



Natural Disasters Preparedness Knowledge of Patients with Chronic Diseases in Iran: A Descriptive Study on Patients with Diabetes and Chronic Obstructive Pulmonary Disease in Masih Daneshvari Hospital, Tehran, Iran

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Abstract

Background: In disasters, patients with chronic diseases, such as diabetes and chronic respiratory diseases, are considered a vulnerable population.

Objectives: This study aimed to examine the natural disaster preparedness knowledge of patients with chronic diseases in Iran with a focus on diabetic patients and those with Chronic Obstructive Pulmonary Disease (COPD) admitted to Masih Daneshvari Hospital in Tehran, Iran.

Methods: This cross-sectional survey was administered from August 2020 to April 2021. A disaster preparedness knowledge questionnaire was devised and validated, subsequently. A total of 86 eligible patients were selected using the census method and completed the questionnaire. The questionnaire included items on patients' knowledge of disasters (n=7), personal preparedness of patients in disasters (n=8), and family and community preparedness in disasters (n=4).

Results: A total of 86 patients were included in this survey, including 44 (51.2%) males. In total, 64% (n=55), 34.9% (n=30), and 1.2% (n=1) of patients had diabetes, COPD, and both, respectively. Two-thirds of patients reported that they had no good knowledge of disaster and emergency awareness and preparedness.

Conclusion: Based on the obtained results and due to the low readiness of patients, it is necessary to make decisions to improve the patients' readiness. Therefore, it is possible to help promote the level of knowledge and preparedness of patients with diabetes and COPD to improve the health results during and after disasters through the adoption of required strategies and comprehensive plans in different areas of public health.

Keywords: Awareness, Chronic diseases, Crisis, Emergencies, Knowledge, Preparedness

1. Background

Non-communicable diseases are one of the most important health challenges and causes of health diseases in the 21st century. Non-communicable diseases, such as cardiovascular diseases, cancer, chronic respiratory diseases, and diabetes, are among the most important global threats that have posed major public health challenges for all countries (1).

Among non-communicable diseases, chronic obstructive pulmonary disease (COPD) is a major public health problem worldwide (2). The World Health Organization has predicted that COPD would be the third leading cause of death by 2030. However, the prevalence of the disease varies in different areas. It is 37% in the US and 7.8-19.7 % in Latin America. The average prevalence in Africa and Asia is 13.4% and 13.5%, respectively (3-5). The global prevalence of COPD is estimated to be 12.6% (6), and it is 5.57% in Iran (7).

Besides COPD, diabetes has also become a

growing epidemic in the recent century (8, 9). Latest estimates revealed that the global prevalence of diabetes has reached 9.3% (463 million people) in 2019, a figure that will rise to 10.9% (700 million people) by 2045 (10). According to the Global Status Report on Prevention and Control: National Action Plan for Diabetes, the prevalence of diabetes in Iran is estimated to be 7.4-10.2% and 9.2 million Iranians will have diabetes by 2030 (11-14).

On the other hand, a literature review revealed that by the end of the 21st century, there would be a six-fold rise in disaster eruptions compared to the past 50 years (15). Natural disasters may lead to exacerbation of NCDs, including chronic respiratory diseases and diabetes (16, 17). Patients with chronic diseases, such as diabetes and COPD, are considered a vulnerable population in emergencies and disasters (18, 19). In the areas that were affected by the Japan earthquake, many patients with diabetes lost their oral medicines and insulin, and drugs were destroyed following the demolition of houses (20). In the

Sichuan Earthquake of China, patients with such chronic diseases as COPD were incapable of emergency evacuation and did not have their medicine with them (21).

Preparedness among patients of a community includes their awareness of disasters, understanding the catastrophe, and admitting the consequences of neglecting safety rules, which may lead to injuries, PTSD, and even deaths (22-24). The level of disaster preparedness for patients with chronic diseases in different world regions, such as the United States, Italy, and the Philippines appeared to be unacceptable (25, 26). In a country such as the Philippines which is often affected by natural disasters, less than 1% of patients with chronic diseases are prepared for emergency conditions (19).

Patients with chronic illnesses during and after disasters should be adequately prepared for self-care. They should be aware of their needs in times of crisis so that they can be fully prepared for disasters. According to the EM-DAT database, Iran, as a middle-income country, is ranked 8th in the list of top 10 countries for disasters and has also witnessed an increase in the prevalence and exacerbation of NCDs, including diabetes and COPD (16). Studies show that the influx of patients, especially COPD and diabetes patients, increases following natural disasters (27, 28). Therefore, natural disasters pose risks to the health of people with chronic diseases and lead to the forced relocation of residence, physical trauma, interruptions of health care services, and destruction of living conditions (29).

While the majority of studies have demonstrated the vulnerability of patients with chronic diseases during disasters and discussed the significance of preparedness, particularly in disasters (13, 30-32), there are few concurrent studies on the knowledge, personal preparedness of diabetic and COPD patients, as well as family and community emergency preparedness in disaster-prone developing countries. Masih Daneshvari Hospital in Tehran, Iran, is the only reference hospital for all pulmonary and internal diseases, where many patients are admitted and diagnosed with COPD and diabetes every year. Awareness of the level of preparedness of chronic patients in disasters can clarify the existence of shortcomings in Masih Daneshvari Hospital.

2. Objectives

Therefore, this study aimed to determine the readiness of chronic patients against natural disasters in Iran by focusing on diabetic and chronic respiratory patients admitted to Masih Daneshvari Hospital in Tehran, Iran (33).

3. Methods

This cross-sectional survey was carried out

among diabetic and COPD patients admitted to Masih Daneshvari Educational Hospital in Tehran, Iran.

3.1. Study Instrument

The questionnaire adopted in this study is entitled "preparedness knowledge for disaster" and has been originally used in a study conducted by Jiraporn et al. (34-36). The reason for selecting this questionnaire was that its items were aligned with research objectives and criteria considered by researchers working on diabetic and COPD patients in disasters.

Considering the Iranian context and according to the experts' opinions on the questionnaire validity, an item was added regarding the insurance status of participants. Another item was also added regarding the patients' mobility status and their experiences of a natural disaster. Regarding the items on patients' knowledge and considering the patients' conditions and their literacy level, an item was added reading: "Do you know your needs during disasters?", and a total of seven questions were selected in this context. The items on patients' preparedness were related to Iranian cultural and indigenous conditions, and a total of eight questions were extracted in this context. Eventually, four questions regarding the patients' family and community preparedness were extracted and matched with the main questionnaire and Iranian culture.

Axes of the questionnaire included demographic characteristics of patients, items on their knowledge of disasters (n=7) with a Likert scale, items on their personal disaster preparedness (n=8) on a scale of Yes or No, and items on their family and community disaster preparedness (n=4) on a scale of Yes or No (Figure 1) (36). The questionnaire validation steps are presented in Flowchart 2.

3.2. Participants

Participants in this survey included patients with diabetes and COPD, who were hospitalized in three internal wards of the hospital. Samples were included in the survey using the census method. Inclusion criteria included patients admitted to the hospital with a definite diagnosis of diabetes and chronic respiratory diseases and patients with a long history of hospitalization. Patients of any age and with any level of education could enter the study. The researcher EGH read all the items for patients and the questionnaires were filled in by the researcher upon receiving the patient's opinions.

3.3. Study Instrument Section

3.3.1. First Step: (Forward Translation)

Initially, two translators familiar with the conceptual terminology, who were experienced in questionnaire translation and the target language, translated the questionnaire from the source (English) to the target language (Persian) (37, 38). The mother tongue of both translators was the



Figure 1 Axes of questionnaire on natural disaster preparedness knowledge of chronic disease patients in Iran

language of the target group. Translations were conceptual (rather than literal) and translators avoided word-for-word translation (39).

3.3.2. Second Step: (Reconciliation of Forward Translation)

At this stage, preliminary translated versions were reviewed by a third translator, who was fluent in both source and target languages. Preliminary versions were compared, and discrepancies and inappropriate concepts were modified (40, 41).

3.3.3. Third Step: (Backward Translation)

At this stage, the final translated version, completed in the previous stage, was back-translated. This was performed independently by two experts (different from the experts in the previous stage) who were fluent in both source and target languages (37, 41, 42).

3.3.4. Fourth Step: Reviewing the Back Translated Version

At this stage, the final version of the questionnaire was reviewed by a team composed of an expert in English, someone familiar with concepts, an expert questionnaire translator, and a coordinating translator. By the review completion, no issue was found and a final acceptance of the questionnaire was reached.

3.3.5. Fifth Step: Cognitive Debriefing and Face Validity

At this stage, the translated questionnaire was tested in a small target group of patients with diabetes and COPD (n=10) to examine their ability to understand, interpret, and comprehend (39). Interviews with each patient took about 30 min. None of the participants had difficulty understanding the items or considered them to be inconsistent with their cultural principles.

3.3.6. Sixth Step: Content Validity

At this stage, the content validity was initially

assessed using a qualitative method. To assess the content validity by a qualitative method, 10 clinical/medical specialists who were skilled and experienced in the treatment of patients with diabetes and COPD were selected to provide an insight into the clinical management of diabetes and COPD as well as the disaster preparedness of these patients. The experts were asked to consider each item on a scale of 1 to 4 in terms of clarity, simplicity, transparency, and objective relevance and express their opinions (43).

Subsequently, the content validity was assessed quantitatively, based on the Lawshe model (44). Responses provided by the experts were based on a 3-point Likert scale: 1) It is necessary, 2) It is useful but not necessary, 3) It is not necessary. The responses were then quantified and the value of the Content Validity Ratio (CVR) was measured afterward (44, 45). The CVR was calculated based on the following formula.

$$CVR = \frac{n_E - \frac{N}{3}}{\frac{N}{3}}$$

In addition to the CVR, the Content Validity Index (CVI) with 10 experts was calculated in the next stage. The experts were then asked to score the relevance of each item (CVI=0.9).

3.3.7. Step Seven: Reliability of Study Instrument

Cronbach's alpha was calculated to determine the internal consistency for the reliability assessment of the questionnaire. The developed questionnaire was then given to the same individuals after seven days to test repeatability, and the repeatability was assessed using the test-retest method and the Intra-class Correlation Coefficient (ICC=0.867).

3.4. Sample Size

Having completed the validity and reliability assessment of the questionnaire, the survey was conducted using the census method with a sample

size of 86 patients hospitalized in the internal medicine wards of the hospital with a definite diagnosis of diabetes and COPD approved by a pulmonologist and endocrinologist. All items of the questionnaire were read to the patients by one of the researchers, and the questionnaires were completed by the researcher after the patient commented on the items. Data analysis was conducted using SPSS software (version 22).

4. Results

Results revealed that items were all scored 3 and 4 by experts for their qualitative validity. In the quantitative content validity assessment, the CVR value was estimated at 0.8, which was acceptable, according to Lawshe's table. The result of the CVI value (obtained at 0.9) was also acceptable in this study. The questionnaire reliability was determined to be 0.92 using the inter-class correlation coefficient.

A total of 86 patients were thoroughly studied, 98.7% (n=85) of whom admitted to be capable of carrying out their daily activities, and 88.9% (n=76)

declared to be dependent on canes and walkers for walking. Results of patients' demographic characteristics are presented in Table 1.

4.1. Patient's Knowledge of Disasters

Two-thirds (n=57, 66.6%) of patients did not know about disaster preparedness in the country. They acknowledged that they had never attended a disaster training course in their lifetime and had no emergency plan for themselves during the disasters. The patients were not aware of their needs during and after disasters. Moreover, 99% (n=85) of patients stated that they had not received any training or information on self-care during and after disasters at the time of hospitalization, and 69.8% (n=60) of patients with diabetes and COPD lacked knowledge of emergency preparedness plans before disastrous incidents, considering their morbidities. Furthermore, 38.4% (n=33) of patients with chronic diseases were not aware of their needs during disasters and emergencies.

Figure 2 presents results related to the knowledge of patients with diabetes and COPD who were admitted to internal medicine wards.

Table 1. Demographic characteristics of patients with diabetes and COPD admitted to the internal medicine ward of Masih Daneshvari Hospital

Demographic characteristics	N	%	
Gender	Male	44	51.2
	Female	42	48.8
Disease	Diabetes	55	64.0
	COPD	30	34.9
	Diabetes + COPD	1	1.2
Duration of Disease	Less than 5 years	28	36.4
	5-10	25	32.5
	11-16	9	11.7
	Over 16 years	15	19.5
Education	Illiterate	25	29.4
	Elementary	13	15.3
	Secondary	17	20.0
	Diploma	23	27.1
	Bachelor's Degree	7	8.2
Insurance	Yes	85	98.8
	No	1	1.2

4.2. Personal Disaster Preparedness of Patients

Regarding the disaster preparedness of patients with diabetes and COPD, the study findings showed no meaningful association between the patients' preparedness and their gender, and both male and female patients had the same level of disaster preparedness. In this survey, 73.3% (n=63) of patients had no preparedness knowledge of emergency shelters and muster stations in their area of residence. Moreover, 58.1% (n=50) lacked any preparedness in terms of keeping a first aid kit at their home. Results on patients' disaster preparedness are presented in Figure 3.

Furthermore, 51.2% (n=44) of patients acknowledged having enough medicine for one week at home in case of emergencies and disasters, and 45.3% (n=39) required electrical medical devices at

home, among whom 63% lacked preparedness in case of a power cut. Patients with chronic respiratory diseases mentioned their need for electricity-dependent medical devices more than those with diabetes, and patients with chronic diseases were more prepared in case of a power cut compared to diabetic patients, indicating a meaningful difference ($P < 0.05$). Results of this study revealed that 87.2% of patients had access to a telephone line at home for emergency calls. Moreover, only 62.8% (n=54) knew Iranian emergency phone numbers to ask for help in critical conditions, and the COPD patients were more informed about emergency phone numbers compared to diabetic patients. A significant association was observed between patients' age and their awareness of the emergency phone number, and older patients with either diabetes or COPD were

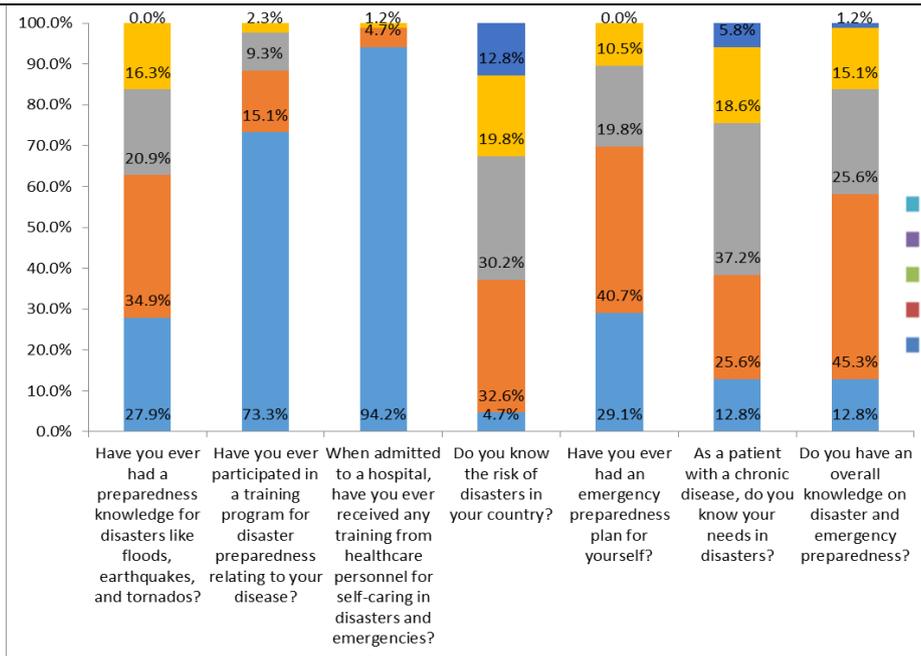


Figure 2. Knowledge of patients admitted to the internal medicine ward of Masih Daneshvari Hospital with diabetes and COPD

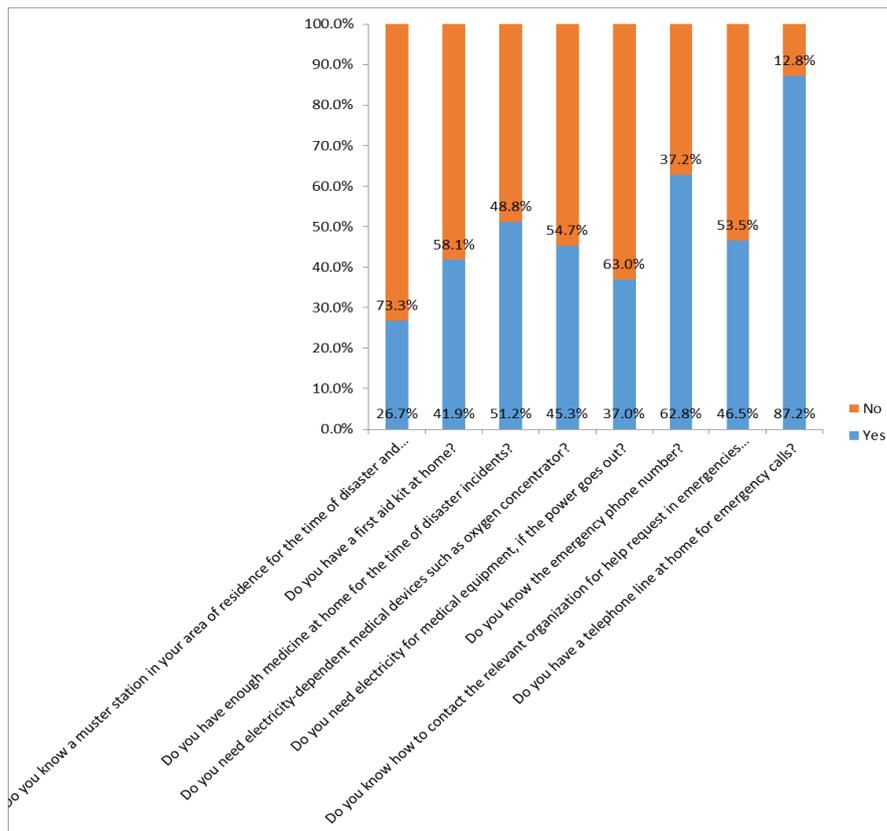


Figure 3. Preparedness of patients admitted to the internal medicine ward of Masih Daneshvari Hospital with diabetes and COPD

less aware of the emergency phone numbers ($P < 0.05$).

Findings revealed that 53.5% of patients with

diabetes and COPD lacked preparedness to seek help from relief organizations other than the Iranian Emergency Organization. On the other hand, a

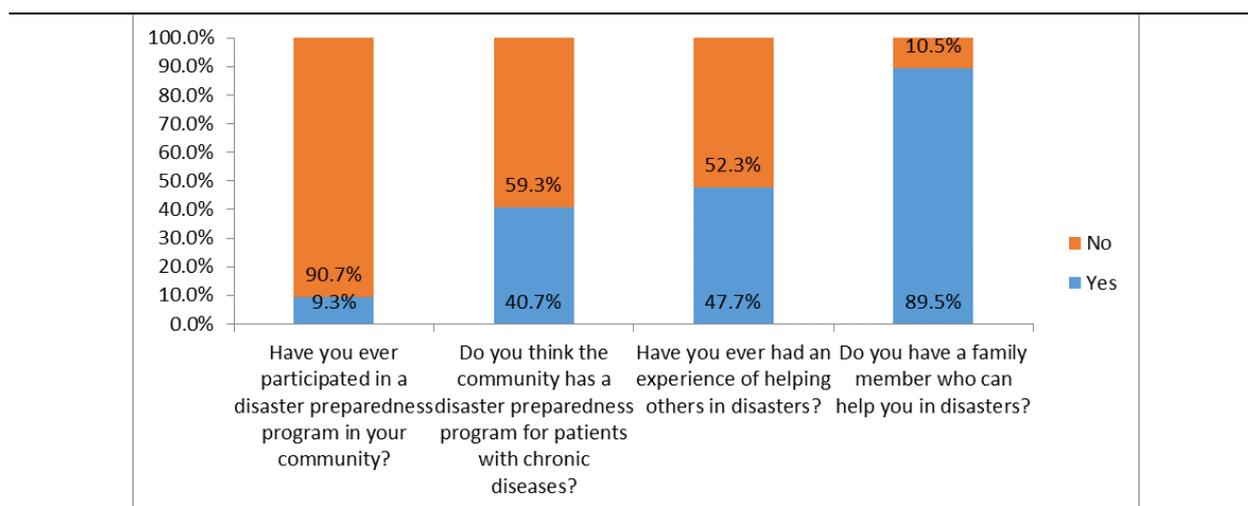


Figure 4. Disaster preparedness of the family and community of patients with diabetes and COPD admitted to the internal medicine ward of Masih Daneshvari Hospital

significant negative association was observed between the age and the receipt of aid from relief organizations, meaning that older patients were less prepared to receive aid from relief organizations ($P < 0.05$). In addition, 10.5% of participants acknowledged that they lived alone and had nobody to help them at times of disasters. The survey findings also revealed a significant association between the age and lack of a caretaker for a patient in disasters and critical conditions ($P < 0.05$).

4.3. Community and Family Disaster Preparedness

The study findings showed that 90.7% of patients had not ever participated in any training program to promote their emergency preparedness and self-care practices, and they stated that no organization had ever held any such training program for them.

In total, 35 (40.7%) patients mentioned that the community had a program for disaster preparedness for patients with chronic diseases; however, patients were not informed of such a program. In addition, findings showed that 89.5% ($n=77$) of patients had a family member who could help them in disasters, and 10.5% of patients stated that they lived alone and had no one at home to help them in critical conditions (Figure 4).

In this survey, the Mann-Whitney test was used to compare the mean knowledge score and preparedness with gender in patients; however, no meaningful difference was observed in this regard ($P > 0.05$). We also ran a Mann-Whitney U test at a 0.05 level of significance to study the patients' knowledge and preparedness considering the type of disease. However, the obtained results showed no meaningful association between the type of diabetes and chronic respiratory diseases with the knowledge and awareness level of participants. Furthermore, the Kruskal Wallis test was applied to compare different time intervals of the disease and the knowledge and preparedness score, the results of which revealed no

meaningful association between the preparedness and knowledge score of patients and the duration of the disease ($P > 0.05$).

The comparison of educational level and the knowledge and preparedness score using the Mann-Whitney test showed a significant association between these variables. Results showed that patients with higher literacy levels had more preparedness and knowledge in disasters and emergencies. The Spearman rank correlation test was applied to investigate the correlation between the age and preparedness score in the survey, the results of which revealed a negative or inverse correlation between the age and the preparedness score, meaning that the preparedness score decreased with age ($P < 0.05$).

5. Discussion

Non-communicable diseases in disasters can exacerbate patients' conditions and disrupt health care services. Public health infrastructure can also be affected by acute injuries and the immediate needs of patients.

As a result, chronic conditions may go untreated, and people with chronic illnesses experience severe complications, increased mortality, and a poor and long-term prognosis.

This study is one of the few studies conducted on the knowledge and disaster preparedness of patients with diabetes and COPD. Findings of this survey revealed that diabetic and COPD patients had a severe lack of knowledge and preparedness to manage a disaster. Moreover, the majority of patients had no specific emergency preparedness plan for themselves and did not know how to access emergency shelters and muster points considering their condition. There were discrepancies between the results of this study and those reported by Horn et al. in the US and the results obtained by Foster et

al. in North Carolina. This discrepancy can be attributed to the failure in investigating and reporting chronic disease patients immediately after natural disasters in developing countries, such as Iran (32, 46). Moreover, the medical needs of these groups of patients have often been met during disasters in developed countries that possess improved supervision systems for accurate data management of chronic disease patients and electronic medical records of patients, compared to developing countries.

Similar to the Center for Disease Control and Prevention 2012 Approval, the Emergency Preparedness plan in developed countries, including the US, European countries, and Japan, aims to identify vulnerable people and take legal measures to enhance protection in emergency conditions (36, 47, 48). This study can contribute to planning for the implementation of a disaster preparedness program for diabetic and COPD patients in a disaster-prone country with an exacerbated prevalence of the two diseases.

Almost two-thirds of the study population reported that they lacked good knowledge of disaster preparedness, and over 60% of patients with diabetes and COPD declared to have not ever received any training on natural disaster preparedness, and that service providers in the hospitals have not provided any training. Consistently, researchers of the studies conducted on older adults during disasters in the United State reported that two-thirds of patients had not ever participated in a training program on emergency preparedness (34). On the other hand, the results of this study were inconsistent with those obtained by Sri-on et al. who reported that over 80% of patients admitted to the emergency ward had enough knowledge of disaster and emergency conditions (36). This inconsistency can be explained by the fact that the study conducted by Sri-on was conducted after the Bangkok flood, which affected almost all hospitals and patients; therefore, healthcare service providers may have become more aware and enthusiastic to provide patients with training on natural disaster preparedness.

Based on the obtained results, over 80% of patients had access to telephone lines to contact the Iranian Emergency Organization and nearly 62% knew the Iranian Emergency phone number. This shows that in a disaster-prone country with an exacerbated prevalence of chronic diseases, patients' knowledge of emergency phone numbers is weak and should be improved by training as well as supervision of relief organizations and authorities.

Considering the special items on disaster preparedness, only about 26% of patients were aware of muster stations for emergency shelters at the time of crisis, and more than half of them had no first aid kit at home for critical conditions. In the

same line, the findings of the study performed by Morin et al. were similar to those obtained in this study (19).

More than 50% of patients with diabetes and COPD acknowledged having medicine at home enough for one week in critical conditions. These results can be explained by the fact that over 80% of patients were insured by an insurance company that covered medicine and pharmacy expenses. In addition, in Iran, physicians usually prescribe medications to patients with chronic diseases for months.

More than 80% of patients needed canes and walkers as walking aids. In this situation, the need for a comprehensive emergency preparedness plan for patients with chronic diseases during disasters is essential considering their safety issues and safe transportation. The study performed by Lauren et al. has emphasized the vulnerability of patients with chronic diseases in disasters, especially those with impaired physical mobility, reduced sensory awareness, and senior patients with chronic diseases (49).

In this study, about 45% of patients needed electricity-dependent medical devices at home for their preparedness and safety; however, they did not have much information and preparedness on power cuts and alternatives to the use of electrical medical devices. The power cut may have significant side effects on the health condition of patients with chronic diseases who are dependent on electrical medical devices. In the same line, according to findings of a survey administered in Queensland-Australia on patients with non-communicable diseases, the patients had emphasized the access to medicines, medical services, and electricity for patients dependent on electrical medical devices, and the chronic disease patient management in disasters had already been planned by policymakers (9).

More than 80% of patients acknowledged having their family support in emergencies and nearly 10% of patients lived alone without any caretaker. These patients were prone to adverse effects of psychophysical stresses arising from disasters. In addition, the demand for supporting families or caretakers becomes important with the aging of vulnerable patients with chronic diseases. However, social isolation even in a large community keeps many vulnerable people, such as chronic disease patients, from receiving warning signals or asking for help. This is another reason why it is essential to implement targeted and effective disaster preparedness plans for chronic disease patients. The significance of sustainability of families with chronic disease patients has been noted in the study performed by Sullivan et al. Researchers stated that preparedness interventions must focus on engendering flexibility and encouraging families to have caretaking facilities at times of crisis to ensure

self-sufficiency in the early stages of disaster (50, 51).

5.1. Research Strengths and Limitations

With the information acquired from participants, it is possible to identify challenges that could strengthen and improve disaster preparedness and disease management in diabetic and COPD patients to improve the healthcare results of these patients in disasters. There are few studies concurrently conducted on knowledge and personal, family, and community preparedness of patients with diabetes and chronic respiratory diseases in disaster-prone and developing countries.

Due to the COVID-19 pandemic, the number of hospitalized patients diagnosed with diabetes and COPD was small in this study due to the fear of hospital-acquired infections, which explains the small sample size of this study. However, the research team tried to include every patient admitted with diabetes and COPD in this survey in coordination with the head nurses of the three wards to increase the accuracy and precision of the study.

6. Conclusion

This study aimed to determine the knowledge of natural disaster preparedness of chronic disease patients in Iran by focusing on diabetic and COPD patients admitted to Masih Daneshvari Hospital in Tehran, Iran. The study results can help every stakeholder, including patients, experts, disaster responders, and policymakers, to develop strategies for knowledge, personal disaster preparedness, and chronic disease patient management in disasters to ensure proper anti-disaster measures in this vulnerable population, particularly in developing disaster-prone countries, such as Iran. Results showed weak preparedness knowledge of patients. At the time of hospitalization, the patients received no training whatsoever on self-care during disasters. Moreover, they had no emergency preparedness plan before the incident considering their condition. Therefore, the development of professional training modules for service providers can prevent the exacerbation of morbidity and mortality of chronic disease patients in disasters.

On the other hand, the weak preparedness of patients in emergency evacuation and gathering in muster stations and emergency shelters was an important finding of this study. These patients did not have the required preparedness to ask for help from rescue organizations other than the Iranian Emergency Organization in critical conditions. Many of them lack a comprehensive emergency preparedness plan and the required knowledge and preparedness for self-care during and after natural disasters. Therefore, there is an urgent global need for health system policymakers and planners to adopt natural disaster preparedness plans to meet the general and

urgent needs of every chronic disease patient.

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Footnotes

Ethical Considerations: This study is approved by the Ethics Committee of Social Determinants of Health Research Center at Urmia University of Medical Sciences (IR.UMSU.REC.1398.228). Written informed consent was obtained from all participants. The researcher informed the participants about the objectives of the study and all questions and answers were conducted upon the written consent of the patients. Translators avoided the use of colloquial tone and terms that were not apprehensible by patients. Translators considered issues related to the age and gender of patients and avoided any expression that might have been offensive to the target group. Approval for the application of the main questionnaire was acquired through email from the corresponding author of the respective paper (36).

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