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ORIGINAL RESEARCH ARTICLE

SPECTRUM OF OCULAR DISEASES IN AFTERMATH OF MONSOON FLOOD IN NEPAL

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ABSTRACT

Background: Floods are common global natural disasters that occur occasionally in Nepal. Numerous environmental damages and health impacts are known to occur due to direct effect of flooding. There are limited studies reporting the ocular diseases after the event of floods using a large population data. We aimed to present the spectrum of flood-related ocular diseases after monsoon flood in Nepal using a community-based database.

Methods: A descriptive, cross sectional study design was used to collect the data from diagnostic screening and treatment camps organized in flood-affected areas between one to three weeks after the monsoon flood in Nepal. The data was analyzed using the excel sheet and the results were presented in frequency and percentage in the frequency distribution tables.

Results: The children and elderly constituted majority of patients. Females constituted 54% while males were 46% of the total patients presenting at the camps. The incidence of infective ocular diseases was 23.8% and that of traumatic ocular injuries was 6.2% of total ocular diseases. Acute conjunctivitis was the most common infective ocular disease (21.1%) followed by keratitis (2.7%). Corneal abrasions (1.4%), subconjunctival hemorrhage (1.1%) and lid ecchymosis (0.7%) were common clinical diagnosis following traumatic ocular injury.

Conclusions: The infective ocular diseases and traumatic ocular injuries are common flood-related ocular diseases seen within one to three weeks after flood receded. The knowledge of these expected ocular morbidities may help for proper planning and organization of such relief camps. Early diagnosis and treatment of these diseases can reduce the ocular morbidities.

INTRODUCTION

Floods are the most common type of global natural disaster globally, responsible for almost 53,000 deaths in the last decade (23:1 low- versus high-income countries). [1] Floods are known to cause severe environmental damages and health impacts. Floods may spread the contaminants into the flooded area, discharge sewage and introduce pathogens to surface waters. Stagnant pools of water in flood-affected areas serve as ideal breeding ground for pathogens and may alter vector breeding grounds and zoonotic reservoirs. [2,3] Due to changes in environmental sanitation, overcrowded shelters, poor personal hygiene, poor nutrition and deterioration of drinking water supply, there is increased risk of infectious diseases. [4] Various studies have reported the increased risks of waterborne and vector-borne diseases from exposure to contaminated water and materials during the flood and in the post-flood cleanup process. The diseases of eyes, skin, soft tissue, gastrointestinal diseases, respiratory tract infections and vector-borne infectious diseases are reported to increase during and after the flood. [2-8]

Nepal is a low-income country with tremendous geographical diversity. Nepal can be divided along a south-to-north transect into three belts: Terai, Pahad and Himal. The average annual precipitation is 1,627 millimeters, which varies from as little as 160 millimeters in the rain shadow north of the Himalaya to as much as 5,500 millimeters on south-facing windward slopes. Rainfall during the monsoon season from June to September contributes about 80% of the rainfall. [9]

Nepal experienced a period of sustained heavy rainfall from the second week of August 2017, which was the heaviest recorded rainfall in the central and western regions in the last 60 years. It resulted in flood affecting 32 of 75 districts and over 80 percent of land in the Terai along Nepal's southern border with India was inundated by flood water. According to Ministry of Home Affairs 43,433 houses were destroyed, 20,888 families were temporarily displaced, a total of 159 people died, 45 were injured and 29 were missing due to rain-induced flood and landslides.[10] The flooded areas are the poorest parts of the country with further large scale adverse impacts on lives, infrastructure and environmental sanitation.

Ocular diseases often occur as a result of direct trauma or direct contact with polluted water during or after flood. A study from Pakistan revealed wound infections, dermatitis and conjunctivitis to be common after flood.[2] Similarly, a record num-

ber of eye infections related to water-borne pathogens have been reported in aftermath of flood in the University of Iowa. The contamination of water supply by sewage and prevailing high temperatures were cited as potential reason for this. [2] Several other studies have reported relationship between floods and health problems including eye diseases. Huang et al. reported increase in medical services of conjunctivitis, trachoma, and other inflammation of the eyelids during and after water outage.[5] The increased cases of ocular involvement following an epidemic of Toxoplasma gondii infection in the contaminated water of flood has been reported in Brazil.[8] An epidemic of presumed Acanthamoeba keratitis was reported following regional flooding associated with a contaminated municipal water supply in the USA.[11] There is high chances of increase in conjunctivitis and trachoma for people lack of fresh water to clean-up.[12]

The analyses on potential health impacts related to flooding using population data have been limited. There are very few studies reporting the ocular diseases after the event of flood. In this study we present the spectrum of flood-related ocular diseases after monsoon flood in Nepal using a community-based database.

METHODS

This is a descriptive cross-sectional study. Total of 7 free diagnostic, screening and treatment camps were organized by Sagarmatha Choudhary Eye Hospital, Lahan in the flood affected areas of Siraha, Saptari, Mahottari and Sarlahi districts of Nepal in August-September 2017. The age, sex, diagnosis and management of each patient attending the eye camps were recorded in the register from the registration cards. The data obtained was analyzed using the excel sheet. Means, ratios and percentages were calculated. The results were presented in frequency and percentage in the frequency distribution tables.

RESULTS

Total of 1,352 patients (730 females and 622 males) were evaluated in the present study with 711 patients having ocular diseases. Females constituted 54% while males were 46% of the total patents presenting at the camps. The average age of the patients was 36 years (range 2 to 72 years). The children less than 16 years constituted 22% (156/711) and elderly more than 60 years constituted 34% (241/711) of total patients (Table 1).

The infective ocular diseases were seen in total 169 cases and traumatic ocular injuries were seen in 44 cases, the incidence of which was 23.8% and 6.2% respectively of total ocular diseases. Acute conjunctivitis was the most common infective ocular disease followed by keratitis (21.1% and 2.7% respectively). Corneal abrasions (1.4%), subconjunctival hemorrhage (1.1%), traumatic uveitis (0.7%) and lid ecchymosis (0.7%) were common findings following traumatic ocular diseases. Among other ocular diseases, refractive error was seen in 350 patients (49.2%), senile cataract was seen in 133 patients (18.7%) with 87 (12.2%) unilateral cases and 46 (6.5%) bilateral cases. No cases of traumatic cataract were seen. Glaucoma was seen in 15 cases (2.1%), corneal opacity in 11 cases (1.5%), optic atrophy in 3 cases (0.4%) and old retinal detachment in 2 cases (0.3%) (Table 2).

Table 1: Demographic characteristics of all patients with ocular diseases

Demographic Characteristics	Classification	Frequency (%)
Gender	Male	327 (46%)
	Female	384 (54%)
Age	less than 16 (Children)	156 (22%)
	16 - 65 (Adult)	314 (44%)
	More than 65 (Elderly)	241 (34%)

Table 2: Distribution of ocular disorders among all patients

Ocular diseases	Frequency (%)
A. Infective diseases	
1. Acute conjunctivitis	150 (21.1%)
2. Keratitis	19 (2.7%)
B. Traumatic diseases	
1.Corneal abrasions	10 (1.4%)
2. Subconjunctival hemorrhage	8 (1.1%)
3. Traumatic uveitis	5 (0.7%)
4. Lid ecchymosis	5 (0.7%)
C. Others	
1. Refractive errors	350 (49.2%)
2. Senile Cataract	133 (18.7%)
3. Chronic Glaucoma	15 (2.1%)
4. Corneal opacity	11 (1.5%)
5. optic atrophy	3 (0.5%)
6. Old Retinal detachment	2 (0.5%)
Total	**711 (100%)**

DISCUSSION

Natural disasters like floods, earthquakes, tsunamis, hurricanes and volcanic eruptions can occur occasionally in any part of the world. Nepal is highly prone to multiple natural hazards such as flood, landslide, earthquake, fire, hailstone, windstorm, drought, glacier lake outburst flood, avalanches and epidemics. Of all the disasters reported, floods are the most devastating in terms of damages they cause and number of deaths that occur. A study by United Nations Development Programme (UNDP) ranked Nepal as 30th country with respect to relative vulnerability to flood. [11] It is in seventh position for deaths resulting as consequences of floods, landslides and avalanches combined, and in eighth position for flood-related deaths alone. [9]

In our study, the incidence of infective ocular diseases among the study population was 23.8%, main clinical diagnosis being acute conjunctivitis (21.1%) followed by keratitis (2.7%). Conjunctivitis was also reported to be common eye disease along with dermatitis and wound infection in a study from Pakistan.[2] Huang et al. also reported increase in medical services of conjunctivitis, trachoma, and other inflammation of the eyelids during and after water outage in Taiwan.[5]

The cases of keratitis were given empirical treatment and referred to base hospital for further investigations and management. An epidemic of presumed Acanthamoeba keratitis have been reported following regional flooding associated with a contaminated municipal water supply in the USA.[11] In the present study, we could not ascertain the final diagnosis for those cases of keratitis due to lack of proper follow-up.

Traumatic ocular diseases were seen in 6.2% of total population. But no case of traumatic ocular injury requiring surgical intervention was seen, probably because those patients may have already sought medical attention before the eye camps in the area or in some cases, people didn't seek any medical assistance.

The risk of infections for people in the flood could be severe especially in low income countries. [14] The children and elderly are more prone to infections than other age groups in flood events. The risk of infections has been noted to be high among children playing or swimming in the flooded area in Germany.[15] In our study, children less than 16 years and elderly more than 65 years constituted 56% of the total patients.

This study is limited in several aspects since the community-based eye camps have been organized only in few selected districts while the larger areas of other districts have also been exposed to the flood. The spectrum of ocular diseases and the association between flood events might thus be underestimated due to non-differential misclassification. These eye camps have been organized between one to three weeks after the flood events, so the post-flood effects have been estimated by calculating cases diagnosed between this periods only. Also, the incidence rates may have been underestimated since some severe cases may have sought medical attention earlier and visited other eye hospitals or in some cases, people may not seek medical assistance at all and didn't visit the eye camps.

CONCLUSION

This study examined the spectrum of ocular diseases in a community based eye camps after the monsoon flood in the flood affected areas in Nepal. The results suggest that infective ocular diseases and traumatic ocular injuries are common flood-related eye diseases seen within one to three weeks after flood receded. The knowledge of these expected ocular morbidities may help for proper planning and organization of such relief camps. Early diagnosis and treatment of these diseases can reduce the ocular morbidities.

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CONFLICT OF INTEREST

None

FINANCIAL DISCLOSURE

None

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