Does chronic psychosocial stress modulate immunity to influenza vaccine in Hong Kong Chinese elderly?

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KEY MESSAGES

1. The linear increase trend in the T-helper/suppressor ratio from 6 to 12 weeks was lower in elderly caregivers than non-caregivers (P=0.0041).
2. Caregivers had higher levels of inflammatory cytokine IL-6, which is an indicator of depression and poor health in older adults.

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In the present study,[1] immune response to influenza vaccine of 55 elderly caregivers whose spouses were diagnosed with stroke, Parkinson's disease, or Alzheimer's disease and had severe limitation of activities of daily living was compared with that of 61 age- and sex-matched participants who did not have major caregiving responsibilities or whose spouses had no chronic condition. A commercially available trivalent influenza vaccine was given to all participants, and all blood samples were collected at similar time points. All participants were recruited from primary care institutes or the community, and all had received influenza vaccination in the previous year to standardise their most recent exposure to the vaccine. Validated scales were used to assess psychological (depressive symptoms, perceived stress and caregiver strain), social (multidimensional social support scale) and lifestyle (physical exercise, cigarette smoking, and alcohol consumption) parameters that have been documented to affect vaccine response.

At baseline, caregivers and non-caregivers did not differ significantly in terms of demographic and socio-economic factors. Caregivers spent a mean of 14 hours per day in caregiving and had higher perceived stress score, caregiver strain index score, and geriatric depression scale score, and lower total multidimensional social support scale score (family component), compared with non-caregivers. Caregivers also had less physical activity per week.

With regard to the antibody immune response to influenza vaccine, caregivers and non-caregivers did not differ significantly in terms of pre-vaccine immunity. In logistic regression analysis after adjusting for medical, psychological, and social factors, neither pre-vaccine status nor being a caregiver was related to post-vaccination antibody response.

Although there was no significant difference in immunophenotyping and enumeration of lymphocyte subsets at baseline, the linear increase trend in the T-helper/suppressor ratio from 6 to 12 weeks was lower in elderly caregivers than non-caregivers (P=0.0041).

With regard to the ex vivo production of pro-inflammatory cytokines (IL-10, IL-6, IL-8, IL-1 β, and IL-8), although caregivers had significantly higher levels at baseline, the increase in cytokines levels over 6 to 12 weeks was smaller, compared with non-caregivers, after adjusting for the geriatric depression scale score, education levels, physical activity, social support, smoking status, and body mass index.

Caregivers and non-caregivers did not differ significantly in terms of antibody response, but caregivers had a decrease in cell-mediated and cytokine immune response to influenza vaccination, even after adjusting for physical activity, body mass index, social support, and albumin level. This suggested that the mechanism responsible for the difference in cell-mediated response may not be related to health practice. People with caregiver stress appeared to have higher levels of ex vivo pro-inflammatory cytokine production.

Stress-related hormones (glucocorticoids and catecholamines) may play a role in the alteration of immune response.[2] Elderly caregivers may have poorer cell-mediated immune response, compared

to non-caregivers.[2] This is particularly relevant as ageing has an adverse impact on cell-mediated response to infections. Further studies are needed to determine whether being a caregiver is associated with decreased antibody response to influenza vaccination, as the present study had limited sample size and only included elderly subjects who had prior exposure to vaccination.

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