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Incidence and risk factors for post-traumatic stress disorder in a population affected by a severe flood

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ABSTRACT

Objectives: We aimed to study the risk of developing post-traumatic stress disorder (PTSD) symptoms in people who resided in an affected area by an extremely severe flood, and sociodemographic risk factors associated with this condition.

Study design: A geographic information system (GIS) was used to distribute the rainfall data. A case-control study was developed to study the relationship between PTSD and socio-demographic risk factors.

Methods: To delineate the areas affected by the flood and the intensity of this rainfall in comparison with historical hydrological data, we employed geographical information systems (GIS). Then, we recruited a representative sample of the affected population and another population sample that lived at the time of this disaster in adjacent geographical areas that were not affected. Both groups were randomly selected in primary care practices, from December 1st 2012 to January 31st 2013. All participants, 70 from the affected areas and 91 from the non-affected, filled a sociodemographic questionnaire and the trauma questionnaire (TQ) to identify and rate PTSD symptoms.

Results: Our GIS analysis confirmed that the amount of precipitation in 2012 in the areas affected by the flood was exceptionally high compared with historical average rainfall data (461l per square metre vs 265). Individuals who resided in the affected areas at the time of the flood were at much higher risk of developing PTSD symptoms (OR: 8.18; 95% CI: 3.99–17.59)

Abbreviations: DTM, digital terrain model; GIS, geographical information systems; IDW, inverse distance weighed; PTSD, post-traumatic stress disorder; TQ, trauma questionnaire.

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than those living in adjacent, non-affected localities. Among the sociodemographic variables included in this study, only material and financial losses were strongly associated with the onset of PTSD ($P < 0.001$). Physical risk during this life-threatening catastrophe also indicated a positive correlation with later development of PTSD symptoms; however, it did not reach statistical significance ($P = 0.06$).

Conclusions: Populations affected by severe floods may suffer an increase of PTSD symptoms in the following months. This finding, along with the importance of material losses as a predictor for such disorder, may help develop effective plans to minimize the negative impact of these natural disasters on public health.

Introduction

International research on the consequences of natural disasters has increased significantly in recent years due to numerous material and human losses caused by these phenomena. The majority of studies on the impact of natural disasters focus on financial costs and tend to ignore their long-term effects on public health.[1]

People who have experienced, or have been affected by, natural disasters are able to recover with the support of their families, friends or colleagues. However, a significant proportion of them may still suffer from long-term health problems and disabilities that deeply affect their well-being. Such events can cause grief, substance misuse, exacerbation of domestic violence and other aggressive behaviours.[2]

Climate change is increasing the risk of flooding worldwide. In Europe, 1.6 million people are at risk of experiencing a flood each year.[3] Indeed, the World Health Organisation (WHO) estimates that floods in Europe have affected 3.4 million people over the last 10 years.[4] Floods are amongst the most severe, life-threatening natural disasters. They usually require long recovery periods, mainly due to significant material damages. In fact, works associated with cleaning, rebuilding and/or refurbishing properties may be costly; affected areas may also suffer from decline of both tourism and house prices.[5] Thus, people who have been affected by a severe flood may experience long-term stressors and strong fears of similar disasters happening again.[1] Recovery following a flood involves adaptation to new social circumstances. This often carries common anxiety that may eventually evolve to more complex mental health problems. Hence, the incidence of severe mental disorders might increase significantly.[6]

Post-traumatic stress disorder (PTSD) is a condition that arises as a delayed reaction to extremely threatening or catastrophic, brief or long-lasting, situations. These events (natural or man-made disasters, fights, serious accidents, being witness of a violent death, being a victim of torture, rape or other crimes) would, in themselves, cause distress to almost everybody.[7] PTSD is characterized by repeated episodes where the traumatic event is re-lived in the form of dreams, flashbacks or intrusive memories often accompanied by emotional numbness and dissociation. It may involve detachment from others, anhedonia and avoidance of activities that remind the victim of the event. On some occasions, stimuli that evoke a memory related to the traumatic situation may trigger extreme fear, panic or even aggressive behaviours. PTSD usually manifests with neuro-vegetative hyperactivity, hypervigilance and insomnia. Anxiety and depression may also be present, and substance misuse and suicidal thoughts are relatively common. The onset occurs after the traumatic event, following a latent period that may last from a few weeks to several months.[8]

The main aim of this study was to compare the incidence of PTSD symptoms between a population affected by a flood and another living in adjacent geographical areas that were not affected by this natural disaster. We also aimed to identify sociodemographic risk factors associated with the development of PTSD symptoms after suffering the flood.

Methods

Study area

On September 28th 2012, Almeria, a province in Southern Spain, was affected by a severe storm with strong winds and hail that lasted forty-five minutes. The heavy rainfall was between 70 and 210l per square metre in some areas. Material damages included 4300 properties and around 2000 vehicles and garages which were filled with water and rendered useless. Three viaducts were damaged, mud and uprooted vegetation amassed in the municipal road network. Ten people died as a consequence of this intense rainfall. This event and its consequences were covered by national and international news media. The total financial losses caused by this natural disaster are still being calculated; the impact on mental health has not yet been studied.

Study design

A geographic information system (GIS) was used to distribute the rainfall data. A case-control study was developed to study the relationship between PTSD and sociodemographic risk factors.

Study of the extreme precipitation

We studied precipitations recorded by weather stations managed by the Spanish Meteorology National Agency (AEMET; http://www.aemet.es). We employed a rainfall