

**A SURVEY ON THE CHANGES IN DRUG USE AND ITS
RELATED FACTORS IN THE SURVIVORS EIGHT MONTH
AFTER BAM EARTHQUAKE**

Final Report

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SUMMARY

Objectives: In the final days of the year 2003, an earthquake in the city of Bam, Iran, led to the death and injury of many of its inhabitants. The aim of the following study were to examine the changes in opioid drug use in the survivors in the eighth month after the earthquake in comparison with the month before the quake and its related factors.

Method: An epidemiologic survey was carried out on 779 survivors, selected by desert sampling from the Bam citizens in the age of 15 and over. An instrument made by the researchers was used to assess lifetime and current use of opioids, alcohol and cannabis; and the changes in their use comparing eighth month after earthquake with the last month before it. Bivariate and multivariate (Logestic regression) analysis were done for examining the relationship between an increase in opioid use and various factors.

Findings: 27.4 percent of men and 4.5 percent of women reported lifetime use of opium. During the eighth month after earthquake the prevalence of daily opium use was 16.9 percent in men and 2.7 percent in women. In men following opium, alcohol and cannabis were the most common illegal drugs of use. Women denied use of any illegal drugs except opium. An increase in opioid use was reported in 18.3 percent of men and 2.3 percent of women. Odds Ratio (OR) for increase in opioid use was 9.4 times more in men than in women. In men, increase in opioid use was related with the history of opioid use during the month before earthquake (OR=5.6), age (OR in age group 30 to 44 was 4.7 times more than age below 30), and PTSD (OR=3.7). In women, it was only related with the history of opioid use during the month before earthquake (OR=43.8).

Conclusion: The findings show that following disasters, especially in the areas or groups that drug use is common, an increase in the drug use might occur. In these situations provision of preventive and treatment interventions particularly for at risk population is necessary.

INTRODUCTION

The earthquake in the city of Bam happened on the 26 December 2003. Out of 222000 inhabitants of Bam (1), the official death toll was 35000, and about 50000 were injured. More than 100000 were also left homeless. Overall, more than 30000 residential and commercial buildings were destroyed (2). The survivors had witnessed the death of their loved ones or had suffered serious injuries. The earthquake inflicted major psychological, social, and economic consequences on the people of this city.

The cultivation of poppy in this region dates back to hundreds of years ago. During 1920s, Iran was one of the main producers of opium in the world; and Kerman- the province in which the city of Bam is located- was one of the areas that contributed most to the cultivation and production of opium. Even though the production of opium has been eradicated in Iran and the use of illicit drugs such as opium is illegal, the use of some drugs- especially opium- is culturally and traditionally prevalent in some parts of the country. Almost all the consumed opium in the province of Kerman is imported from Afghanistan, and this province is one of the main transit routes of illicit drugs to other parts of the country as well as other countries. The use of opium is also prevalent among men in the city of Bam.

In a survey carried out two weeks after the earthquake in order to examine the state of substance dependence in Bam, most responders believed that one fourth to one half of adult males in the city were opium users. In the extremely critical period after the earthquake, withdrawal symptoms and the call for drugs gradually appeared in many substance dependents from the second day, and became one of the basic needs of these subjects. A number of relapses of drug abuse were also reported in subjects who had stopped abusing drugs prior to the earthquake (3).

In a qualitative study carried out one year after the earthquake in Bam, the prevalence of substance dependence in Bam was reported to be high, and was estimated to be present in more than half of the men. Most people believed that the prevalence of substance dependence had risen after the earthquake, and that 30 to 40 percent of people who had approached for the treatment of their addiction were new cases. Most people believed that the increase in substance use after the earthquake was due to the tranquility brought about by the use of the substances and people's intense problems and their hopelessness, along with the presence of migrants among whom substance abuse especially the abuse of heroin and the intravenous route was prevalent. Also, a decrease in the will to abstain from substances was sometimes considered to be an important factor. Almost all respondents believed that the use of opium had risen after the earthquake. Even though there were different ideas about heroin, most believed that the use of heroin was not prevalent in Bam and it had not been present there for a long time. Most respondents stated that the rate of cannabis and alcohol use in Bam was not high, and they had not seen any change in the use of cannabis after the earthquake. Intravenous injection of substances is considered to be highly improper in Bam and has a very low prevalence (4).

Several studies have shown that natural disasters cause significant psychological and psychiatric consequences (5). To date, only a few studies have examined the change in the use of substances after natural disasters; most of which have focused on the use of cigarettes and alcohol (6). Rarely has the change in use of illegal substances been considered, and in these cases marijuana has been mostly studied. Most studies conducted after disasters indicate a rise in substance abuse (6-10). Also, these studies have been carried out after man-made disasters, such as the disasters of the 11th of September (6-10), the Oklahoma bombings (11-12), and the civil violence in Northern Ireland (13). In some cases these types of studies have been carried out after natural disasters (14-15). Many of these studies were not population based, and were conducted on people who had approached treatment centers (6,9,11,12). In addition to the change in substance use, in some studies the relationship of the change to several factors such as sociodemographic variables (7,16-18), Post Traumatic Stress Disorder (PTSD) (11,12,19,20), the experience of trauma (7,12,21,22) and stressful life events (7) have been examined, and mixed results have been reported.

As mentioned before, the non-injectable use of opium is prevalent among men in Bam; and the study of changes in the prevalence and amount of use, the type of substances being used, and the pattern of abuse after such a disaster are very important. Since opium is considered an illicit drug, the conditions of its supply and use becomes significantly chaotic upon the breaking out of disasters. In our review through the world literature, we did not come across any studies examining the change in the use of opioids in the general population after a disaster. Also, no quantitative studies have been carried out in Iran on the change in the use of any substance and the factors related to it following disasters.

OBJECTIVES

The objectives of the present study are to provide an estimate of the prevalence and the change in the prevalence and the rate of use of opioids, alcohol, and cannabis, and to determine the relationship between the increase in opioid use and the prevalence of PTSD, the socio-demographic variables, and other factors including the experience of trauma, stressful life events before the earthquake, and social support in the survivors of the earthquake in the city of Bam, eight months after the earthquake. With regards to the vulnerability of our country to natural disasters, the results of this study can be used for program planning, the more rapid detection of people at risk in any possible disaster, and also effective service providing in the future.

METHOD OF STUDY

Sampling and the Sample Population:

The population under study were all the survivors of the Bam earthquake with at least 15 years of age, who were residing in the city both at the time of the earthquake and at the time when the study was being done, and who consented to be interviewed.

Subjects who due to severe injuries or cognitive disorders or unfamiliarity with the Persian language in order to understand the questions in the questionnaires, could not take part in the interviews, were excluded.

Due to the widespread destruction, which caused the demolition of more than 90 percent of houses and their total evacuation, and the temporary and scattered settlement of people in the city, there were no records of the survivors of the earthquake to be used as a framework for sampling, and a precise population map was also missing. Therefore, the following method (desert sampling) was used as the closest method to random sampling:

After the earthquake, the crisis control headquarters divided the city of Bam to 13 geographical areas. First, five areas were randomly selected from among the above. Then, a list of the main squares and crossroads in each of these areas was developed through consultation with people who had full knowledge of the city's new situation. In the next step, 50 spots from the mentioned list were randomly selected in each area. One interviewer would go to the chosen square or crossroad in the area, and in that square or crossroad he/she would move toward the road that leads to the north, until he/she reached the first residential place. There, he/she would make a list of all the residents who were 15 years old and over, and would choose one of them randomly. In case the chosen individual was absent, they would postpone the interview to a later time and would go to the next residential place and repeat the same steps. Thereafter, the group of interviewers would move about 500 meters on the main street and in the same direction, from the place where "the second studied residential place was situated, to the first residential place that could be seen on the left; then they would interview the third and fourth subjects in the same way. After that, they would go to the next spot, and would continue interviewing people. If they could not reach the individual on the second time as well, they would choose another person from among the present people randomly, and would interview him/her. Besides, only one person would be interviewed from each place of residence.

Gathering Information:

The following factors were examined in this study:

Socio-demographic characteristics: age, sex, marital status before and after the earthquake, the individual's occupation after the earthquake, and the family income before and after the earthquake were enquired about as demographic and background variables.

Substance use: To assess the present situation and the lifetime status of substance use, an instrument developed by researchers was used. The following were enquired about: the lifetime use of opium, heroin, alcohol, cannabis, and other substances-each separately; the history of use of each substance during one month before the earthquake and one month before the interview (including responses of no use, any use, and daily use); the change in the dosage and the frequency of use of each substance, comparing one month before the interview with one month before the earthquake (the following responses were included: decrease, no change, and increase). Also, information was obtained about the history of intravenous substance use; and its amount, frequency, and change compared with the time before the earthquake. A new variable that was indicative of the change in opioid drug use in general, was generated using the following factors: the comparison of the pattern of opium or heroin use, between the periods of one month before the interview and one month before the earthquake, and the reported changes in the frequency of use or the amount of opium or heroin use. Each case of a beginning of substance use after the earthquake or the rise in the frequency or amount of use was considered “increase in use”, and any kind of abstinence or decrease in the frequency or amount of use was considered “decrease in use”. Having not used the substance before and after the earthquake, and the lack of change in the frequency or the amount of use was considered “no change in use”.

Post Traumatic Stress disorder: Composite International Diagnostic Interview (CIDI) was used to assess the lifetime and current (previous month) prevalence of Post Traumatic Stress disorder (PTSD). CIDI is a structured instrument used for the diagnosis of psychiatric disorders based on DSM, which was designed by Robins et al (23), and its Persian version has been validated for the Iranian society (24).

Stressful life events during six months prior to the earthquake: A checklist was used to assess stressful life events. The checklist was essentially based on the life event questionnaire by Paykel et al (25). This questionnaire, which is composed of 69 questions, has been validated for the Iranian society (26). In the present study, the first 15 stressors, which had shown the highest emotional intensity in another study on the people of Zahedan (27), were used in order to reduce the time of administration.

The trauma experience: To assess the experience of trauma, a questionnaire was used that was developed by researchers. The following items were included in the questionnaire: 1- the loss of first or second-degree relatives, 2- damage to the place of residence (including total damage rendering the house uninhabitable, partial damage, and no damage), 3- remaining under the rubble (not having been under the rubble, getting out without help, getting out with help) and 4- the extent of physical injury because of the earthquake (no injury, injury requiring outpatient care, injury requiring hospitalization, major injury with sequels such as paralysis or the amputation of a limb).

Perceived social support: This researcher-developed questionnaire was designed with the help of a group of social workers who had experience in previous earthquakes and natural disasters. Four factors were assessed as major criteria in the appreciation of social support: 1-the support of family and friends (with three questions concerning

the discussion of personal problems with family members, the amount of help provided by the family, and the amount of help provided by friends and neighbors), 2- the condition of news provision about the family and relatives after the earthquake (with one question), 3- access to basic facilities after the earthquake (with 11 questions regarding adequate and proper access to clothing, carpets and blankets, heating and cooling appliances, lighting, drinkable water, food, hygienic toilets and bathrooms, hygienic situation of the place of residence and its surroundings), and 4- people's impression about general social support (with 3 questions regarding the religious atmosphere, fairness in distribution of facilities, and the support of political and religious authorities). Each question was answered with one of the following choices: very good, good, average, bad, or very bad.

History of receiving psychosocial services after the earthquake: The Psychosocial Intervention Headquarters in the city of Bam started its activities from the first days after the earthquake; and it carried out outreach counseling and pharmacologic interventions after detection of psychiatric signs and symptoms. The interviewees were asked about receiving these services from the psychosocial intervention headquarters of the city of Bam during the 8 months after the earthquake. Interviewees would respond to these questions with either "yes" or "no".

The researcher-designed questionnaires were corrected and finalized, first by 7 experienced psychiatrists and researchers, and then through experimental implementation and applying the views of interviewers in a group discussion meeting. Interviewers were chosen from among local experienced psychologists and took a three-day training course for carrying out field action and filling out the questionnaires.

In addition to active supervision of the interviews, the field action supervisor would regularly review the completed questionnaires and provide the necessary feedback to the interviewers.

Due to ethical principles, the first and family name of the interviewees were not revealed. In the beginning of the interview, and after the explanation given by the interviewer regarding the confidentiality of the collected information, the subjects were asked about their willingness to be interviewed, and in case of their refusal, the interview was not carried out. Due to the psychological state of the interviewees, the number of questions were tried to be limited when the questionnaires were designed.

Data analysis:

All data based on the collected questionnaires were analyzed using the 10th version of SPSS. First, descriptive data were used to illustrate the use of different substances and other variables. Then, bivariate and multivariate analyses were used to examine the association of risk factors with the change in opioid use. As the clusters were consisted of just two people, and those two had been selected from different residential places, design effect was small and negligible.

Due to studies and observations carried out in other countries and particularly in Iran, it is evident that the prevalence of substance use is significantly different between men and women. Due to the same reason, one could expect to observe dissimilarities between the two genders, with regards to the change in use and the factors affecting it; therefore, in bivariate and multivariate analysis, the data belonging to men and women were analyzed separately. In the bivariate analysis of categorical and nominal data, χ^2 test was used to carry out the analysis. In multivariate analysis (logistic regression), variables whose p value of their relation with the increase in opioid use was less than 0.2 in bivariate analysis, were provided to the logistic model, and the Odds Ratio and its 95% confidence interval were calculated for each variable. In effect, the method of this study was historical cohort. Although Relative Risk could be used, Odds ratio was preferred since it could be calculated and compared in all studies. Variables of very low (less than 10 percent) or very high (more than 90 percent) frequency were excluded from the analysis of factors effective on the change in opioid use. All experiments were carried out with a significance level of $\alpha=0.05$.

RESULTS

In total 786 people participated in this study, but 7 subjects (0.9 percent) including 3 men and 4 women were excluded because they were not willing to respond to questions regarding the history of substance use. From the remaining 779, 560 (71.9 percent) of the population under study consisted of females and the rest were males. The mean age of respondents was 31.7 (\pm 12.9) with a range between 15 to 75 years. At the time of the administration 487 (62.5 percent) were married and 72 (9.2 percent) were widowed. Also, at the same time 67 (8.6 percent) were jobless. The mean income of the interviewees was 147,080 (\pm 122,090) tomans before the earthquake, and 99,370 (\pm 78,549) tomans at the time of the interview.

695 respondents (99.3 percent) had lost at least one first or second degree family member. The number of people comprising the first or second degree family members was reported to be between one and 40. 47 (6.1 percent) had lost their spouses due to the earthquake. The houses of 97.7 percent of people had sustained major damage and were rendered uninhabitable. 292 (37.5 percent) gave a history of having remained under the rubble after the earthquake. 124 (16 percent) had suffered major physical injury, leading to their hospitalization or disability.

468 (60.2 percent) had lifetime Post Traumatic Stress Disorder (PTSD). All 468 subjects gave a history of signs and symptoms beginning in the previous year. 52.8 percent of the all respondents fulfilled the criteria for current PTSD. The cause of PTSD in 97.9 percent was considered to be the earthquake or its direct consequences.

The prevalence and change in substance use:

Tables 1 and 2 show the prevalence and change in the use of different substances among men and women. In general 45 (20.5 percent) men and 13 (2.3 percent) women reported an increase in the use of one of the illicit drugs under study.

60 (27.4 percent) men and 25 (4.5 percent) women gave a history of opium use in their lifetime. This dissimilarity between men and women was statistically significant ($X^2=85.2$, $df=1$, $p<0.001$). 17.4 percent of men and 3.0 percent of women reported the use of opium during one month before the earthquake, and 25.1 percent of men and 4.1 percent of women reported the use of opium during the eighth month after the earthquake (one month before the interview). The difference in the prevalence of different patterns of opium use between the eighth month after the earthquake and one month before the earthquake was significant among men (Mc Nemar $p< 0.001$), but not significant among women (Mc Nemar $p=0.07$). From among the subjects who had used opium during the month before the earthquake, 50 percent of men and 53 percent of women used opium on a daily basis. From among the subjects who were using opium in the eighth month after the earthquake 67.3 percent of men and 65.2 percent of women used opium on a daily basis. The difference in the prevalence of daily opium use between the eighth month after the earthquake and one month before the earthquake was significant among men (Mc Nemar $p< 0.001$). In women this

difference was also significant (Mc Nemar $p=0.03$). From among all the respondents, 20 (9.1 percent) men and 7 (1.3 percent) women reported that even though they had had not used opium in the month before the earthquake, they had used it in the eighth month after the earthquake.

From among all the respondents, 3 (1.4 percent) men gave a history of heroin use in their lifetime. Among these 3, 2 reported an increase in the frequency or dosage of heroin use in the eighth month after the earthquake in comparison with the time before the earthquake. The change in the prevalence of heroin use in men before and after the earthquake was not significant. None of the women reported heroin use in their lifetime.

As mentioned under method, using a number of variables, a new variable indicating “the change in opioid use” was developed. 40 (18.3 percent) men and 13 (2.3 percent) women reported an increase in opioid use, and 6 (2.7 percent) men and one (0.2 percent) woman reported a decrease. All women and men who had taken part as respondents denied the intravenous use of substances in their lifetime.

From among the respondents, 22 (10 percent) men reported the use of alcohol in their lifetime. Amongst the men in general, 8 (3.7 percent) reported an increase, and 4 (1.8 percent) reported a decrease in alcohol intake. The change in the prevalence of alcohol use among men before and after the earthquake was not significant. None of the women reported the use of alcohol in their lifetime. Among the respondents 6 (2.7 percent) men reported the use of cannabis in their lifetime. None of the men reported an increase in the use of cannabis, and 2 (0.9 percent) reported a decrease in its use. The change in the prevalence of cannabis use among men before and after the earthquake was not significant. None of the women gave a history of cannabis use in their lifetime.

Table 1. Prevalence of drug use and its changes among men, Bam, 2004

Substance	Indicator	No.	%	95% CI
Opium	Lifetime use (n=219)	60	27.4	21.5-33.3
	Use one month before the quake (n=219)			
	Use	38	17.4	12.3-22.4
	Daily use	19	8.7	4.9-12.4
	Use one month before interview (n=219)			
	Use	55	25.1	19.4-30.9
	Daily use	37	16.9	11.9-21.9
	Change in use (n=60)			
	Increase	39	65	52.9-77.1
	Decrease	6	10	2.4-17.6
Heroin	Lifetime use (n=219)	3	1.4	-0.2-2.9
	Use one month before the quake (n=219)			
	Use	1	0.5	-0.4-1.3
	Daily use	0	0	-
	Use one month before interview (n=219)			
	Use	3	1.4	-0.2-2.9
Daily use	0	0	-	
Opioids	Overall change in use (n=219)			
	Increase	40	18.3	13.1-23.4
	Decrease	6	2.7	0.06-4.9
Alcohol	Lifetime use (n=219)	22	10.0	6.1-14.0
	Use one month before the quake (n=219)			
	Use	13	5.9	2.8-9.1
	Daily use	1	0.5	-0.4-1.3
	Use one month before interview (n=219)			
	Use	12	5.5	2.5-8.5
	Daily use	3	1.4	-0.2-2.9
	Change in use (n=22)			
	Increase	8	36.4	16.3-56.5
	Decrease	4	18.2	2.1-34.3
	Overall change in use (n=219)			
Increase	8	3.7	1.2-6.1	
Decrease	4	1.8	0.05-3.6	
Cannabis	Lifetime use (n=219)	6	2.7	0.6-4.9
	Use one month before the quake (n=219)			
	Use	3	1.4	-0.2-2.9
	Daily use	0	0	-
	Use one month before interview (n=219)			
	Use	1	0.5	-0.4-1.3
	Daily use	0	0	-
	Overall change in use (n=219)			
	Increase	0	0	-
	Decrease	2	0.9	-0.3-2.2
Any substance	Overall increase in use (n=219)	45	20.5	15.2-25.9

Table 2. Prevalence of drug use and its changes among women, Bam, 2004

Substance	Indicator	No.	%	95% CI
Opium	Lifetime use (n=560)	25	4.5	2.8-6.2
	Use one month before the quake (n=560)			
	Use	17	3.0	1.6-4.5
	Daily use	9	1.6	0.6-2.6
	Use one month before interview (n=560)			
	Use	23	4.1	2.5-5.8
	Daily use	15	2.7	1.3-4.0
	Change in use (n=60)			
	Increase	13	52	32.4-71.6
Decrease	1	4	-3.7-11.7	
Heroin	Lifetime use (n=560)	0	0	-
Opioids	Overall change in use (n=560)			
	Increase	13	2.3	1.1-3.6
	Decrease	1	0.2	-0.02-0.5
Alcohol	Lifetime use (n=560)	0	0	-
Cannabis	Lifetime use (n=560)	0	0	-

Factors affecting the increase in opioid use:

The increase in opioid use was reported to be 18.3 percent among men, which was considerably higher than the increase in opioid use among women (2.3percent) ($X^2= 63.1$, $df = 1$, $p<0.001$). The Odds Ratio (OR) of the increase in opioid use in men was 9.4 times (%95 CI* =4.9-18.0) more than that of the women. Regarding the considerable difference in the prevalence of opioid use between men and women, the bivariate and multivariate analysis of the increase in use was done separately for each sex.

Results of bivariate analysis in men: The results of bivariate analysis for men are shown in table 3. Considering the variable of age and by categorizing this variable into three different categories, there is an increase in opioid use until the age of 44, with a decrease above that age ($p<0.001$). Regarding marital status, the lowest rate of increase in opioid use is seen in unmarried subjects, and the highest is seen in people who had lost their spouses because of the earthquake ($p=0.004$). The highest increase in opioid use was present in people with permanent jobs, and the lowest was observed in school and university students, and the retired (zero percent) ($p=0.03$). In people with a history of opioid use before the earthquake, the increase in opioid use was considerably higher than in the subjects without this history ($p<0.001$). In people with lifetime diagnosis of PTSD (with 97.1 percent of them suffering from PTSD caused by the earthquake), the increase in opioid use was higher than the ones without this diagnosis ($p=0.001$). The rise in opioid use was higher in people who had experienced at least one significant stressful event in the period of 6 months before the earthquake, than in people who had not had such experiences ($p=0.04$). In people who had been present in the battlefield of Iran-Iraq war, the increase in opioid use was considerably higher than in people without such experience ($p<0.001$). People who believed they had received a good support from family and friends after the earthquake, showed a lower increase in opioid use than people without such an impression ($p=0.017$).

Results of bivariate analysis in women: The results of bivariate analysis in women are shown in table 4. With regards to the variable of age, the rate of increase in opioid use among women has risen with age, and has reached a maximum in people above 44 years of age ($p=0.013$). All increases in opioid use had happened amongst housewives, which was significantly different from other groups ($p=0.008$). The people who had a history of opioid use before the earthquake showed a significantly higher increase in opioid use than people with no such history ($p<0.001$). The rate of increase in opioid use was higher in people who had remained under the rubble, than in people who had not been under the rubble ($p=0.04$). The increase in opioid use was higher among subjects with PTSD than people without such diagnosis. However, the difference was not significant ($p=0.09$).

* Confidence Interval

Table 3. Bivariate relations between demographic, event exposure, previous opium use, PTSD, life stressors, and social support with increase in opioid use among men, Bam, 2004

Variable	No.	% Increase	χ^2	df	p value
Age					
<30	99	8.1			
30-44	66	36.4	21.8	2	<0.001
>44	54	14.8			
Marital status					
Single	83	8.4			
Married	117	21.4	13.5	3	0.004
Divorced or Widowed (Before the quake)	3	33.3			
Widowed (Due to the quake)	16	43.8			
Occupation					
unemployed	35	22.9	0.63	1	0.43
Others	180	17.2			
Family income before earthquake					
Below Poverty Line*	147	17.7	0.17	1	0.68
Above Poverty Line	70	20.0			
Family income 8 months after earthquake					
Below Poverty Line	170	17.1	0.07	1	0.79
Above Poverty Line	37	18.9			
Opioid use one month before earthquake					
No	180	11.1	34.6	1	<0.001
Yes	39	51.3			
PTSD					
No	95	8.4	10.3	1	0.001
Yes	123	25.2			
Participation in Iran-Iraq war					
Yes	28	42.9	13	1	<0.001
No	191	14.7			
Life stressors during 6 months before earthquake					
No	136	14.0	4.4	1	0.04
Yes	83	25.3			
Physical injuries due to earthquake					
No/subtle injury	178	18.5	0	1	0.99
Serious injury	38	18.4			
Trapped beneath the rubble					
No	122	14.8	2.3	1	0.13
Yes	97	22.7			
Identified & Received psychological interventions					
Yes	164	20.7	2.5	1	0.11
No	54	11.1			
Perceived support from family & friends					
Good	66	10.6			
Fair	38	13.2	5.7 [†]	1	0.017
Poor	115	24.3			
Received information about health of family & relatives					
Good	42	23.8			
Fair	96	18.8	1.4	2	0.49
Poor	80	15.0			
Availability of basic goods and facilities					
Good	119	13.4			
Fair	20	30.0	4.7	2	0.097
Poor	80	22.5			
Perceived global social supports					
Good	43	11.6			
Fair	50	22.0	1.8	2	0.4
Poor	126	19.0			
Total	219	18.3			

* Poverty Line is supposed to be 1,500,000 Rials (~ 167 USD) per month

[†] χ^2 for trend

Table 4. Bivariate relations between demographic, event exposure, previous opium use, PTSD, life stressors, and social support with increase in opioid use among women, Bam, 2004

Variable	No.	% Increase	χ^2	df	p value
Age					
<30	294	0.7			
30-44	169	3.6	8.7	2	0.013
>44	90	5.6			
Marital status					
Single	130	0.08			
Married	370	3.2	4.2	3	0.24
Divorced or Widowed (Before the quake)	29	0			
Widowed (Due to the quake)	31	0			
Occupation					
Housewife	362	3.6	7.1	1	0.008
Others	194	0			
Family income before earthquake					
Below Poverty Line	405	2.7	0.9	1	0.34
Above Poverty Line	149	1.3			
Family income 8 months after earthquake					
Below Poverty Line	450	2.2	0.37	1	0.54
Above Poverty Line	84	1.2			
Opioid use one month before earthquake					
No	560	1.3	84.1	1	<0.001
Yes	17	35.3			
PTSD					
No	210	1.0	2.8	1	0.09
Yes	346	3.2			
Life stressors during 6 months before earthquake					
No	341	1.8	1.3	1	0.26
Yes	216	3.2			
Physical injuries due to earthquake					
No/subtle injury	471	2.3	0	1	0.99
Serious injury	86	2.3			
Trapped beneath the rubble					
No	364	1.4	4.1	1	0.04
Yes	195	4.1			
Identified & Received psychological interventions					
Yes	490	2.4	0.3	1	0.62
No	68	1.5			
Perceived support from family & friends					
Good	203	1.0	2.5	2	0.29
Fair	95	3.2			
Poor	262	3.1			
Received information about health of family & relatives					
Good	90	3.3	1.7	2	0.42
Fair	241	2.9			
Poor	225	1.3			
Availability of basic goods and facilities					
Good	359	1.7	2.6	2	0.27
Fair	37	5.4			
Poor	164	3.0			
Perceived global social supports					
Good	141	2.1	3.0	2	0.22
Fair	145	4.1			
Poor	274	1.5			
Total	560	2.7			

Results of logistic regression analysis in men: The results of this analysis are shown in table 5. It can be seen that in the end, the history of opioid use one month before the earthquake, age, and the diagnosis of PTSD, were all related to the change in opioid use. In people with a history of opioid use in the month before the earthquake, the odds ratio of the increase in opioid use was 5.6 times (%95 CI=2.4-13.1) more than in people without such a history. Also, the odds ratio has increased with the increase in age up to 44 years, and it is 4.7 times (%95 CI=1.8-12.1) higher in people between 30 and 44, than in people under 30. The odds ratio in people with PTSD was 3.7 times (%95 CI=1.5-9.2) higher than in other people. Other variables in the final model did not show any significant association with the increase in opioid use in men.

Results of logistic regression analysis in women: The results of this analysis are shown in table 6. It can be seen that in the end, the history of opioid use one month before the earthquake was related to the change in opioid use and the odds ratio of the increase in opioid use in people with such a history is 43.8 times (%95 CI=12.5-154.0) more than in people with no such history. Other variables in the final model did not show a significant association with the increase in opioid use in women.

Table 5. Multivariate (Logistic regression) models predicting increase in opioid use among men, Bam, 2004

Variable	No.	Wald	df	p value	OR	%95 CI
Opioid use one month before earthquake						
No	181	-	-	-	1.0	
Yes	39	15.4	1	<0.001	5.6	2.4-13.1
Age						
<30	99	-	-	-	1.0	
30-44	66	9.9	1	0.002	4.7	1.8-12.1
>44	54	0.9	1	0.357	1.7	0.6-5.2
PTSD						
No	95	-	-	-	1.0	
Yes	123	7.8	1	0.005	3.7	1.5-9.2

Table 6. Multivariate (Logistic regression) models predicting increase in opioid use among women, Bam, 2004

Variable	No.	Wald	df	p value	OR	%95 CI
Opioid use one month before earthquake						
No	560	-	-	-	1.0	
Yes	17	34.7	1	<0.001	43.8	12.5-154.0

Stratified analysis of the increase in opioid use according to sex, age, and the diagnosis of PTSD with regards to opioid use in the month before the earthquake: In stratified analysis, men who had a history of opioid use in the month before the earthquake, showed a higher increase in the use of opioids; however, the difference was not statistically significant ($p=0.3$). But among subjects who had not used opioids in the month before the earthquake, men reported a significantly higher increase than women ($p<0.001$). Amongst subjects who were opioid users in the month before the earthquake, even though the increase in opioid use in people between 30 and 44 years of age was higher than in people of other ages, the difference was not statistically significant ($p=0.2$). However, amongst subjects who were not abusing opioids before the earthquake, people between 30 and 44 reported a significantly higher increase in opioid use than people below 30 ($p=0.007$). Stratified analysis among people who were opioid users during one month before the earthquake, showed a higher increase in opioid use in subjects with a diagnosis of lifetime PTSD ($p=0.04$). Also, among people who had not used opioids in the month before the earthquake, subjects with the diagnosis of lifetime PTSD showed a higher increase than the others ($p=0.02$).

DISCUSSION AND CONCLUSION

Prevalence of substance use and its increase:

As mentioned in the results, 27.4 percent of men and 4.5 percent of women gave a history of opium use in their lifetime. The prevalence of daily use was 16.9 percent among men and 2.7 percent among women. In men, after opium, alcohol and cannabis were the second and the third most used substances respectively. In women, no illicit substance use was reported aside from opium.

The use of opioids has a high prevalence in our country. It seems that the prevalence of opioid use among adult males in particular parts of the country such as Bam, is higher than the national average of 10 percent (i.e. two million out of twenty million adult males inside the country). The method of this study was face-to-face interview and it was based upon Self-report. A study in the emergency departments throughout the country in 2001, showed that by examining urine samples taken from people who had denied a history of opioid use, the amount of positive results obtained through Thin Layer Chromatography (TLC) was relatively the same as the amount of people who had admitted using opioids in the past month in a face-to-face interview (28). In another study carried out in eight large prisons inside the country (29), 23.6 percent of prisoners who had denied abusing opioids, showed a positive result for opioid use in their urinalysis. In addition, the study in the emergency departments also showed that the validity of self-report is higher in regions where substance use is culturally prevalent, than in regions where substance use is considered a break of the social norm (28). In any case, it is possible that the actual size of opioid users could be slightly higher than the results obtained in this study.

This study showed a significant increase in the prevalence of monthly opioid use among men, and also the daily use of opium among men and women, in the eighth month after the earthquake in comparison with the one month prior to the earthquake. However, some reported a decrease in substance use. This quantitative study is in line with the findings in the qualitative study carried out in Bam (4), which indicated an increase in opioid use among the earthquake-stricken people of Bam. This study provided a quantitative estimate of the amount of the mentioned increase.

Even though the use of opium is illegal in our country, the prevalence of its use might indicate that the use of opium is considered a norm among the male community in Bam; and the increase in its use might correspond to the results obtained in other societies, which usually show a rise in the use of substances that are considered legal, such as tobacco and alcohol after disasters. Nevertheless, various findings have been documented with regards to alcohol use in external literature. In about half of the survivors an increase in alcohol consumption has been reported six months after Herald of Free Enterprise disaster in Belgium (30), in 51 percent of the sample population six months after the Oklahoma bombing (12), and in 24.6 percent of population 5 to 8 weeks after the 11th of September in New York (7), with no decrease in consumption six months after the event (8). Another study reported the appearance

of new alcohol consumers after the Oklahoma bombing (31). However, in another study, no new cases of substance-related disorders were reported after the event (32). Another study showed an increase in alcohol consumption in men after the outbreak of flood; however, the use of alcohol among women did not show a considerable change (15). A study carried out over the course of the 3 months to one year after the events in North Ireland, where people had been subject to violence, showed an incidence of 8 percent in alcohol abuse, which demonstrated no difference between people with diagnosis of PTSD and those without it (13). On the other hand, a decrease in alcohol consumption was reported 4 to 5 weeks after a plane crash (33). In this study the abuse of alcohol was reduced to half of its previous amount, in witnesses who had been alcohol users prior to the event, but there was a 4 percent increase in the number of new alcohol users. A study carried out on Cambodian refugees with PTSD showed no substance use (34). Another study showed mixed results regarding the change in problematic use of alcohol, after an ashfall (14).

Considering different studies, it is evident that most of them were focused on alcohol, and only limited studies have been carried out on opioids. We found only two studies on opium and cocaine, which were carried out on the population of users. In one of these studies, the amount of people who had increased their substance use after the events of the 11th of September was equal to the amount of people who had decreased their substance use (6). The second study, which was carried out in Manhattan New York, showed no change in the use of cocaine and heroin after the 11th of September (9). While the general population had reacted with an increase in the use of tobacco, alcohol, and marijuana, there was no change in the amount of cocaine and heroin use among their consumers. According to the authors, this group was the marginalized group residing in the slums. Even though they had been affected by the event, their reaction to stress had been different from the normal population (6). Indeed, as the authors have pointed out, the methodology of this study could have caused a considerable reduction in the observation of these possible changes. In the present study, which was carried out in Bam, the 18.3 percent increase in opioid use can be compared with the change in alcohol consumption in western societies.

It should be noted that in our country there is an annual increase in the incidence of substance use. The amount of increase in substance use that would have taken place in a course of eight months is not clear, if the earthquake had not happened. In any case, with regards to the increase in the prevalence of substance use in Bam, the establishment of a surveillance system in order to monitor the substance use situation seems necessary, and it suggests the need to provide this system prior to any possible future events in other parts of the country.

Factors related to increase in opioid use:

This study showed that the increase in opioid use 8 months after the earthquake had shown a 18.3 percent increase in men and 2.3 percent increase in women, in comparison with the time before the earthquake. Through bivariate analysis, the odds ratio (OR) for men versus women was 9.4. Therefore, although women had shown an increase in the use of opioids, men constitute a group with a higher risk of increase in opioid use.

In any case, there was a question of whether the difference between men and women regarding the increase in opioid use was because of a difference in the history of opioid use, or was it due to other factors causing differences in the increase of opioid use. Stratified analysis showed no significant difference in the amount of increase in opioid use between men and women who were opioid users in the month before the earthquake. Therefore, it is possible that a history of opioid use could be more important than sex, as a cause of increase in opioid use after the event. Nevertheless, amongst subjects who had not used opioids in the month before the earthquake, men reported a significantly higher increase of use; however, it is not clear if these men have had a history of opioid use in their lifetime before the earthquake. Also, the factor(s) that caused a higher increase in opioid use among men who had not used opioids in the month before the earthquake is yet to be determined.

With regards to the association of the increase in substance use with sex, studies carried out around the world have shown inconsistent results. In a review assessing the disaster-stricken, a direct association was found between alcohol consumption and the male sex (16). In another study, direct association was found between alcohol consumption and the female sex (21). In yet another study no association was found between alcohol consumption and sex (17). Other studies have shown that women tend to use drugs less than men in reaction to trauma (19). In our study the strong association found between the increase in substance use and the male sex, could be due to the higher cultural acceptance of substance use by men.

The present study showed a strong association between the increase in opioid use and age. The ages of 30 to 44 in men, and above 44 in women, were correlated with the increase in opioid use. However, there was a question of whether the increase in opioid use in these ages after the earthquake was due to the higher prevalence of the history of opioid use in these ages, or was it due to other factors. Stratified analysis showed that in people who had been drug users in the month before the earthquake, there was no significant dissimilarity in the increase in opioid use among different ages. However, among people who had not used opioids in the month before the earthquake, people between 30 and 44 reported a significantly higher increase in opioid use in comparison with those under 30. This might be due to the higher popularity of these opioids among this age group. Other studies on the association of age and substance use have provided different results. In one study, an indirect association was found between age and the use of marijuana, while there was no association between age and the use of tobacco and alcohol (7). Other studies did not find any association between age and alcohol consumption after disasters (21,7).

The present study showed that among the residents of Bam who were fifteen and over, 60.2 percent had lifetime PTSD and the disorder in all these patients had become apparent during the last year, and most (87.1 percent) had shown signs of the disorder in the last month. Our study showed that among men, those with PTSD had a higher increase in opioid use than those without it. Different studies have yielded inconsistent results with regards to the association of substance use with PTSD or PTSS*. Some

* Post Traumatic Stress Symptoms

studies have not found any association between the use of substances such as tobacco, alcohol, and cannabis and developing PTSD (19,20,35). On the other hand, many studies have indicated a direct association between these two variables (11,12,16,36,37). In addition, in some studies the consumption of alcohol was described as a protective factor against developing depression and PTSD (38,39). It is conceivable that in the present study, which was carried out in Bam, one of the reasons for the detection of a direct association between the increase in substance use and PTSD, was the high prevalence of both variables and a satisfactory sample size, which provided an adequate power for assessing the association between these two.

The association between PTSD and substance use possibly follows socio-cultural norms, and in Bam opium abuse shows the highest comorbidity with PTSD. This subject has been also noted in Deering's review article (40). He has suggested that the kind of substance used after traumas and disasters, might depend on culture or on the amount of access to the substance. In any case, probably both of these factors, namely cultural roots and easy accessibility had affected the higher increase in opium use after the Bam earthquake.

Through literature review, one can notice a mutual association between PTSD and substance-related disorders; however, it is not known that which one is primary and which is secondary. Deering et al believe that the persistence in substance use leads to a chronic course of PTSD through symptom aggravation, decrease in compliance for treatment and exposure to other traumas (40). In our study, the emergence of new cases of substance use after the earthquake indicates that signs of stress after trauma can be the grounds for substance use in order to relieve symptoms; especially hyperarousal, which can be temporarily controlled by opium use. Also, stratified analysis showed that both in subjects who had been opioid users in the month before the earthquake and in those who had not used opioids during that time, the ones with lifetime PTSD showed a higher increase in opioid use than the others. This finding points to the possibility that at least the recent use of substances (during the month before the earthquake) is not a factor for developing PTSD and does not make people vulnerable to it.

In this study, the use of opioids in the month before the earthquake, showed the highest association with the increase in the use of these substances after the earthquake, in both sexes. Especially, the odds ratio of women with such a history was 43.8 times more than the other women. Also, in these subjects, there is no significant difference between the two sexes and different age groups, with regards to the increase in substance use. Therefore, this seems to be the most important factor in the increase in opioid use. Also, in another study, an association was found between a history of previous substance use and its increase after the disaster (17).

With regards to other factors, different results have been obtained and there are mixed findings with regards to the effect of other demographic indexes such as marital status and income, the severity of the traumatic experience, stressful events, and social support. In the present study, which was carried out in Bam, bivariate analysis in men indicates an association between experiencing stressful events during the six months prior to the earthquake, history of participation in the Iran-Iraq war, poor family and

friend support, and the loss of spouse due to the earthquake; and in bivariate analysis in women an association was found between remaining under the rubble and increase in substance use, which was not confirmed in logistic regression.

Therefore, as can be seen, different results are obtained in each particular event around the world, and based on sample size and implemented methods. This indicates the necessity of studying the risk factors in substance use after trauma in each society. Indeed, more research is needed in order to find the association between these variables.

Limitations of the study:

In this study the number of women who entered the study was more than men, and this is probably not in accord with the pattern of the population in Bam. This might be due to the higher presence of women at home at the arrival of the interviewers and women's more inclination to responding to questions and expressing their problems. Nevertheless, since substance use is more uncommon among women, the larger sample size in women has helped to carry out a better analysis. . Due to the inaccessibility of the demographic features of the people of Bam, which has probably undergone changes after the earthquake, the obtained results were not standardized according to age or other factors.

In this study substance use was studied exclusively, and the indexes associated with substance related disorders, such as substance dependence and abuse were not assessed; and as mentioned in the method, only the frequency of use in time and the change in frequency and dosage were assessed; therefore, a direct viewpoint on the amount of increase in substance dependency (addiction) could not be given and the extent to which the increase in substance use had caused a decline in function could not be determined. Nevertheless, a study has shown that the increase in substance use in a society is associated with the increase in abuse and dependency (41).

The method of this study was face-to-face interview and this method might have caused an underreport of use. On the other hand, after such events there is an inclination for exaggerating the ensuing problems and understating the previous ones, which might have resulted in an overestimation of the increase in substance use after the earthquake.

Conclusion:

This study suggests that in regions of the country where the substance use is common, there is a serious possibility of increase in prevalence and severity of substance use after unexpected events. This study showed that among people who had a history of substance use, men between the ages 30 to 44 and people who have developed PTSD, are more vulnerable to the increase in substance use. These findings can be used to identify the groups, which should be given priority at the outbreak of such events. Especially people who develop PTSD and get in touch with mental health services, probably due to their disorder, should be assessed with regards to substance-related disorders, and necessary interventions should be performed.

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