



Does adiposity influence the relationship between diet quality and bodily pain in Australia adults?

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Chronic pain affects 20-30% of people worldwide⁽¹⁾. While the impact of nutrition and dietary patterns on bodily pain has gained attention in recent years, the underlying linking mechanisms remain poorly understood; it is possible that body weight, specifically adiposity, may be a mediating factor⁽²⁾. Thus, the primary aim of this study was to explore whether adiposity mediates the relationship between diet quality and bodily pain. This cross-sectional analysis included 654 adults (57% women, mean age 50.4 ± 1.1 years, BMI 29.0 ± 6.2 kg/m²) with complete diet, adiposity, and pain measures from the Whyalla Intergenerational Study of Health (2008-09). Diet quality was calculated using the Dietary Guideline Index (DGI total score, core and non-core scores)⁽³⁾, and pain assessed via the Short Form-36 bodily pain scale (SF36-BPS) transformed percent score. Adiposity was determined from body mass index (BMI), waist circumference (WC), and body fat percent (BF, via dual energy x-ray absorptiometry). Mediation analyses determined the role of adiposity in the direct and indirect relationships between diet quality and pain in the whole population, then stratified by sex (self-report). There were no significant indirect or direct effects between DGI total scores and SF36-BPS, for any measure of adiposity. Direct effects were observed for DGI core-food scores on SF36-BPS for each measure of adiposity (BMI, $\beta = 0.258$, 95% CI 0.048, 0.467; WC $\beta = 0.246$, 95% CI 0.037, 0.455; BF $\beta = 0.247$, 95% CI 0.040, 0.454; all $p < 0.05$). Each measure of adiposity accounted for <10% of the relationship between diet quality and pain, with a better-quality diet associated with less bodily pain (higher SF36-BPS). Relationships differed by sex; with no direct or indirect effects seen between DGI scores and SF36-BPS for men while, in women, there was non-mediation with direct positive effects between DGI total score and SF36-BPS for each measure of adiposity (BMI, $\beta = 0.362$, 95% CI 0.132, 0.591; WC $\beta = 0.345$, 95% CI 0.116, 0.574; BF $\beta = 0.357$, 95% CI 0.130, 0.584; all $p < 0.05$). Also in women, body fat mediated 85% of the relationship between DGI non-core scores on bodily pain (indirect effect $\beta = -0.242$, 95% CI -0.358, -0.126, $p < 0.05$). While adiposity did not mediate the relationship between diet quality and pain, this study highlights that diet quality plays a role in the pain experience with higher consumption of core foods showing direct associations with lower levels of bodily pain. Moreover, sex differences were observed, with less bodily pain in women associated with higher overall diet quality. Interestingly, body fat drove the relationship between higher pain scores and greater consumption of non-core foods (discretionary), but body fat alone was associated with consumption of fewer discretionary foods. This anomaly requires further investigation.

Keywords: diet quality; adiposity; pain; mediation

Ethics Declaration

Yes

Financial Support

Susan Ward is supported by a University of South Australia Research Training Program domestic (RTPd) Fee Offset Scholarship and Australian Government Research Training Program (RTP) scholarship.

References

1. World Health Organisation. Musculoskeletal Conditions: WHO (2021) <https://www.who.int/news-room/fact-sheets/detail/musculoskeletal-conditions>.
2. Elma Ö, Brain K & Dong H-J (2022) *J Clin Med* 11:5950.
3. McNaughton SA, Ball K & Crawford D (2008) *J Nutr* 138:86–93.