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Jury still out on what confers survival advantage in female trauma patients

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Female hormones, particularly estrogen, do not seem to explain why women tend to have higher survival rates than men following severe trauma, an 11-year study using data from 815,843 Swedish patients suggests. The findings are published in the open access *Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine*.

Robert Larsen of Linkoping University, Sweden, the corresponding author, said: "A general female survival advantage is well known; women tend to outlive men by several years. The survival advantage has also been shown in models of trauma and sepsis in animals, but the underlying mechanisms that may explain these advantages remain unclear. Better understanding of these mechanisms may provide clues that could help improve trauma care outcomes. Here, we wanted to find out if estrogen, the female sex hormone, is involved in the female survival advantage in trauma."

The researchers found that women appear to have an overall survival advantage—that is lower mortality—compared to men, in the 30 days following hospital admission for the three most lethal forms of injury—from falls, road traffic accidents, and assault. Yet, no major differences were observed in this pattern across the three age categories that the authors used as surrogate markers for sex hormone levels: 0-14 years, 15-50 years, and older than 50 years (pre-menarche, reproductive, and post-menopausal status).

Survival advantage in women did not differ between age groups and it

was not more pronounced in the age group where female sex hormones are expected to be higher (15-50 years), that is mortality within that group wasn't significantly lower than in the other age groups. The findings thus do not seem to confirm the authors' hypothesis that estrogen is protective and the main contributing factor for female survival following trauma.

Robert Larsen, the corresponding author, said: "We were convinced that the survival advantage was due to estrogen, but if the hormonal component was of major importance, an added survival advantage during the hormone-producing years of life would have been expected. However, if anything, we observed that survival advantage for females actually increased with age. This further supports the idea that other mechanisms than levels of female sexual hormones explain differences in survival in men and women."

The authors examined data on 815,843 hospital admissions from falls, road traffic accidents, or assault, collected from 2001 to 2011, included in the National Patient Registry in Sweden and the Cause of Death Registry. Out of the total number of patients whose data was included in this study, 54% were female. The authors caution that as age ranges were used as proxies for hormonal status, this may have led to some misclassification of hormone levels.

Another recent study by Pape et al. also published in the *Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine* found an increased likelihood for intensive care unit admission in men compared to women in a cohort of 6,865 trauma patients admitted to the emergency department of three trauma centers in the Netherlands between January 2006 and December 2014. The authors also found a survival advantage for female patients aged 16 to 44 years. Yet, although the effect of gender in severely injured patients has been investigated for years, the exact physiological mechanisms that confer this survival

advantage remain unclear.

More information: Female risk-adjusted survival advantage after injuries caused by falls, traffic or assault: a nationwide 11-year study, Larsen et al. *Scandinavian Journal of Trauma*, Resuscitation and Emergency Medicine 2019. DOI: 10.1186/s13049-019-0597-3

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