



## Association between protein intake, diet quality, and obesity in Australian adults: A comparison of measurement units

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The role of protein in decreasing the risk of cardiometabolic diseases has been proposed, yet the findings are inconsistent, possibly due to how protein intake was expressed<sup>(1)</sup>. This study aimed to examine how different ways of expressing protein intake may influence its relationships with diet quality and obesity. This study used data from the Australian National Nutrition and Physical Activity Survey (NNPAS) 2011-12, focusing on adults aged  $\geq 19$  years, excluding those who were pregnant or lactating, and had both anthropometric and dietary data ( $n = 7637$ ). Total protein intake was assessed by up to two 24-hour dietary recalls and reported in two measurement units, namely g/day and % of energy intake. Usual protein (g) and energy intakes (kJ) were modelled using the Multiple Source Method<sup>(2)</sup>. Diet quality was assessed using the Dietary Guidelines Index (DGI)<sup>(3)</sup>. Body mass index (BMI) and waist circumference were used as measures of obesity. Multiple linear regressions were performed stratified by sex, and adjusting for age, country of birth, Socio-economic Indexes for Areas, physical activity level, energy misreporting, usual energy intake (for diet quality), and non-protein energy intake (for obesity). Positive associations between protein intake and diet quality were confirmed across measurement units. Protein intake expressed in % of energy intake ( $\beta$ -coefficient: men = 0.97; women = 1.21,  $p < 0.001$ ) had a higher  $\beta$ -coefficient than those reported in g/day ( $\beta$ -coefficient: men = 0.19; women = 0.30,  $p < 0.001$ ). Linear regression models showed a positive association between protein intake and BMI for men and women, either expressed in g/day ( $\beta$ -coefficient: men = 0.02,  $p < 0.001$ ; women = 0.03,  $p = 0.001$ ) or % of energy intake ( $\beta$ -coefficient: men = 0.14,  $p < 0.001$ ; women = 0.12,  $p = 0.002$ ). The relationship between protein intake expressed in g/day and waist circumference was also statistically significant ( $\beta$ -coefficient: men = 0.04,  $p = 0.004$ ; women = 0.05,  $p = 0.035$ ). However, protein intake expressed as % of energy intake was correlated with waist circumference for men only ( $\beta$ -coefficient: men = 0.26,  $p = 0.001$ ; women = 0.19,  $p = 0.075$ ). The consistent findings across measurement units suggested that the unit of g/day and % of energy intake can be used for examining associations between protein intake and diet quality. However, associations between protein intake and measures of obesity varied between protein units and sex. These findings suggest that the selection of protein measurement units in relation to obesity outcomes might need to consider the characteristics of study population (e.g., sex, energy intake). Overall, the outcomes of this study suggest that how protein is expressed may impact the associations between protein intake, diet quality, and obesity, and therefore require further considerations when examining the role of protein in cardiometabolic health.

**Keywords:** Protein; diet quality; obesity; measurement unit

### Ethics Declaration

Yes

### Financial Support

RML is supported by National Health and Medical Research Council Emerging Leadership Fellowship L1 (APP1175250).

### References

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