11. Tunn R, Baessler K, Knüpfer S, Hampel C. Urinary Incontinence and Pelvic Organ Prolapse in Women. Dtsch Arztebl Int. 2023 Feb 3;120(5):71–80. doi: 10.3238/arztebl.m2022.0406.
12. van IJsselmuiden MN, van Oudheusden A, Veen J, van de Pol G, Vollebregt A, Radder CM, et al. Hysteropexy in the treatment of uterine prolapse stage 2 or higher: laparoscopic sacrohysteropexy versus sacrospinous hysteropexy-a multicentre randomised controlled trial (LAVA trial). BJOG. 2020 Sep;127(10):1284–1293. doi: 10.1111/1471-0528.16242.
13. Weintraub AY, Glinter H, Marcus-Braun N. Narrative review of the epidemiology, diagnosis and pathophysiology of pelvic organ prolapse. Int Braz J Urol. 2020 Jan-Feb;46(1):5–14. doi: 10.1590/S1677-5538.IBJU.2018.0581.
14. Wu JM, Vaughan CP, Goode PS, Redden DT, Burgio KL, Richter HE, et al. Prevalence and trends of symptomatic pelvic floor disorders in U.S. women. Obstet Gynecol. 2014;123:141–8.

Стаття надійшла 13.12.2023 р.

DOI 10.26724/2079-8334-2024-4-90-52-57
UDC 616-036.88-02:550.34(479.24)

L.Q. Afandiyeva, T.A. Sadigova, A.K. Alekperova, S.M. Mammadli, K.F. Mammadyarova, E.Z. Kerimova
Azerbaijan Medical University, Baku, Azerbaijan

ANNUAL STATISTICAL ANALYSIS OF CARDIOVASCULAR MORTALITY IN SEISMICALLY UNSTABLE REGIONS OF AZERBAIJAN

e-mail: mic_amu@mail.ru

With the purpose to examine the influence of geophysical and seismic parameters in unstable regions of Azerbaijan on mortality rates from cardiovascular pathologies the medical records of 4,043 patients were analyzed. The number of deaths, their causes, distribution by gender and age were assessed, and a relationship was established with the magnitude of earthquakes, the depth of the epicenter and seismological activity. Earthquakes with a magnitude of 1.1–2.0 and a depth of less than 10 km, significantly impacted mortality rates. Individuals with cardiovascular pathologies have a 1.63 times higher risk of death due to an earthquake compared to those without such pathologies. Persons with cardiovascular diseases have 2.67 times the odds of dying compared to those without such pathologies. Cardiovascular pathologies account for 5.79 % of the variation in overall mortality among all causes. These results indicate that cardiovascular pathologies significantly increase the risk of death.

Key words: cardiovascular pathology, mortality, earthquake, seismic parameters.

Л.Г. Ефендієва, Т.А. Садигова, А.К. Алекперова, С.М. Мамедлі, К.Ф. Мамед'ярова, Е.З. Керімова

РІЧНИЙ СТАТИСТИЧНИЙ АНАЛІЗ СМЕРТНОСТІ ВІД СЕРЦЕВО-СУДИННИХ ЗАХВОРЮВАНЬ У СЕЙСМІЧНО НЕСТАБІЛЬНИХ РЕГІОНАХ АЗЕРБАЙДЖАНА

З метою вивчення впливу геофізичних та сейсмічних параметрів у нестабільних регіонах Азербайджану на показники смертності від серцево-судинних патологій було проаналізовано медичні картки 4043 пацієнтів. Оцінено кількість смертей, їх причини, розподіл за статтю та віком, встановлено зв'язок з магнітудою землетрусів, глибиною епіцентру та сейсмічною активністю. Землетруси магнітудою 1,1–2,0 та глибиною менше 10 км суттєво вплинули на показники смертності. У осіб із серцево-судинними патологіями ризик смерті від землетрусу в 1,63 рази вищий, ніж у осіб без таких патологій. У осіб із серцево-судинними захворюваннями шанси померти у 2,67 рази вищі, ніж у осіб без таких патологій. Серцево-судинні патології становлять 5,79 % варіації загальної смертності серед усіх причин. Ці результати свідчать, що серцево-судинні патології значно збільшують ризик смерті.

Ключові слова: серцево-судинна патологія, смертність, землетрус, сейсмічні параметри.

Republic of Azerbaijan is situated within the central section of the Mediterranean mobile belt, characterized by significant geological activity due to the dynamics between the Arabian and Eurasian lithospheric plates [3]. This belt exhibits high seismic activity, active magmatism, mud volcanism, extensive landslide processes, and notable vertical and horizontal tectonic movements. Considering the fact that the cardiovascular system is one of the first to react to extreme changes in environmental conditions, triggering adaptive processes in the form of changes in vascular wall tone, blood rheological properties, etc., it is undoubtedly of interest to study the relationship between these factors [5, 9, 10].

Currently, the scientific community is focused on evaluating the biological impact of intense environmental stressors on the human body [7]. Accordingly, conducting research within the Republic of Azerbaijan to predict ecologically and medically adverse seismic conditions and prevent cardiovascular diseases is a primary objective of studies in various regions of country [3].

According to a number of studies, myocardial infarctions on days of geomagnetic disturbances are characterized by a more severe course and can more often have a fatal outcome [4, 6, 8]. However, a methodology for predicting seismological lability states based on scientific data on the impact of environmental features of the region of residence on the risk of complications of cardiovascular diseases has not yet been developed [1, 7].

The results of this study can contribute to a better understanding of the impact of seismic activity on human health and aid in the development of appropriate preventive measures. Such research is also important for enhancing public preparedness for seismic threats.

The purpose of the study was to examine the influence of geophysical and seismic parameters in unstable regions of Azerbaijan – specifically, variations in the magnetic field, earthquake magnitude, and depth of seismic processes – on mortality rates from cardiovascular pathologies.

Materials and methods. The materials from the Central Statistical Committee of Azerbaijan were used in the study, additional studies were conducted at the Department of Internal Diseases of the Azerbaijan Medical University (AMU) and the Educational and Therapeutic Clinic of the AMU.

In addition, in 2013 the seismological information was received from 35 telemetry stations, which included an overview of the seismic regime of the Azerbaijan Republic, the propagation of seismic waves, the dynamics of seismic processes, earthquake intensity, magnitude and other indicators. Based on the spatial distribution of focal zones identified by weak seismicity and the magnitudes of the maximum possible earthquakes in them, a seismic hazard map was compiled for the territory of Azerbaijan. The number of deaths, their causes, distribution by gender and age were assessed, and a relationship was established with the magnitude of earthquakes, the depth of the epicenter and seismological activity.

To analyze the connection with diseases medical records of 4,043 patients were analyzed, including 2,007 men and 2,036 women. Among these patients, deaths were attributed to the following causes: heart failure (HF) in 1,353 cases, acute coronary syndrome (ACS) in 1,077 cases, acute cerebrovascular accident (ACVA) in 1,042 cases, hypertensive crisis (HC) in 430 cases, and other causes (OC) in 141 cases.

To analyze quantitative data, the Kruskal-Wallis test was used, allowing the assessment of differences between several independent groups. For variance analysis, one-way analysis of variance (ANOVA) was applied. Risk ratios (RR) and odds ratios (OR) were calculated to determine associations between the studied variables. To enhance result accuracy and minimize bias, the Effective Inclusion Function (EIF) was employed. Statistical significance was established at a level of ($p<0.05$).

Results of the study and their discussion. Based on a detailed study of medical records, we found a relationship between the patient's gender, age, cause of death, month, seismic days, Magnitude, and Depth of Seismic Activity.

1. Mortality Analysis Based on Gender, Cause of Death, Month, Age, Seismic Days, Magnitude, and Depth of Seismic Activity:

– Gender: Women constituted 50.4 % of the deceased, and men 49.6%.

– Cause of Death: The highest mortality was attributed to heart failure (HF) at 33.5 %, followed by acute coronary syndrome (ACS) at 26.6 %, acute cerebrovascular accident (ACVA) at 25.8 %, and hypertensive crisis (HC) at 10.6%.

– Monthly Distribution: Mortality peaked in January (10.3 %), followed by March (10.2 %), May (8.5 %), June (8.4 %), February (8.3 %), July and August (8.1 % each), October (7.7 %), December (7.6 %), November (7.5 %), and September (7.0 %).

– Age Distribution: The majority of deaths occurred in individuals aged 70–79 years (34.0 %), followed by 80–89 years (32.7 %), 60–69 years (12.2 %), 50–59 years (10.3 %), 90–99 years (4.8 %), over 100 years (0.5 %), 0–9 years (0.4 %), and 10–19 and 20–29 years (0.2 % each).

– Seismic Activity: Comparative analysis showed that 62.0 % of deaths occurred on earthquake days, while 38.0 % were on calm days.

– Depth of Seismic Process: Mortality rates were distributed as follows: no seismic activity (38.0 %), depth less than 10 km (20.8 %), 11–20 km (16.1 %), 21–30 km (11.2 %), 31–40 km (8.1 %), and more than 40 km depth (5.9 %).

– Magnitude: The highest number of deaths occurred at a magnitude of 1.1–2.0 (35.2 %), followed by 0.1–1.0 (14.6 %), 2.1–3.0 (10.7 %), 3.1–4.0 (1.4 %), and more than 4.0 (0.1 %).

2. Gender-Based Mortality Analysis by Age and Cause of Death:

– Gender and Cause of Death: A comparative analysis of mortality causes by gender revealed statistically significant differences ($p<0.001$). Among men, the primary cause of death was heart failure (HF) at 32.3 %, followed by acute coronary syndrome (ACS) at 31.4 %, cerebrovascular accident (CVA) at 22.8 %, hypertensive crisis (HC) at 10.1 %, and other causes at 3.3 %. Among women, heart failure was also the leading cause at 34.6 %, followed by CVA at 28.7 %, ACS at 21.9 %, HC at 11.1 %, and other causes at 3.6 % ($\chi2=51.219$; $p<0.001$).

Age-Based Mortality Distribution: Statistically significant age-related differences in mortality were also observed ($p<0.001$). The highest mortality rate was seen in individuals aged 70–79 years (32.9 %), followed by those aged 80–89 years (26.9 %), 60–69 years (15.8 %), 50–59 years (14.6 %), 40–

49 years (5.6 %), 90–99 years (2.1 %), 30–39 years (1.2 %), 0–9 years (0.4 %), 10–19 years (0.2 %), and 20–29 and over 100 years (0.1 % each) (Fig. 1).

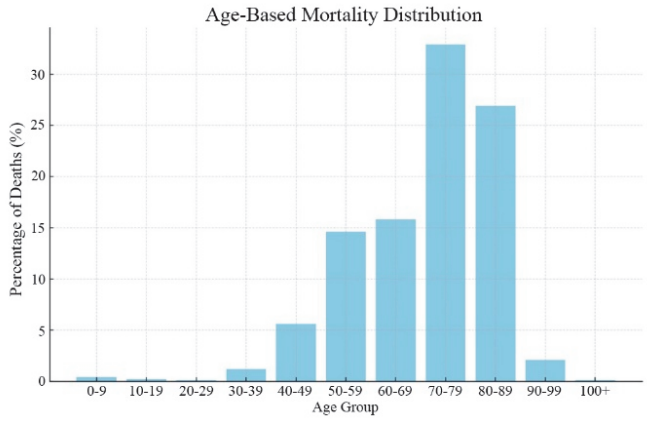

Fig. 1. Age-Based Mortality Distribution $\chi 2=280.128$; $p<0.001$.

3. Age-specific analysis of mortality by gender and causes of disease:

There were statistically significant differences ($p<0.001$) in mortality rates by gender and age group. Among males, the highest mortality rates were observed in the following age groups: 40–49 years (76.7 %), 30–39 years (70.6 %), 60–69 years (64.0 %), and 0–9 years (56.3 %). Conversely, among females, higher mortality rates were observed in the following age groups: 10–19 years (60.0 %), 20–29 years (62.5 %), 70–79 years (51.9 %), 80–89 years (59.3 %), 90–99 years (78.1 %), and over 100 years (90.9 %).

When analyzing the association between age and causes of death, the following statistically significant results ($p<0.001$) were obtained:

– Age group 0–9 years: Cardiovascular complications accounted for 43.8 % of deaths (7 cases), acute coronary syndrome (ACS) for 25.0 % (4 cases), and acute cerebrovascular accidents (ACVA) for 18.8 % (3 cases).

– Age group 10–19 years: Deaths were attributed to cardiovascular complications in 50.0 % of cases (5 individuals), ACS in 20.0 % (2 cases), with hypertensive crises (HC), ACVA, and heart failure (HF) each accounting for 10.0 % of cases.

– Age group 20–29 years: HF was the leading cause in 75.0 % of cases (6 individuals), with ACVA and ACS each responsible for 12.5 % (1 case each).

– Age group 30–39 years: HF accounted for 52.9 % of deaths (18 individuals), followed by ACS in 23.5 % (8 cases), ACVA in 17.6 % (6 cases), and HC and other causes each in 2.9 % (1 case).

– Age group 40–49 years: The primary causes were ACS (42.5 %), HF (27.4 %), ACVA (17.8 %), HC (4.1 %), and other causes (8.2 %).

– Age group 50–59 years: ACS accounted for 37.9 % of deaths, HF for 25.9 %, ACVA for 22.1 %, HC for 10.6 %, and other causes for 3.6 %.

– Age group 60–69 years: ACS was responsible for 32.9 % of deaths, HF for 28.1 %, ACVA for 24.8 %, HC for 9.5 %, and other causes for 4.6 %.

– Age group 70–79 years: HF was the most common cause at 31.7 %, followed by ACVA (31.2 %), ACS (23.8 %), HC (10.1 %), and other causes (3.2 %).

– Age group 80–89 years: HF accounted for 38.1 % of deaths, ACVA for 23.8 %, ACS for 22.4 %, HC for 13.0 %, and other causes for 2.6 %.

– Age group 90–99 years: HF was the leading cause at 48.0 %, followed by ACVA (21.9 %), ACS (18.9 %), HC (8.2 %), and other causes (3.1 %).

– Age group over 100 years: HF accounted for 36.4 % of deaths, ACS for 22.7 %, with HC, ACVA, and other causes each responsible for 13.6 %.

Annual Analysis of Mortality by Gender, Age, and Causes of Disease:

Gender-based analysis. Statistically significant differences were observed in mortality rates by gender across different months:

– Among men, higher mortality rates were recorded in January (50.6 %), February (50.7 %), April (50.9 %), August (52.1 %), September (53.4 %), and October (52.6 %).

– Among women, higher mortality rates occurred in March (52.2 %), May (51.5 %), June (50.3 %), July (55.2 %), November (54.6 %), and December (50.3 %).

Age-based analysis by month. When analyzing mortality by age and month, the following trends were observed:

– January: The highest mortality occurred in the 70–79 age group (35.3 %), followed by 80–89 years (32.1 %) and 60–69 years (11.3 %).

– February: Mortality was highest in the 70–79 age group (34.7 %), followed by 80–89 years (34.4 %) and 60–69 years (11.0 %).

– March: Equal mortality rates were observed in the 70–79 and 80–89 age groups (32.6 % each), followed by 60–69 years (12.8 %).

– April: Mortality was highest in the 70–79 age group (37.8 %), followed by 80–89 years (32.4 %) and 60–69 years (12.5 %).

– May: The 80–89 age group recorded the highest mortality (37.2 %), followed by 70–79 years (32.0 %) and 60–69 years (10.5 %).

– June: Mortality was highest in the 70–79 age group (32.9 %), followed by 80–89 years (32.4 %) and 60–69 years (14.1 %).

– July: The 80–89 age group recorded the highest mortality (37.1 %), followed by 70–79 years (30.1 %) and 60–69 years (9.5 %).

– August: Mortality was highest in the 80–89 age group (31.4 %), followed by 70–79 years (29.3 %) and 60–69 years (14.6 %).

– September: The 70–79 age group recorded the highest mortality (35.3 %), followed by 80–89 years (27.9 %) and 60–69 years (15.2 %).

– October: Mortality was highest in the 70–79 age group (36.1 %), followed by 80–89 years (31.9 %) and 60–69 years (14.5 %).

– November: The 70–79 age group recorded the highest mortality (35.1 %), followed by 80–89 years (32.8 %), with equal mortality rates in the 50–59 and 60–69 age groups (9.9 % each).

– December: Mortality was highest in the 70–79 age group (37.6 %), followed by 80–89 years (29.7 %) and 60–69 years (11.4 %).

Cause-based analysis by month. Across all months from January to December, heart failure (HF) was consistently the leading cause of mortality.

4. Analysis of the Impact of Magnitude on Mortality by Gender, Age, and Causes of Disease:

Gender-based analysis. A comparative analysis of seismic event magnitude and gender revealed the following trends:

– In the absence of a recorded magnitude, mortality was higher among men (50.6 %) than women (49.4 %).

– Among men, mortality rates were: 50.8 % at a magnitude of 0.1–1.0, 50.6 % at a magnitude of 2.1–3.0.

– Among women, mortality rates were: 51.6 % at a magnitude of 1.1–2.0, 59.6 % at a magnitude of 3.1–4.0, 66.7 % at a magnitude above 4.0.

Age-based analysis by magnitude. When analyzing mortality by age and magnitude, the following trends were observed:

– Magnitude 0.1–1.0: The highest mortality occurred in the 80–89 age group, followed by 70–79 years (32.6 %) and 60–69 years (12.4 %).

– Magnitude 1.1–2.0: Mortality was highest in the 80–89 age group (34.0 %), followed by 70–79 years (33.5 %) and 60–69 years (12.2 %).

– Magnitude 2.1–3.0: The 70–79 age group recorded the highest mortality (36.0 %), followed by 80–89 years (28.1 %) and 60–69 years (12.3 %).

– Magnitude 3.1–4.0: Mortality was highest in the 70–79 age group (40.4 %), followed by 80–89 years (33.3 %) and 50–59 years (10.5 %).

– Magnitude above 4.0: Equal mortality rates of 33.3 % were observed in the 60–69 and 80–89 age groups, with 16.7 % in the 50–59 and 70–79 age groups.

Cause-based analysis by magnitude: The analysis of causes of mortality across different magnitudes revealed statistically significant differences ($p<0.001$):

– Magnitude 0.1–1.0: Heart failure (HF) was the leading cause (33.3 %), followed by acute coronary syndrome (ACS) (26.5 %), acute cerebrovascular accidents (ACVA) (26.0 %), hypertensive crises (HC) (8.5 %), and other causes (5.8 %).

– Magnitude 1.1–2.0: HF accounted for 31.4 % of deaths, followed by ACVA (28.4 %), ACS (26.7 %), HC (10.7 %), and other causes (2.9 %).

– Magnitude 2.1–3.0: HF accounted for 31.8 %, followed by ACVA (29.2 %), ACS (26.7 %), HC (8.1%), and other causes (4.2 %).

– Magnitude 3.1–4.0: Equal proportions of deaths were caused by ACVA and ACS (31.6 % each), followed by HF (22.8 %), HC (10.5 %), and other causes (3.5 %).

– Magnitude above 4.0: ACVA accounted for the majority of deaths (66.7 %), followed by HF (33.3 %).

5. Analysis of the Impact of Seismic Depth on Mortality by Gender, Age, and Causes of Disease (Fig. 2).

Gender-based analysis. An examination of mortality based on seismic depth and gender revealed the following results:

– At depths less than 10 km, more women died (52.4 %) compared to men (47.6 %).

– At a depth of 11–20 km, men accounted for 52.5 % of deaths, while women accounted for 47.5 %.

– At a depth of 21–30 km, women made up 53.4 % of deaths, while men accounted for 46.6 %.

– At a depth of 31–40 km, 53.1 % of the deceased were women and 46.9 % were men.

– At depths greater than 40 km, men accounted for 52.5 % of deaths, while women accounted for 47.5 %.

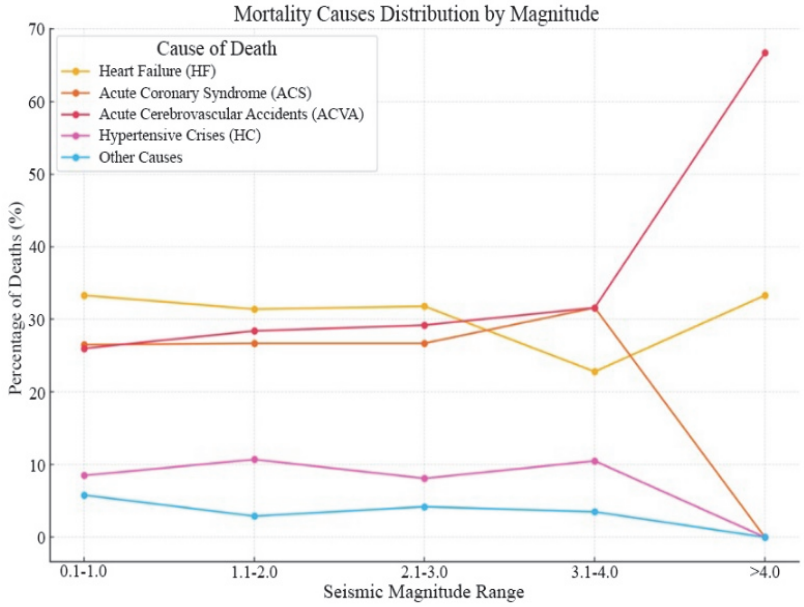

Fig. 2. Distribution of mortality causes due to the magnitude ($\chi 2$=50.247; p<0.001).

Age-based analysis by depth. When analyzing mortality by age and depth of the seismic event, the following trends were observed.

– Depth <10 km: The highest mortality was in the 80–89 age group (36.7 %), followed by the 70–79 age group (32.1 %) and the 60–69 age group (10.6 %).

– Depth 11–20 km: The highest mortality was in the 70–79 age group (34.9 %), followed by 80–89 years (31.0 %) and 60–69 years (13.4 %).

– Depth 21–30 km: The 70–79 age group had the highest mortality (34.6 %), followed by 80–89 years (30.4 %) and 60–69 years (12.0 %).

– Depth 31–40 km: Mortality was highest in the 80–89 age group (35.6 %), followed by 70–79 years (32.5 %) and 60–69 years (13.8 %).

– Depth >40 km: The highest mortality occurred in the 70–79 age group (37.1 %), followed by 80–89 years (28.3 %) and 60–69 years (12.1 %).

Cause-based analysis by depth. The effect of seismic depth on mortality causes was statistically significant (p<0.001), with the following distributions:

– Depth <10 km: Heart failure (HF) was the leading cause of death (37.6 %), followed by acute cerebrovascular accidents (ACVA) (26.1 %), acute coronary syndrome (ACS) (23.6 %), hypertensive crises (HC) (8.1 %), and other causes (4.6 %).

– Depth 11–20 km: HF accounted for 30.4 % of deaths, ACVA for 27.6 %, ACS for 26.9 %, HC for 12.1 %, and other causes for 2.9 %.

– Depth 21–30 km: ACS was the leading cause (30.4 %), followed by ACVA (29.9 %), HF (23.9 %), HC (13.5 %), and other causes (2.2 %).

– Depth 31–40 km: HF accounted for 29.8 % of deaths, ACVA for 29.1 %, ACS for 28.5 %, HC for 8.6 %, and other causes for 5.8 %.

– Depth >40 km: HF accounted for 32.1 % of deaths, ACVA for 31.7 %, ACS for 27.5 %, HC for 2.9 %, and other causes for 5.8 %.

This data indicates significant variation in mortality by depth, with the distribution of causes changing across different depths.

The analysis results revealed statistically significant differences when comparing causes of death with earthquake magnitudes. Statistical analysis using the ANOVA method demonstrated significant differences between age, cause of death, magnetic activity, seismic depth, and earthquake magnitude. Specifically, as the magnitude increases, there is a rise in the number of deaths from various causes, especially from heart failure (HF). Analysis using the Kruskal-Wallis test showed a statistically significant relationship (p<0.001) between the following variables: cause of death and gender, age and gender, cause of death and age, cause of death and earthquake magnitude, and cause of death and seismic depth. These findings underscore the importance of considering gender, age, and seismic characteristics when analyzing causes of mortality, as well as confirm the significance of seismic activity as a factor influencing public health. The results indicate a complex relationship between seismic activity and mortality levels from various diseases in Azerbaijan. Mortality from HF was the leading cause of death across all population categories, especially among women and older individuals.

In the analysis of relative risk (RR), a result of 1.63 was obtained, indicating that individuals with cardiovascular pathologies have a 1.63 times higher risk of death due to an earthquake compared to those without such pathologies. In other words, the presence of these pathologies increases the risk of a fatal outcome in an earthquake by 63 %.

We also conducted an analysis of mortality from cardiovascular pathologies using odds ratio analysis, obtaining a result of 2.67 with a 95 % confidence interval (2.44–2.92) at p≤0.001. This indicates that the presence of cardiovascular diseases significantly increases the likelihood of death during an earthquake, with individuals with these pathologies having 2.67 times the odds of dying compared to those without such pathologies, necessitating appropriate protective measures for this population group.

We also analyzed the effect influence factor (EIF) on overall mortality. EIF is an indicator that evaluates the contribution of a specific factor to the overall outcome or process and is often used to understand how strongly a particular factor influences a system or phenomenon. In analyzing the influence of earthquake factors on overall mortality, an EIF of 5.79 % was obtained with a 95 % confidence interval (5.75–5.84) at p≤0.001, meaning that cardiovascular pathologies account for 5.79 % of the variation in overall mortality among all causes. Although the contribution of this factor to overall mortality is relatively small, its influence is statistically significant.

It should be noted that not all studies note a connection between earthquakes and cardiac pathologies. One study conducted in New Zealand found that after two earthquakes there was no increase in ventricular arrhythmia [2]. However, this study did not study the dependence of mortality from CVD on age, earthquake magnitude and other important factors. Regarding the connection with seasonal changes, some authors point to an increase in blood pressure on winter mornings, especially in older people [11]. Similar results were characteristic of our patients: a high percentage of deaths was in January (10.3 %).

Conclusions

1. Seismic activity, particularly earthquakes with a magnitude of 1.1–2.0 and a depth of less than 10 km, significantly impacted mortality rates.

2. Individuals with cardiovascular pathologies have a 1.63 times higher risk of death due to an earthquake compared to those without such pathologies.

3. The presence of cardiovascular diseases significantly increases the likelihood of death during an earthquake, with individuals with these pathologies having 2.67 times the odds of dying compared to those without such pathologies

4. Cardiovascular pathologies account for 5.79 % of the variation in overall mortality among all causes.

These results indicate that cardiovascular pathologies significantly increase the risk of death. Given the high statistical significance and precise confidence interval, we can conclude the necessity of enhanced prevention, diagnosis, and treatment of cardiovascular diseases to reduce mortality.

References

1. Babaie J, Pashaei Asl Y, Naghipour B, Faridaalaee G. Cardiovascular Diseases in Natural Disasters; a Systematic Review. Arch Acad Emerg Med. 2021 May 4;9(1): e36. doi: 10.22037/aaem.v9i1.1208.

2. Chan C, Daly M, Melton I, Crozier I. Two major earthquakes in Christchurch were not associated with increased ventricular arrhythmias: Analysis of implanted defibrillator diagnostics. PloS one. 2019;14(5): e0216521. doi: 10.1371/journal.pone.0216521.

3.Efendiyeva LG. Mortality from cardiovascular pathologies depending on seismological activity in Zagatala region of Azerbaijan. World of Medicine and Biology. 2022; 3(81): 050–054. doi: 10.26724/2079-8334-2022-3-81-50-54.

4. Erol Ç. Earthquake and Cardiovascular Effects. Anatol J Cardiol. 2024 Sep;28(9):416. doi: 10.14744/AnatolJCardiol.2024.9.

5. Hayman KG, Sharma D, Wardlow RD, Singh S. Burden of cardiovascular morbidity and mortality following humanitarian emergencies: a systematic literature review. Prehospital and disaster medicine. 2015;30(1):80–8. doi: 10.1017/S1049023X14001356.

6. JCS J, Group JJW. Guidelines for Disaster Medicine for Patients with Cardiovascular Diseases (JCS 2014/JSH 2014/JCC 2014)– Digest Version– Circulation Journal. 2015;80(1):261–84. doi: 10.1253/circj.CJ-66-0121.

7. Moreira RP, da Silva CBC, de Sousa TC, Leitão FLBF, Morais HCC, de Oliveira ASS, et al. The Influence of Climate, Atmospheric Pollution, and Natural Disasters on Cardiovascular Diseases and Diabetes Mellitus in Drylands: A Scoping Review. Public Health Rev. 2024 Aug 8; 45:1607300. doi: 10.3389/phrs.2024.1607300.

8. Moscona JC, Peters MN, Maini R, Katigbak P, Deere B, Gonzales H, et al. The incidence, risk factors, and chronobiology of acute myocardial infarction ten years after Hurricane Katrina. Disaster medicine and public health preparedness. 2019;13(2):217–22. doi: 10.1017/dmp.2018.22.

9. Ripoll Gallardo A, Pacelli B, Alesina M, Serrone D, Iacutone G, Faggiano F, et al. Medium-and long-term health effects of earthquakes in high-income countries: a systematic review and meta-analysis. International journal of epidemiology. 2018;47(4):1317–32. doi: 10.1093/ije/dyy130.

10. Shih H-I, Chao T-Y, Huang Y-T, Tu Y-F, Sung T-C, Wang J-D, et al. Increased Medical Visits and Mortality among Adults with Cardiovascular Diseases in Severely Affected Areas after Typhoon Morakot. International journal of environmental research and public health. 2020;17(18):6531. doi: 10.3390/ijerph17186531.

11.Wang CX, Hilburn IA, Wu DA, Mizuhara Y, Cousté CP, Abrahams JNH, et al. Transduction of the Geomagnetic Field as Evidenced from alpha-Band Activity in the Human Brain. eNeuro. 2019 Apr 26;6(2): ENEURO.0483–18.2019. doi: 10.1523/ENEURO.0483-18.2019.

Стаття надійшла 24.11.2023 р.