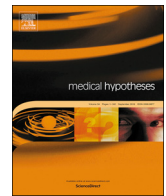




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Letter to Editors

Are individuals with cardiovascular disease at risk of COVID-19-related mental health problems or individuals with cardiovascular disease at risk of cardiovascular disease-related mental health problems during COVID-19? A psychological-psychiatric perspective



Mental health problems and heart diseases (cardiovascular diseases CVDs) are one of the leading sources of morbidity and mortality across the world [1,2]. Pervious research has found that individuals with heart problems are more likely to experience depression which is associated with the two-fold or greater risk of cardiovascular mortality [3,4]. Multitude of bio-behavioral mechanisms has been associated with health-related behaviors, behavioral risk behaviors, impairment in autonomic nervous system functioning, increased proinflammatory cytokines, and platelet activation [5–7]. Many researches have found that mood, anxiety disorders, and stress occurred among individuals with heart disease at higher rates than among individuals with the comparable age and gender in the absence of heart disease. There is a decade of researches speculating whether psychological disorders are a cause or consequence of heart disease [8]. Although, the struggle to find the precise nature of these links is underdeveloped, yet the proposed discussion on the state-of-the-art structure of the epidemiology and pathophysiological aspects of possible bi-directional relation between mental illness and heart problems with an understanding of possible causal relationship between heart problems and psychological illness among the diverse cultural contexts, linguistic differences, socioeconomic status of individuals, low and middle income countries (Imics), and prevalence (predisposing, precipitating and perpetuating) mental illnesses exists [8]. There is a high possibility of prevalence of mental disease in individuals with cardiovascular problems and conversely, individuals with mental health problems seems to have an increased risk of cardiovascular problems – including common pathophysiological, epidemiological and pathophysiological mechanisms between mental illness and heart disease.

Coronary artery disease or ischemic heart disease (CHD) is a term for the buildup plaque in the heart's arteries, leading to the failure of coronary circulation to cardiac muscle and surrounding tissue which results in myocardial infarction (MI) [9,10]. Some of the risk factors include dyslipidemia, arterial hypertension, diabetes, obesity, substance use (smoking, alcohol consumption, drugs), sedentary lifestyle (diet higher in calories, saturated fat, and cholesterol, decreased compliance and adherence to medication intake, and high physical inactivity) stress and old age [11] – a perfect recipe under the global pandemic outbreak and quarantine policy for individuals with heart problems who are also at risk/existing mental health problems. Mental illness is also one of major contributor to the global burden of diseases [12,13] as more than 300million people suffer from depression worldwide and 14.3% deaths [14,15] each year are attributed to mental illness. Mental illness and psychological distress are two highly prevalent common terms used to describe the current situation, experience, and symptoms in a person's life during the pandemic COVID-19 outbreak. A wide range of mental health problems and unprecedented life situations during the coronavirus outbreak including bereavement,

grief, stress, loss of a job, sleep problems, violence, abuse, accidents, trauma and health threat can induce psychological distress or exacerbate pre-existing physical and mental health problems – acting as a contributor to or resulting from the cardiovascular disease [16].

The prevalence of mental health problems with heart disease is threefold higher than the general population and there is about 80% increase in the risk of developing new or exacerbation of pre-existing cardiovascular disease [17] (complications or hospitalization) during a perceived or actual threatening or stressful situation such as the advent of COVID-19 [18,19]. The prevalence of depression and anxiety is seen more common among individuals with angina, at risk of developing myocardial infarction, stroke, and atrial fibrillation, the bi-directional relationship in other words states that, mental health problems can increase the risk of developing cardiovascular disease; cardiovascular disease can increase the risk of developing mental health problems [12–18]. General anxiety, psychological distress, anger, negative emotions, fear, worry, grief, severe emotional stress [20] can result in the release of the hormone adrenaline temporarily increasing blood pressure and constricting arteries resulted in myocardial infarction (or the 'broken heart syndrome') which have been shown to precipitate and perpetuate cardiovascular diseases [20,21].

The psychological impact of COVID-19 related quarantine includes post-traumatic stress disorder, confusion and frustration [22]. Such major pandemic outbreak are showing negative effects on psychological health of individuals and society, for instance, psychological issues, mental distress, grief and bereavement, deliberate or unintentional harm to family, loss/separation from family, self-injury, shame, guilt, helplessness, posttraumatic stress symptoms, addiction or substance use, medical mistrust and inclination towards conspiracies, panic attacks, stress, anxiety, depression, loneliness, suicidal ideation, mood problems, sleep problems, worry, denial, boredom, ambivalence, uncertainty, frustration, anger, fear, stigmatization, marginalization, xenophobia, mass hysteria, socio-economic status, and other mental health concerns would require pre-established coalition to mobilize resources for effective intervention, management and preventive measures for affected individuals. [23–26]. Mental health problems can occur or aggravate or trigger psychological and emotional distress in self-isolated and quarantined individuals [27]. Empirical findings are salient features at this state of COVID-19 outbreak – addressing the individuals with cardiovascular disease regarding health risks and perceived threats; reiterating mental health concerns predispose to fixation on the stressful cognitive patterns; and encouraging lifestyle modification and motivate behavior change helps stress appraisal and coping strategies [18]. Medication as well as non-medication interventions including cognitive-behavioral therapy, mindfulness meditation, transcendental meditation, spiritual/religious meditation, physical activity staying, breathing exercise, could dramatically increase the

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efficacy of interventions and quality of life. The goal of cultivating resilience, coping, mindfulness and healthy adjustment with the change of lifestyle behavioral modification and mental wellbeing will bring the immediate the focal of attention towards physical sensation (heart) and emotions and thoughts (mental health) by contributing to a more coherent and healthy sense of self and identity while living through the COVID-19 pandemic outbreak.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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References

- [1] Shepard D, Vander Zanden A, Moran A, Naghavi M, Murray C, Roth G. Ischemic heart disease worldwide, 1990 to 2013: estimates from the global burden of disease study 2013. *Circ Cardiovasc Qual Outcomes*. 2015;8(4):455–6.
- [2] Benziger CP, Roth GA, Moran AE. The global burden of disease study and the preventable burden of NCD. *Glob Heart* 2016;11(4):393–7.
- [3] Foley JR, Plein S, Greenwood JP. Assessment of stable coronary artery disease by cardiovascular magnetic resonance imaging: current and emerging techniques. *World J Cardiol* 2017;9(2):92–108.
- [4] Rudisch B, Nemeroff CB. Epidemiology of comorbid coronary artery disease and depression. *Biol Psychiatry* 2003;54:227–40.
- [5] Lett HS, Blumenthal JA, Babyak MA, et al. Depression as a risk factor for coronary artery disease: evidence, mechanisms, and treatment. *Psychosom Med* 2004;66:305–15.
- [6] Evans DL, Charney DS, Lewis L, et al. Mood disorders in the medically ill: scientific review and recommendations. *Biol Psychiatry* 2005;58:175–89.
- [7] van Melle JP, de Jonge P, Spijkerman TA, et al. Prognostic association of depression following myocardial infarction with mortality and cardiovascular events: a meta-analysis. *Psychosom Med* 2004;66:814–22.
- [8] Berkman LF, Blumenthal J, Burg M, et al. Effects of treating depression and low perceived social support on clinical events after myocardial infarction: the Enhancing Recovery in Coronary Heart Disease Patients (ENRICH) Randomized Trial. *JAMA* 2003;289:3106–16.
- [9] American Heart Association. Available at: http://www.heart.org/HEARTORG/Conditions/HeartAttack/TreatmentofaHeartAttack/SilentIschemia-and-Ischemic-Heart-Disease_UCM_434092_Article.jsp#.WZ_pPT-5JaUI.
- [10] De Hert M, Correll CU, Bobes J, et al. Physical illness in patients with severe mental disorders. I. Prevalence, impact of medications and disparities in health care. *World Psychiatry* 2011;10(1):52–77.
- [11] Nasitowska-Barud A, Zapolski T, Barud M, Wysokinski A. Overt and covert anxiety as a toxic factor in ischemic heart disease in women: the link between psychological factors and heart disease. *Med Sci Monit* 2017;23:751–8.
- [12] Player MS, Peterson LE. Anxiety disorders, hypertension, and cardiovascular risk: a review. *Int J Psychiatry Med* 2011;41(4):365–77.
- [13] Amare AT, Schubert KO, Klingler-Hoffmann M, Cohen-Woods S, Baune BT. The genetic overlap between mood disorders and cardiometabolic diseases: a systematic review of genome wide and candidate gene studies. *Transl Psychiatry* 2017;7(1):e1007.
- [14] Whooley MA, Wong JM. Depression and cardiovascular disorders. *Annu Rev Clin Psychol* 2013;9:327–54.
- [15] Walker ER, McGee RE, Druss BG. Mortality in mental disorders and global disease burden implications: a systematic review and meta-analysis. *JAMA Psychiatry* 2015;72(4):334–41.
- [16] Serrano CV, Setani KT, Sakamoto E, Andrei AM, Fraguas R. Association between depression and development of coronary artery disease: pathophysiologic and diagnostic implications. *Vasc Health Risk Manage* 2011;7:159–64.
- [17] Rutledge T, Reis VA, Linke SE, Greenberg GH, Mills PJ. Depression in heart failure: a meta-analytic review of prevalence, intervention effects, and associations with clinical outcomes. *J Am Coll Cardiol* 2006;48:1527–37.
- [18] Mukhtar S. Mental health and emotional impact of COVID-19: applying Health Belief Model for medical staff to general public of Pakistan. *Brain Behavior & Immunity* 2020. <https://doi.org/10.1016/j.bbi.2020.04.012>.
- [19] Mukhtar S, Mukhtar S. Mental health and psychological distress in people with diabetes during COVID-19. *Metabolism* 2020. <https://doi.org/10.1016/j.metabol.2020.154248>.
- [20] Riba M, Wulsin L, Rubenfire M. *Psychiatry and Heart Disease: The Mind, Brain, and Heart*. Hoboken, NJ: Wiley-Blackwell; 2011.
- [21] American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*. 4th ed. Washington, DC: American Psychiatric Association; 1994.
- [22] Brooks SK, Webster RK, Smith LE, Woodland L, Wessely S, Greenberg N, et al. The psychological impact of quarantine and how to reduce it: rapid review of the evidence. *The Lancet* 2020;395:10227.
- [23] Mukhtar S. Mental Health and psychosocial aspects of coronavirus outbreak in Pakistan: psychological intervention for public mental health crisis. *Asian J Psychiatry* 2020. <https://doi.org/10.1016/j.ajp.2020.102069>.
- [24] Mukhtar S. Preparedness and proactive infection control measures of Pakistan during COVID-19 pandemic outbreak. *Res Soc Administr Pharmacy* 2020. <https://doi.org/10.1016/j.sapharm.2020.04.011>.
- [25] Mukhtar S. Mental wellbeing of nursing staff during the COVID-19 outbreak: a cultural perspective. *J Emergency Nurs* 2020. <https://doi.org/10.1016/j.jen.2020.04.003>.
- [26] Mukhtar S. Pakistanis' Mental Health during the COVID-19. *Asian J Psychiatry* 2020. <https://doi.org/10.1016/j.ajp.2020.102127>.
- [27] Kelvin DJ, Rubino S. Fear of the novel coronavirus. *J Infection Devel Countr* 2020;14(1):1–2. <https://doi.org/10.3855/jidc.12496>.

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