METHODS

This is a retrospective study of all the patients presenting to primary Health Care Centre, Jared, Kaghan. The centre maintains a register of all the patients coming to the centre including age, sex and diagnosis. Patients are evaluated and treated by a qualified family physician and diagnosis is coded using International Classification of Diseases version 10 (ICD-10) of World health Organization (WHO). Clinical details are written in individual files of each patient. The daily data is verified by doctor in charge of the centre. The data is then sent to Department of Family Medicine FMH College of Medicine and Dentistry for entry into computer. Universal sample of all the patients seen between August 2006 and December 2008 was included in the study. Frequency

of diseases in different age groups, both sexes and time of the year were the main outcome variables of the study. Age of patients was converted into groups for analysis. The individual diseases were grouped together according to organ system for the purpose of analysis. The original data was available in the form of hard copies of daily OPD sheets which was entered into computer. The data was analysed using SPSS-17. No separate data collection questionnaires were used in this study. Incomplete entries (n=7) were excluded from analysis.

RESULTS

Total number of patients seen between August 2006 and December 2008 was 22,122, comprising of 1,913 in 2006, 9,874 in 2007, and 10,335 in 2008. The mean age of our cases was 26±16 years. The age was categorised into paediatric (<15 years), young adult (15–34 years), middle age (35–55 years) and elderly (>55 years) for the purpose of analysis. Paediatric cases were 4,905 (22.2%), young adults were 8,684 (39.3%), middle age group was 6,414 (29%), and elderly were 2,119 (9.6%). Female patients were 12,634 (57.1%) male were 9,488 (42.9%). The number of female patients increased from 50.5% in 2006 to 56.4% in 2007, and to 59% in 2008 (*p*=0.001). Male patients were in greater number in paediatric (M=53.6%, F=46.4%) and elderly groups (M=58.8%, F=41.2%) while female patients were in greater numbers in young adults (M=39.7%, F=60.3%) and middle age (M=33.6%, F=66.2%) groups (*p*=0.001).

July had the highest number of cases (2,297, 10.4%) and January had the lowest number of cases (924, 4.2%). Highest number of paediatric cases were in month of November (n=599, 12.2% 4905) and highest number of elderly cases were in the months of August and November (each n=228, 10.8% of 2119). The highest ratio of male cases was in October (49%) and highest ratio of female cases was in the month of March (64%).

Disease pattern

The diseases were categorised into Medical, Ear Nose and Throat (ENT), Skin, Eye and Musculoskeletal groups for determination of general pattern of diseases. Among each group individual diseases were then separately analysed. Medical conditions as a group were the most commonly encountered problems during the study period (n=6869, 31% of 22,122). Ear Nose and Throat (ENT) problems were the second most common condition (n=6031, 27.3% of 22,122). The frequencies of other groups of diseases are shown in Table-1. The single most common condition in the study period was viral Upper Respiratory Tract Infection (URTI) (n=5,042, 23% of 22,122). The top most common individual diseases in order of frequency are shown in Table-2.

Disease pattern over the year

ENT and medical conditions were present throughout the year with slightly increase number in spring and summer. Eye problems were common in winter. Injuries were common in August and February. Musculoskeletal problems were common in rainy season, i.e., July, August and September. Skin problems were common in summer, although present throughout the year.

DISCUSSION

Our study was a retrospective collection of the record of a health care centre operating in an earthquake affected area. Data from most of other studies about disease pattern in earthquake affected areas also came retrospectively in the after math of disaster.[14] Our data was collected over a period of 29 months which gave a better picture of disease pattern over months. Coding of diseases using ICD gave a uniform system of diagnosis which has also been used in Tsunami affected areas in 2004. As the centre operated on 7 days week basis throughout the year, the number of cases was 22,122 which gave statistically significant comparisons during analysis. Studies from Kashmir during the same period showed that young people utilise fixed health services more than mobile health service which was also found in our study. In contrast to study in Kashmir where men utilized fixed health service more than women, in our study women were using the health centre more than men.[14] In both extremes of age that is in children and elderly the number of male patients was more than female patients in most of health conditions while in young adults and middle age groups the number of female patients was more than male patients in most diseases.[15] This could be because of increased social responsibilities of women in that society where they have to take care of children as well as of themselves because young men are usually away from home for earning bread. Elderly men usually stay at home to look after their families. Myalgia was the only condition in which the number of female patients was more than male patients in all age groups.
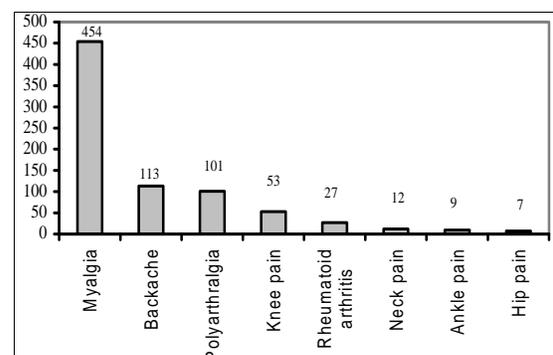

Figure-1: Common Musculoskeletal problems seen 2006–2008 at earthquake affected areas of Pakistan

Table-1: Common Medical Conditions seen 2006–2008 at earthquake affected Kaghan valley of Pakistan [n (%)]

Disease	Total	Gender	Male	<15 years	15–35 years	36–55 years	>55 years	p
Acid Peptic Disease	3157 (45.9)	M	1289 (41)	335 (52.0)	440 (32.8)	309 (32.8)	205 (60.1)	0.001
		F	1868 (59.0)	307 (48.0)	744 (62.1)	673 (67.2)	134 (39.9)	
Urinary Tract Infection	1197 (17)	M	475 (40.0)	112 (53.9)	159 (34.3)	126 (31.3)	78 (36.3)	0.001
		F	722 (60.0)	98 (46.1)	301 (65.7)	276 (68.7)	47 (36.7)	
Hypertension	933 (13.6)	M	370 (40.0)	113 (54.9)	125 (38.5)	79 (25.5)	53 (57.6)	0.001
		F	563 (60.0)	93 (45.1)	200 (61.5)	231 (74.5)	39 (42.4)	
Diarrhoea	664 (9.4)	M	305 (47.0)	113 (54.1)	132 (48.0)	37 (29.6)	23 (65.7)	0.001
		F	339 (53.0)	96 (45.9)	143 (52.0)	88 (70.4)	12 (34.3)	
Parasitic infestation	207 (3)	M	84 (41.0)	29 (55.8)	32 (35.2)	15 (34.1)	8 (40.0)	0.001
		F	123 (59.0)	23 (44.2)	59 (64.8)	29 (34.1)	12 (60)	
Headache	175 (2.6)	M	58 (33.0)	8 (42.1)	18 (31.1)	23 (28.4)	9 (53.0)	0.001
		F	117 (67.0)	11 (57.9)	40 (68.9)	58 (71.6)	8 (47)	
Bronchitis	78 (1.1)	M	44 (56.0)	13 (65.0)	14 (51.9)	12 (50.0)	5 (71.4)	0.001
		F	34 (44.0)	7 (35.0)	13 (48.1)	12 (50.0)	2 (28.6)	
Asthma	67 (1)	M	29 (43.0)	5 (41.5)	4 (33.3)	10 (41.7)	10 (52.6)	0.001
		F	38 (57.0)	7 (58.5)	8 (66.7)	14 (58.3)	9 (47.4)	
Diabetes mellitus	63 (0.9)	M	22 (35.0)	4 (44.5)	5 (31.3)	6 (21.4)	7 (70.0)	0.001
		F	41 (65.0)	5 (55.5)	11 (68.5)	22 (78.6)	3 (30.0)	
DM-Type I	34 (0.5)	M	9 (26.5)	3 (42.9)	2 (18.2)	2 (18.2)	2 (40.0)	0.001
		F	25 (73.5)	4 (57.1)	9 (81.8)	9 (81.8)	3 (60.0)	
DM- Type II	29 (0.4)	M	13 (45.0)	1 (50.0)	3 (60.0)	4 (23.5)	5 (100)	0.001
		F	16 (55.0)	1 (50.0)	2 (40.0)	13 (76.5)	0 (0)	
Abdominal pain	54 (0.8)	M	27 (50.0)	8 (61.5)	12 (45.8)	4 (34.3)	3 (75.0)	0.001
		F	27 (50.0)	5 (38.5)	13 (54.2)	8 (65.7)	1 (25.0)	
Tuberculosis	51 (0.7)	M	15 (29.0)	3 (27.3)	9 (37.5)	1 (14.3)	2 (22.2)	0.001
		F	36 (71.0)	8 (72.7)	15 (62.5)	6 (85.7)	7 (77.8)	
Dysentery	39 (0.6)	M	21 (46.0)	7 (53.8)	6 (37.5)	8 (88.9)	0 (0)	0.001
		F	18 (54.0)	6 (46.2)	10 (62.5)	1 (11.1)	1 (100)	

Table-2: Top most common individual diseases seen 2006–2008 at earthquake affected Kaghan valley [n(%)]

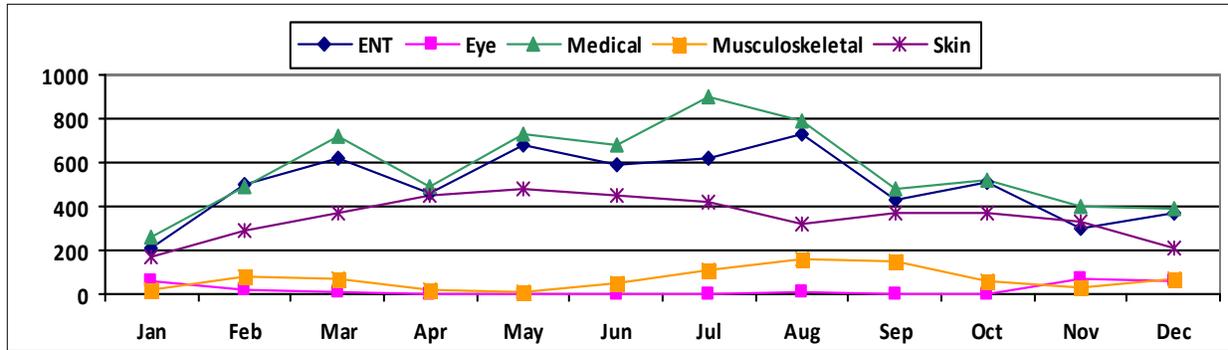| Disease	Total	Gender	Male	<15 years	15–35 years	36–55 years	>55 years	Month of highest frequency
Viral URTI	5042 (22.8)	M	2216 (44.0)	642 (52.6)	797 (40.0)	499 (35.9)	278 (61.2)	May 627 (12.4)
		F	2826 (56.0)	579 (47.4)	1197 (41.7)	892 (64.1)	176 (38.8)	
Scabies	3757 (17)	M	1694 (45.0)	463 (54.3)	656 (41.6)	389 (38.3)	186 (59.6)	June 445 (11.8)
		F	2063 (55.0)	390 (45.7)	921 (58.4)	626 (61.7)	126 (40.4)	
Acid Peptic Disease	3157 (14.3)	M	1289 (41.0)	335 (52.0)	440 (32.8)	309 (32.8)	205 (60.1)	May 427 (13.5)
		F	1868 (59.0)	307 (48.0)	744 (62.1)	673 (67.2)	134 (39.9)	
Urinary Tract infection	1197 (5.4)	M	475 (40.0)	112 (53.9)	159 (34.3)	126 (31.3)	78 (36.3)	July 216 (18)
		F	722 (60.0)	98 (46.1)	301 (65.7)	276 (68.7)	47 (36.7)	
Hypertension	933 (4.2)	M	370 (40.0)	113 (54.9)	125 (38.5)	79 (25.5)	53 (57.6)	July 163 (17.5)
		F	563 (60.0)	93 (45.1)	200 (61.5)	231 (74.5)	39 (42.4)	
Diarrhoea	664 (3)	M	305 (47)	113 (54.1)	132 (48.0)	37 (29.6)	23 (65.7)	July 148 (23)
		F	339 (53.0)	96 (45.9)	143 (52.0)	88 (70.4)	12 (34.3)	
Bacterial URTI	500 (2.3)	M	213 (43.0)	60 (55.1)	93 (38.1)	43 (37.7)	17 (51.5)	February 148 (72.9)
		F	287 (57.0)	49 (44.9)	151 (61.9)	71 (62.3)	16 (48.5)	
Myalgia	454 (2)	M	189 (42.0)	41 (46.6)	76 (40.4)	36 (29.3)	36 (11.7)	September 125 (27.5)
		F	268 (58.0)	48 (53.4)	110 (59.6)	88 (70.7)	19 (34.6)	
Otitis media	414 (1.9)	M	165 (40.0)	58 (51.3)	62 (36.3)	24 (23.8)	21 (72.4)	June 134 (32.4)
		F	249 (60.0)	55 (48.7)	109 (63.7)	77 (76.2)	8 (27.6)	
Conjunctivitis	235 (1.1)	M	111 (47.0)	37 (62.7)	34 (43.0)	24 (33.3)	16 (64.0)	November 67 (28.5)
		F	124 (53.0)	22 (37.3)	45 (57.0)	48 (66.7)	9 (36.0)	
Atopic dermatitis	231 (1)	M	97 (42.0)	12 (52.2)	29 (39.7)	38 (38.8)	18 (48.6)	March 43 (24.7)
		F	134 (58.0)	11 (47.8)	44 (60.3)	60 (61.2)	19 (51.4)	
Parasitic infestation	207 (1)	M	84 (41.0)	29 (55.8)	32 (35.2)	15 (34.1)	8 (40.0)	Nov, Dec 31 (15) each
		F	123 (59.0)	23 (44.2)	59 (64.8)	29 (34.1)	12 (60.0)	
Headache	175 (0.8)	M	58 (33.0)	8 (42.1)	18 (31.1)	23 (28.4)	9 (53.0)	August 47 (27)
		F	137 (67.0)	11 (57.9)	40 (68.9)	58 (71.6)	8 (47.0)	
Maculo-papular rash	174 (0.8)	M	73 (42.0)	21 (48.8)	30 (42.3)	17 (37.0)	5 (35.7)	August 43 (24.7)
		F	101 (58.0)	22 (51.2)	41 (57.7)	29 (63.0)	9 (64.3)	
Polyarthritis	128 (0.6)	M	43 (33.5)	3 (37.5)	11 (32.4)	17 (24.3)	12 (75.0)	March 37 (29)
		F	85 (66.5)	5 (62.5)	23 (67.6)	53 (75.7)	4 (25.0)	
Backache	113 (0.5)	M	40 (35.0)	7 (35.0)	12 (27.3)	14 (36.8)	7 (63.6)	February 36 (31.9)
		F	73 (65.0)	13 (65.0)	32 (72.7)	24 (63.2)	4 (36.4)	

Figure-2: Pattern of different groups of diseases in different months of the year

The two most common conditions were viral respiratory tract infection (URTI) and scabies both of which are contagious and depend on close living conditions. As the climate of the earthquake hit area was extremely cold, therefore the houses are usually small and less ventilated in order to combat the chilly winds of winter. This could be a risk factor for above two conditions. Respiratory diseases are known to peak three folds in cold weather and high altitudes.[16,17] In contrast to studies done in Karachi pneumonia was less common in our study population.[18] On the other hand bacterial respiratory tract infections consisting of tonsillitis, pharyngitis and sinusitis collectively were in the proportion of 1:9 with viral URTI which is similar to their global pattern. Scabies could be common due to infrequent bathing and changing of clothes and sharing beds.[19] Secondly incomplete treatment of whole families for scabies is a well known risk factor for endemicity of scabies.

The third most common condition was acid peptic disease across all age groups. This condition consisted of gastro oesophageal reflux disease (GERD), epigastric burning and retrosternal burning. Although in our study the diagnoses were mostly clinical, but some form of gastritis, peptic ulcer and reflux is present in patients with these symptoms.[20] Gastritis is the most common endoscopic finding in patients with dyspepsia and gastric ulcers are only 9.5% in these patients.[21] Acid peptic disease is known to flare up after earthquakes probably due to stress.[7] Other causes could be high prevalence of Helicobacter pylori infection which is associated with 53 percent of duodenal ulcers, giardiasis, dietary habits like high salt intake, sleeping soon after dinner and possible as a psychosomatic complaint.[22,23] The psychosomatic nature of dyspepsia is also reinforced by a clinical audit of 8,481 cases of endoscopies in most of endoscopies were normal mostly in females suggesting functional dyspepsia.[24] On the other hand symptoms of depression meeting the DSM-IV diagnostic criteria were found in less than 0.01% despite loss of close family members in earthquake which is in contrast to other studies in post earthquake period showing a higher prevalence of depression.[8]

Urinary tract infection (UTI) regardless of the predisposing factor was also frequent in our study. Studies from the same district have also reported similar number of cases of UTI and renal calculi even in children.[25] One explanation could be poor water intake because of cold climate other could be use of stones for cleaning when people pass urine in the wild. Secondly presence of silent stones could also be possible as they are prevalent in 3% of our population and Pakistan is among the 'stone countries'.[26] Renal stones are found in 18.98% of patients with urinary tract infection.[27]

In our study diarrhoea was found less common than other earthquake affected areas where diarrhoea and dysentery had epidemics. The major source of drinking water in Jared is natural springs which could be a protective factor against water borne diseases. The highest number of cases of diarrhoea was noticed in July which is a rainy season and spring water is contaminated with rain water. On the other hand helminthes infestation was found in all age groups and both sexes. Helminthes infestations does not seem to be related to earthquake as such because 86% of stool samples of houses in rural set up has been found positive for different helminthes.[28,29] The major source of work infestation comes through contact of skin with larvae in the soil during bare foot walking and farming and also through ingestion of ova. Presence of helminthes in young and middle age women implies that they may be responsible for spreading infection by handling of food for their families.[30]

Hypertension was more common than diabetes in our study. A significant number of hypertensive cases were found in children and young adults in contrast to other studies in Pakistan and India which raises alarm about secondary causes of hypertension. The known risk factors for pre-hypertension and hypertension like diabetes, increased BMI and waist hip ratio were not present in our subjects.[31,32] The alternate explanation for this high figure could be use of inappropriately sized cough, white coat hypertension, stress, walking for miles before coming to centre, poor antihypertensive therapy or excessive use of tea or salt in diet.[33] This is one aspect which needs in-depth community based

studies to confirm or refute these high figures of hypertension in young people. Diabetes was very uncommon in our study in contrast to national Diabetic Survey of Pakistan in which its prevalence is 12.68% in males and 19.37% in females.[34] Type I diabetes was more common than Type II diabetes most probably because of excessive physical activity of the people living in the mountains. The same physical activity could also be responsible for the most common musculoskeletal complaint of muscle pains. Myalgia was also the third most common cause for clinic visits in a large multicentre study in which computerized data was retrospectively analysed like in our study. Similarly climbing up and down the mountains might be providing natural quadriceps exercise because of which only a small number of people in all ages presented with knee pains. Frequency of knee pains in similar poor population of Pakistan has been reported as 5 percent which is much higher than our study population.[35,36]

The groups of diseases also showed some seasonal pattern. All groups of diseases were more common in warm weather except eye diseases which were more common from November till January. ENT, musculoskeletal and medical conditions were most common in rainy season of July and August. Skin conditions were most common in dry summer of May and June.

There were few limitations of our study as our data was based on the daily OPD register of the centre which did not give the clinical details of the diseases. There was a miscellaneous group of conditions under ICD code for 'others' which could not be analysed. The cases were defined as the clinical encounters of patients at the centre and the same patient might have presented multiple times to the centre with different or same diagnosis.

CONCLUSIONS

Communicable diseases like viral respiratory tract infection and scabies were the most common infections in the earthquake affected Kaghan valley of Pakistan. Acid peptic disease was the most common medical condition presenting to primary health care centre. There was a high number of young patients with urinary tract infection and hypertension in our study which necessitates further studies. Except eye conditions all diseases were more common in summer and rainy season.

ACKNOWLEDGEMENTS

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