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Letter to the editor

Struggling hearts: Cardiovascular health in a war-torn Gaza

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ABSTRACT

The Gaza Strip, a small territory home to 2.2 million, faces an escalating healthcare crisis amidst the ongoing conflict and severe socio-economic challenges previously. This review sheds light on the current cardiovascular health situation in Gaza, emphasizing the impact of stress, hypertension, myocardial infarction, and cardiomyopathy. The dire state of healthcare infrastructure, limited access to medical care, and disruption of essential services, particularly in the northern region, exacerbate the crisis. Stress hormones, which are elevated by chronic conflict, further contribute to cardiovascular risks. The prevalence of hypertension and cardiovascular disease is alarming, with inadequate access to medications and healthcare resources. Urgent international intervention is crucial to address immediate healthcare needs, provide medication, and ensure the well-being of the population of Gaza.

Keywords: Cardiovascular Health, Hypertension, myocardial infarction, Gaza conflict

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Dear Editor,

Gaza is a small coastal territory of 365 km² located in the eastern part of the Mediterranean Sea, bordered by Occupied Palestine and Egypt. It is one of two Palestinian territories, with the other being the West Bank.¹ The Gaza Strip has a complex political and socio-economic landscape.²

The Gaza Strip has faced significant humanitarian challenges, varying from high population density and economic scarcity to limited access to basic life requirements. Home to 2.2 million people, it stands as the largest open-air prison. Ongoing blockades and restrictions on the movement of people and goods through the ground, sky, and sea have isolated it from the entire world.^{2,3} While 47.8% of the Gaza population is obese, 40.2% have high triglyceride levels, 28.4% have hypertension, 23.3% are smokers, and 19.1% have diabetes. Moreover, Gaza's people suffer significantly from coronary artery disease (8.3%) and strokes (3%), which were accompanied by high triglyceride levels (40%), and 20% of the population have diabetes mellitus.^{3,4} All situations led to high unemployment, sedentary lifestyle, and obesity, which contribute to an elevated risk of cardiac complications ranging from high atherosclerosis to catastrophic events like myocardial infarction (MI) and stroke.³

Amid the ongoing hostility in Gaza, a lot of people are being displaced from the northern to the southern region of Gaza. Over a period of ten weeks, the percentage of people internally displaced in Gaza has become one of the highest recorded globally.⁵ According to the United Nations, on December 16, 2023, approximately 1.9 million individuals were estimated to have been internally displaced in the southern part of Gaza, which accounts for approximately 85% of the Gaza total population.^{5,6} Human rights and international law of wars have been breached by the Israeli occupation army countless times, prompting many initiatives and appeals from the international community for an immediate ceasefire to save innocent lives.⁶

Under international humanitarian law, hospitals that are safeguarded have consistently been targeted by Israeli attacks in Gaza since the onset of the conflict.⁷ A World Health Organization (WHO) representative confirmed the absence of currently functioning hospitals in the northern part of the Gaza Strip. He led a mission to Al-Shifa and Al-Ahli hospitals on 20th December, and he reported, "Our staff are running out of words to describe the beyond catastrophic situation facing remaining patients and health workers".⁸

Operating rooms are no longer functioning because of the absence of essential resources such as fuel and power, along with a scarcity of medical supplies and healthcare professionals, and this followed extended Israeli army bombardments and operations surrounding Al-Shifa Hospital, the largest hospital in Gaza.⁸ Moreover, Al-Ahli Hospital was the only hospital where operations were possible in the north of Gaza; however, it stopped functioning after it was stormed by the Israeli army on December 19, leaving no hospitals functioning in the north of Gaza. Furthermore, only 9 of the 36 hospitals are partially functioning, all in the Southern part of the Gaza Strip.⁸

Dr. Hassan Zammar, the previous President of the Palestinian Cardiovascular Society, emphasized the absence of functioning catheterization labs in Gaza, forcing medical professionals to resort to less favorable thrombolytic treatments. Additionally, only two of the five cardiology care units (CCUs) are partially operational, with severe shortages in essential medications. He succinctly described the situation to us as "catastrophic and beyond imagination".

Hypertension (HTN) is a medical condition of elevated blood pressure, also known as the silent killer. It is a very dangerous implication in situations where access to healthcare is limited or absent, which can culminate in deadly events like a ruptured aneurysm or sudden cardiac death if not controlled.^{8,9}

Abu Hamad's study revealed a significant prevalence of hypertension among adults in Gaza, reaching 56.5%, of which 71.5% of cases were previously diagnosed, and two-thirds of them are on antihypertensive medications, with one in three patients having their hypertension controlled.¹⁰

Controlled hypertension is hypertension treated with medications that can keep the blood pressure within the acceptable ranges for the patient. Uncontrolled hypertension is due to either untreated hypertension or a current treatment plan that is ineffective in reducing blood pressure to the acceptable range.¹¹ People who previously had their HTN controlled are now deprived of their antihypertensive medications, worsening their health and leading them to develop the consequences following uncontrolled HTN. Uncontrolled hypertension can lead to various consequences, including coronary artery disease, heart failure, stroke, kidney impairment, retinopathy, aneurysms, cognitive decline, and dementia.¹¹

Stress hormones increase blood pressure and can put individuals at higher risk of developing HTN. Moreover, for individuals with HTN, stress can further exacerbate their condition and lead to the development of complications.¹¹

Research has consistently shown a link between stress hormones, armed conflict, and cardiovascular risks.¹² During wars, one can only imagine the amount of stress the body goes through, especially when faced with death every single moment and witnessing the death of one's family and beloved ones, along with the destruction of homes, hospitals, mosques, and various spiritual places. The most recent statistics in Gaza state that the death toll nears thirty-two thousand, with children accounting for more than forty percent of the toll, as once the United Nations stated that "Gaza is the most dangerous place in the world to be a child".^{13,14,15}

Myocardial infarction (MI) is defined as the death of myocardial cells due to the lack of oxygen supply. The prevalence of MI in the Gaza Strip has not been exclusively studied yet. Still, the high incidence of risk factors like hypertension, obesity, and smoking suggests a substantial significant prevalence of MI in Gaza.¹⁶ Psychological stress is also a significant risk factor in the pathophysiology of MI; it leads to sympathetic stimulation and increases the myocardial oxygen demand by increasing heart rate and contractility. This, in turn, increases the blood flow in the coronary arteries, which can increase shear stress on atherosclerotic plaques in the coronary arteries, increasing the chance of their rupture and eventually leading to MI.¹⁷

According to Dr. Hassan Zammar, only two out of five cardiovascular centers in Khan Younis and Deir Al-Balah are currently operating. The center in Khan Younis provides care to around 331 thousand people before the war,¹⁸ with an estimated admission rate of 70 cases per month. According to the center, around 112 cases were admitted only during the first month of the war, and 80% of them had Acute coronary syndrome. The displacement of Gaza people from the north has only further strained the healthcare system. According to Human Rights Watch, almost 1.9 million people -over 85% of Gaza's population- are displaced, nearly half of whom are crammed inside Rafah, the southernmost government.¹⁹

Cardiomyopathy comprises a diverse range of diseases of the myocardium, with inappropriate ventricular hypertrophy or dilatation, leading to cardiovascular death or progressive heart failure-related disability.²⁰ Intense emotional stimuli may lead to Stress-induced cardiomyopathy (SCM), also known as takotsubo cardiomyopathy or broken heart syndrome. It is a significant subtype that manifests as transient left ventricular dysfunction following acute physiological stress, posing risks such as thromboembolism and contraction band necrosis, a distinctive type of damage to heart muscle cells.^{20,21}

In occupied areas facing hostility, like Gaza, the combination of prolonged exposure to stress hormones, limited healthcare access due to ongoing hostilities, and chronic stress can lead to hypertension, HTN complications, and stress-induced cardiomyopathy. Unfortunately, the necessary medical treatment is currently unavailable. Recall urgent international efforts should prioritize a ceasefire and the immediate provision of medications and healthcare resources to safeguard the basic human right to proper healthcare for people in Gaza.

A cross-sectional study in Gaza revealed a significant prevalence of cardiovascular disease, with coronary artery disease (CAD) (8.3%) and stroke (3%) being prominent conditions. The burden of the associated risk factors was concerning: around one-half of the adult population was obese, particularly females, one-half of the population was unemployed, one-quarter was hypertensive, and tobacco smoking exceeded 30% in males who were more than ten years old. These conditions contribute to overall cardiovascular disease (CVD) mortality, which was estimated to be up to 30.3% in Palestine in 2018.¹⁶

The scarcity of heart failure drugs and stress hormones in Gaza exacerbates hypertrophic obstructive cardiomyopathy, leading to life-threatening arrhythmias and sudden death.²² These conditions might be underestimated due to the lack of medical records, the collapse of the healthcare system, and the high prevalence of life-threatening events.

Gaza's healthcare infrastructure is critically strained, with only 9 out of the 36 hospitals operating beyond capacity, 1.2 beds per 1000 compared to 2.8 beds per 1000 in the US.^{23,24} Ongoing Israeli aggression has targeted medical personnel, ambulances, and infrastructure, leading to shortages of essential resources and fuel depletion.^{23,24}

This dire situation, coupled with the lack of electricity to operate crucial medical equipment, poses severe challenges for patients with stroke and CAD. Since December 15, all telecommunications in Gaza have been completely shut down. Dr. Hassan confirmed the absence of fuel and electricity that has hindered the operation of catheterization laboratories, exacerbating the challenges faced by

stroke and CAD patients, who now struggle to access the necessary thrombolytics and medical treatment, further compromising their chances of survival.

Blood donation, which is vital for emergency medical care, has been compromised in Gaza due to repeated conflicts, blast-related injuries, and the collapse of the healthcare sector.¹⁸

Urgent action is needed to address the shortage of medical supplies and blood products, as well as the potential risk of blood-borne viruses from decomposing bodies in the streets.

Blasts, explosions, shrapnel wounds, and burns compromised the majority of the overall war-related injuries in the 2014 war against Gaza. Urgent blood transfusions were pivotal for these most commonly reported types of injury.¹⁸

The siege over the Gaza Strip, together with the collapse of the medical healthcare sector, has led to a shortage of medical supplies and blood products.²⁵

Moreover, the public decomposition of unburied dead bodies remaining scattered in the streets poses a significant risk to the transfusion of blood-borne viruses. It poses a substantial risk to blood safety and screening.²⁶

Recommendations for the management of the healthcare crisis in Gaza include the following:

1. Ensuring access to all medications is necessary to control heart failure and hypertension.
2. Improving access to specialized cardiovascular care and implementing psychological support.
3. Ensuring safe delivery of humanitarian aid and screening of blood strips and products.

The international community, WHO organizations, and humanitarian aid organizations must exert pressure on the occupying forces to end the siege and halt the ongoing hostile war against Gaza. By leveraging their influence and resources, they can play a pivotal role in ensuring access to essential resources, such as water, medication, food, and healthcare for the people of Gaza. Moreover, concerted efforts must be made to hold the occupying forces accountable for their actions and advocate for the protection of human rights and dignity in the region.

In conclusion, the healthcare crisis in Gaza demands urgent international attention and intervention to ensure access to medications, specialized care, and humanitarian aid. The precarious situation, exacerbated by conflict and collapsing infrastructure, poses severe risks to cardiovascular health and the overall well-being of the population. Collaboration among various international community sectors is crucial to providing Gaza with basic life needs and emphasizing the importance of a call for an immediate and sustained ceasefire and end of the siege on Gaza.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

JHJ: Conceptualization, writing the first draft, revising; YJA: Write the first draft, revising; OA: Write the first draft, revising; MBB: Write the first draft, revising.

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