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Caregiving stress is a risk factor for coronary heart disease among middle-aged and older female long-term caregivers

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Aging Populations with Less Young Family Caregivers

Older adults occupy a significant proportion of developed countries' populations, at the same time that birth rates are decreasing. For example, the US has 15.41% and Japan 27.5% proportion of older adults 65 or older in their population [1], with a birth rate of 1.77 and 1.44 per woman, respectively [2,3]. As a result, it is projected that older adults will outnumber children 18 or under in the US by 2035 for the first time in history [4]; likewise, 40% of Japan's population will be over 65 by 2050 [5]. Most older adults who live with chronic conditions require home care for long periods of time. Women are traditional family caregivers across cultures [6]. With the decease of future caregivers—the kid generation, and the young adult children are working and/or having their own nuclear family to take care of, the middle-aged and older women may inevitably take on the long-term caregiving duties at home.

Long-Term Caregiving Stress and Coronary Heart Disease

Although long-term caregiving could be rewarding, it is very stressful. Chronic stress is associated with increased coronary heart disease (CHD) risks [7]. In fact, von Känel and colleagues [8] have found that dementia caregivers developed CHD in the following 10 years at a higher rate than in non-caregiving controls. Heart disease is the number-one and number-two cause of death for women in the US [9] and Japan [10], respectively. To make it worse, caregiving tasks are particularly stressful for middle-aged and older women who may have developed their own health issues with an elevated age-related CHD risk [11], who may neglect adherence to their own treatment regimen [12], and who may have a reduced ability to handle caregiving tasks [13] that aggravate their caregiving stress related CHD risk [14].

CHD is an inflammatory disease [7]. Stress can trigger secretion of stress inflammatory mediators, e.g., C-Reactive Protein (CRP), interleukin-6 (IL-6) [15], activating plasma fibrin formation [16], causing endothelial inflammation [17], and thus increasing CHD risk. The stress-induced inflammation may explain at least 40% of CHD patients without other known risk factors [13]. Under prolonged stress, sympathetic output triggers inflammatory cytokines that are also influenced by cortisol [18]. Increased neuroendocrine output and inflammation were seen in dementia caregivers over 2 years compared to new or non-caregivers [19]. While caregivers could be resilient when their loved ones face chronic conditions, long-term caregiving stress may increase CHD risk during the constantly challenging stress-adaptation process. Those long-term caregivers are likely to be at a higher risk of developing CHD, and therefore deserve more attention from healthcare professionals.

The Role of Gender on Caregiving Stress-CHD Risk Linkages

There are gender differences in the brain responses to stress that need further exploration [20]. Some researchers claim the differences may stem from different perceptions and responses to stress [21]. Others argue that psychosocial factors are more important than biological factors in explaining the gender differences in stress responsivity [22]. Anyhow, women perceive stress differently from men with high rates of metabolic disorders that increase CHD risk [23]. Compared to men, more women have psychosocial stress-induced myocardial ischemia [24]. Furthermore, many women may need to stop working to assume caregiving, and lacking economic means, caregiving is impoverishing for women. Many studies showed that women are more susceptible to chronic stress with higher CHD risks than men when serving as primary caregivers of ill spouses [25].

Related studies have shown some interesting findings. For example, caring for disabled or ill husbands has been associated with increased CHD risk in wives, but this association has not been found when women provide care for someone other than their husbands [26]. Also, wife caregivers show significant concordance in risks with their husbands suffering heart disease; however, no significant concordance was found in husband caregivers of ill wives [27]. CRP and IL-6 can predict future CHD in a large pool of menopausal women [28] because both biomarkers are thought to be crucial in atherosclerosis among women under chronic stress. Although researchers have not reached consensus about the gender effects on stress [29], what we know is that stress provokes CRP with strong and consistent associations to future CHD [30]. In fact, women in the top third of CRP concentrations (i.e. > 3.0 mg/L) had an odds ratio of 1.92 for CHD in a 12 years of follow-up [31,32]. Particularly, woman caregivers with increased caregiving stress had higher CRP than those without compared to no difference in CRP by stress group for men [33] and higher levels of IL-6 [34]. The gender responses to stress are not random as evolution might have kept a female-typical 'tend and befriend' pattern than male-typical 'fight and flight' pattern [35].

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Conclusion

Women in general are more susceptible to stress and have worse health outcomes than men once diagnosed with CHD (e.g., higher mortality rate). However, health professionals tend to focus on the traditional risk factors of CHD (e.g., obesity, high lipid, blood pressure and sugar) among women and overlook the fact that these may be the consequences of long-term caregiving stress. The higher incidence of CHD among middle-aged and older female caregivers warrants an investigation of the long-term caregiving stress-CHD risk linkages to advance our understanding of how the stress affects the development of CHD to intervene in reducing its prevalence in the population.

References

1. The World Bank (2018) Populations ages 65 and above (% of total).
2. Allen CM (2018) Alarming birthrate trend in U.S., Japan.
3. Ihme (2017) Institute for Health Metrics and Evaluation, Japan.
4. US Census Bureau (2018) The graying of America: More older adults than kids by 2035.
5. McIntyre DA (2016) 40% of Japan's population will be over 65 in 2050.
6. FCA (2015) Women and Caregiving: Facts and Figures. Family Caregiving Aliance (n.d.).
7. Vitaliano PP, Scanlan JM, Zhang J, Savage MV, Hirsch IB, et al. (2002) A path model of chronic stress, the metabolic syndrome, and coronary heart disease. *Psychosom Med* 64: 418-435.
8. von Känel R, Mausbach BT, Patterson TL, Dimsdale JE, Aschbacher K, et al. (2008) Increased Framingham coronary heart disease risk score in dementia caregivers relative to non-caregiving controls. *Gerontology* 54: 131-137.
9. CDC (2018) Leading causes of death in female, 2015. Centers for Disease Control and prevention.
10. Population and households (2017) Handbook of Health and Welfare Statistics 2017 Contents. Ministry of Health, Labour, and Welfare (n.d.), Statistical Compendia.
11. Seeman TE, Singer BH, Rowe JW, McEwen BS (2001) Exploring a new concept of cumulative biological risk—allostatic load & its health consequences: MacArthur studies of successful aging. Proceedings of the National Academy of Sciences of the United State of America, 98: 4770-4775.
12. Garlo K, O'Leary JR, van Ness PH, Fried TR (2010) Burden in caregivers of older adults with advanced illness. *J Am Geriatr Soc* 58: 2315-2322.
13. Black PH, Garbutt LD (2002) Stress, inflammation and cardiovascular disease. *J Psychosom Res* 52: 1-23.
14. Bird CE, Seeman T, Escarce JE, Basurto-Dávila R, Finch BK, et al. (2010) Neighbourhood socioeconomic status and biological "wear & tear" in a nationally representative sample of us adults. *J Epidemiol Community Health* 64: 860-865.
15. Marsland AL, Walsh C, Lockwood K, John-Henderson NA (2017) The effects of acute psychological stress on circulating and stimulated inflammatory markers: A systematic review and metaanalysis. *Brain Behav Immun* 64: 208-219.
16. von Känel R, Ancoli-Israel S, Dimsdale JE, Mills PJ, Mausbach BT, et al. (2010) Sleep and biomarkers of atherosclerosis in elderly Alzheimer caregivers and controls. *Gerontology* 56: 41-50.
17. Taleb S (2016) Inflammation in atherosclerosis. *Arch Cardiovasc Dis* 109: 708-715. [Crossref]
18. Wolf JM, Rohleder N, Bierhaus A, Nawroth PP, Kirschbaum C (2009) Determinants of the NF-kappaB response to acute psychosocial stress in humans. *Brain Behav Immun* 23: 742-749.
19. Clark MS, Bond MJ, Hecker JR (2007) Environmental stress, psychological stress and allostatic load. *Psychology, Health& Medicine* 12: 18-30.
20. McEwen BS, Gray JD, Nasca C (2015) Redefining neuroendocrinology: stress, sex and cognitive and emotional regulation. *J Endocrinol* 226: T67-T83.
21. King AC, Oka RK, Young DR (1994) Ambulatory blood pressure and heart rate responses to the stress of work and caregiving in older women. *J Gerontol* 49: M239-M245. [Crossref]
22. Lundberg U (2005) Stress hormones in health and illness: the roles of work and gender. *Psychoneuroendocrinology* 30: 1017-1021. [Crossref]
23. Giardina EGV, Sciacca RR, Foody JM, D'Onofrio G, Villablanca AC, et al. (2011) The DHHS Office on women's health initiative to improve women's heart health: focus on knowledge and awareness among women with cardiometabolic risk factors. *J Womens Health (Larchmt)* 20: 893-900.
24. Samad Z, Boyle S, Ersboll M, Vora AN, Zhang Y, et al. (2014) Sex differences in platelet reactivity and cardiovascular and psychological response to mental stress in patients with stable ischemic heart disease: insights from the remit study. *J Am Coll Cardiol* 64: 1669-1678.
25. Robertson T, Benzeval M, Whitley E, Popham F (2015) The role of material, psychosocial and behavioral factors in mediating the association between socioeconomic position and allostatic load (measured by cardiovascular, metabolic and inflammatory markers). *Brain Behav Immun* 45: 41-49.
26. Lee S, Colditz GA, Berkman LF, Kawachi I (2003) Caregiving and risk of coronary heart disease in U.S. women: a prospective study. *Am J Prev Med* 24: 113-119.
27. Konnov MV, Dobordzhginidze LM, Deev AD, Gratsianskii NA (2010) Spousal concordance for factors related to metabolic syndrome in families of patients with premature coronary heart disease. *Kardiologiia* 50: 4-8.
28. Ridker PM, Hennekens CH, Buring JE, Rifai N (2000) C-reactive protein and other markers of inflammation in the prediction of cardiovascular disease in women. *N Engl J Med* 342: 836-843. [Crossref]
29. Mercuro G, Deidda M, Piras A, Dessalvi CC, Maffe S, et al. (2010) Gender determinants of cardiovascular risk factors and diseases. *J Cardiovasc Med (Hagerstown)* 11: 207-220.
30. Kang DH, Rice M, Park NJ, Turner-Henson A, Downs C (2010) Stress and inflammation: a biobehavioral approach for nursing research. *Western Journal of Nursing Research* 32: 730-760.
31. Pearson TA, Mensah, G. A., Hong, Y., Smith, S. C. Jr, Center of Diasese Control and prevention (CDC) and American Heart Association (AHA) (2004). CDC/AHA Workshop on Markers of Inflammation and Cardiovascular Disease: Application to Clinical and Public Health Practice: overview. Circulation, 110, e543-544.
32. Ridker PM (2003) Cardiology Patient Page. C-reactive protein: a simple test to help predict risk of heart attack and stroke. *Circulation* 108: e81-85. [Crossref]
33. Shivpuri S, Gallo LC, Crouse JR, Allison MA (2012) The association between chronic stess type and C-reactive protien in the multi-ethnic study of atherosclerosis: does gender make a difference? *J Behav Med* 35: 74-85.
34. Lutgendorf SK, Garand L, Buckwalter KC, Reimer TT, Hong SY, et al. (1999) Life stress, mood disturbance, and elevated interleukin-6 in healthy older women. *Journal of Gerontology: Biological and Medical Science* 54: M434-439.
35. Taylor SE, Klein LC, Lewis BP, Gruenewald TL, Gurung RA, et al. (2000) Biobehavioral responses to stress in females: Tend-and-befriend, not fight-or-flight. *Psychol Rev* 107: 411-429.