



## A systematic review of diet, nutrition, and medication use among centenarians and near centenarians worldwide

Z. Dai<sup>1</sup>, S.Y. Lee<sup>3</sup>, S. Sharma<sup>3</sup>, E.C.K. Tan<sup>2</sup>, S. Ullah<sup>3</sup>, H. Bodady<sup>4</sup> and P.S. Sachdev<sup>4</sup>

<sup>1</sup>School of Population Health; Faculty of Medicine and Health, UNSW Sydney, NSW 2052 Australia

<sup>2</sup>School of Pharmacy, Faculty of Medicine and Health, The University of Sydney, Sydney, NSW 2006, Australia

<sup>3</sup>College of Medicine and Public Health, Flinders University, Bedford Park, Adelaide, SA 5042

<sup>4</sup>Centre for Healthy Brain Ageing, Faculty of Medicine and Health UNSW Sydney, NSW 2052 Australia

Centenarians represent a phenomenon of successful aging, yet little is known about their lifestyle and health practices, including diet/nutrition, medication use, and health conditions. A protocol for this systematic review was registered previously<sup>(1)</sup>. We systematically searched Medline, CINAHL, Scopus, and grey literature from 2000 to 2022, limited to quantitative studies published in English among adults aged 95 years or above. Two reviewers independently screened 3,392 records and identified and extracted data from 34 eligible studies. Additionally, they independently assessed the study quality using the Modified Newcastle-Ottawa Scale (mNOS)<sup>(2)</sup>. Any disagreement was discussed and resolved with a third reviewer. In analysis, pooled prevalence was provided for categorical variables on demographics, lifestyles, medications, and diseases using % (95%CI); mean or median was provided for continuous variables. Due to study heterogeneity, we conducted a narrative synthesis for the associations between the exposures and outcomes. Over 70% of the included studies met 6/8 criteria based on the mNOS; nearly half did not mention or control for confounders in statistical analyses. The age ranged from 95-118y (32 studies: 100y+; 2 studies: mean age 97-98 y); the majority were females (75%; 95%CI: 71%, 78%). Most centenarians did not smoke or drink [current smokers: 7% (5%, 9%); former smokers: 16% (12%, 19%); daily drinkers: 27% (20%, 34%); former drinkers: 21% (13%, 30%)]. Most centenarians were physically inactive (23%; 20%, 26%). Over 50% had normal weight (52%; 42%, 61%), 33% (14%, 52%) underweight, and 14% (8%, 20%) overweight. Regarding nutrition, the narrative synthesis suggests that centenarians had normal levels of albumin (3.8g/dL), total triglycerides (111mg/dL), total (188mg/dL), and HDL cholesterol (54mg/dL) but high levels of LDL cholesterol (109mg/dL). Regarding medications, nearly 50% took antihypertensive medications (49%; 14%, 84%) or other cardiovascular drugs (48%; 24%, 71%); they took a median of 5 (range: 2-7) drugs. Common conditions included impairment of basic activities of daily living (ADL) (54%; 33%, 74%), hypertension (43%; 21%, 65%), and diabetes (22%; 9%, 52%). In regression analyses among centenarians, high dietary diversity, lower salt preference, and weight status were significant factors for more independence in basic ADL, lower mortality, and greater longevity. For example, a high dietary diversity score was associated with a low mortality risk [0.93 (0.92, 0.94) per unit increase]; those who preferred salty food versus those who did not had a 3.6-fold risk of impaired ADL [adj.OR: 3.59 (1.14, 11.25)]. Being overweight vs. normal weight reduced the risk of ADL impairment [adj.OR: 0.84 (0.78, 0.91)] while underweight increased this risk [adj.OR: 1.34 (1.28, 1.41)]. Also, overweight [adj.OR: 0.92 (0.90, 0.94)] or abdominal obesity [adj.OR: 0.72 (0.52, 0.996)] reduced the likelihood of longevity per kg increase. This systematic review suggests a healthy lifestyle, good nutrition, and normal body weight may contribute to extreme longevity. Interpreting these summary findings should be cautious due to potential recall bias and heterogeneity of the included studies.

**Keywords:** longevity; extreme longevity; oldest old; healthy ageing; diet

### Ethics Declaration

Yes

### Financial Support

This research received no external funding, except for a small amount of summer scholarship to SYL and SS (each received \$1000) from Flinders University.

### References

1. Dai Z, Lee SY, Sharma S *et al.* (2023) A systematic review of diet, nutrition, and medication use among centenarians around the world: <https://osf.io/ey38d>
2. The University of Pennsylvania Health System Center for Evidence-based Practice (2016) Modified Newcastle-Ottawa scale for appraisal of non-randomised controlled studies: <https://www.med.upenn.edu/CEP/assets/user-content/documents/modified-newcastle-ottawa.pdf>