Association of primary allostatic load mediators and metabolic syndrome: A systematic review.

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Introduction

1. Allostatic load (AL): sub-clinical measure of physiological wear and tear resulting from chronic exposure to stress [1].

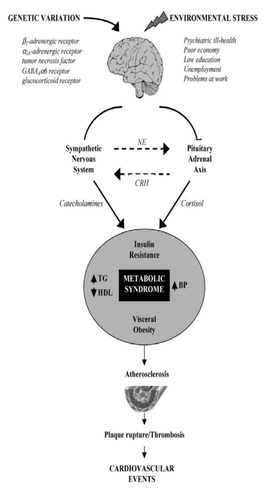

Fig 1. Diagram showing the connection between stress and MetS [4].

2. Primary mediators of AL: cortisol, epinephrine, norepinephrine, dehydroepiandrosterone sulfate (DHEAS) [2].

3. AL exposure may cause detrimental effects on the neuroendocrine systems leading to a metabolic syndrome (MetS).

4. MetS: co-occurrence of high blood pressure, abdominal obesity, low high-density lipoprotein cholesterol, elevated triglycerides, and hyperglycemia [3].

Purpose

- Critical examination of the association between the primary mediators of allostatic load and metabolic syndrome

Methods

Systematic literature review

- PubMed, Cochrane Library and Web of Science (January 2010 to December 2021).
- Boolean-search strategy with operators “AND”/“OR”/* and MeSH terms: Allostatic load, Allostatic overload, cortisol Epinephrine, adrenalin, norepinephrine, noradrenalin, dehydroepiandrosterone sulfate, DHEAS, Metabolic Syndrome, MetS and abbreviation

Inclusion & exclusion criteria

- Population: Individuals with and without MetS, obesity and overweight in early adulthood and above
- Cross-sectional and case-control studies that examined primary mediators of AL and MetS
- Original full texts in English

Assessment of study quality

- The Joanna Briggs Institute (JBI) critical Appraisal tools for cross-sectional studies (0 – 8 points) and case-control studies (0 – 10 points) [5]
- Cross-sectional studies with ≥ 5 points (fairly-good) and case-control studies with ≥ 6 points (fairly-good) were included.

Results

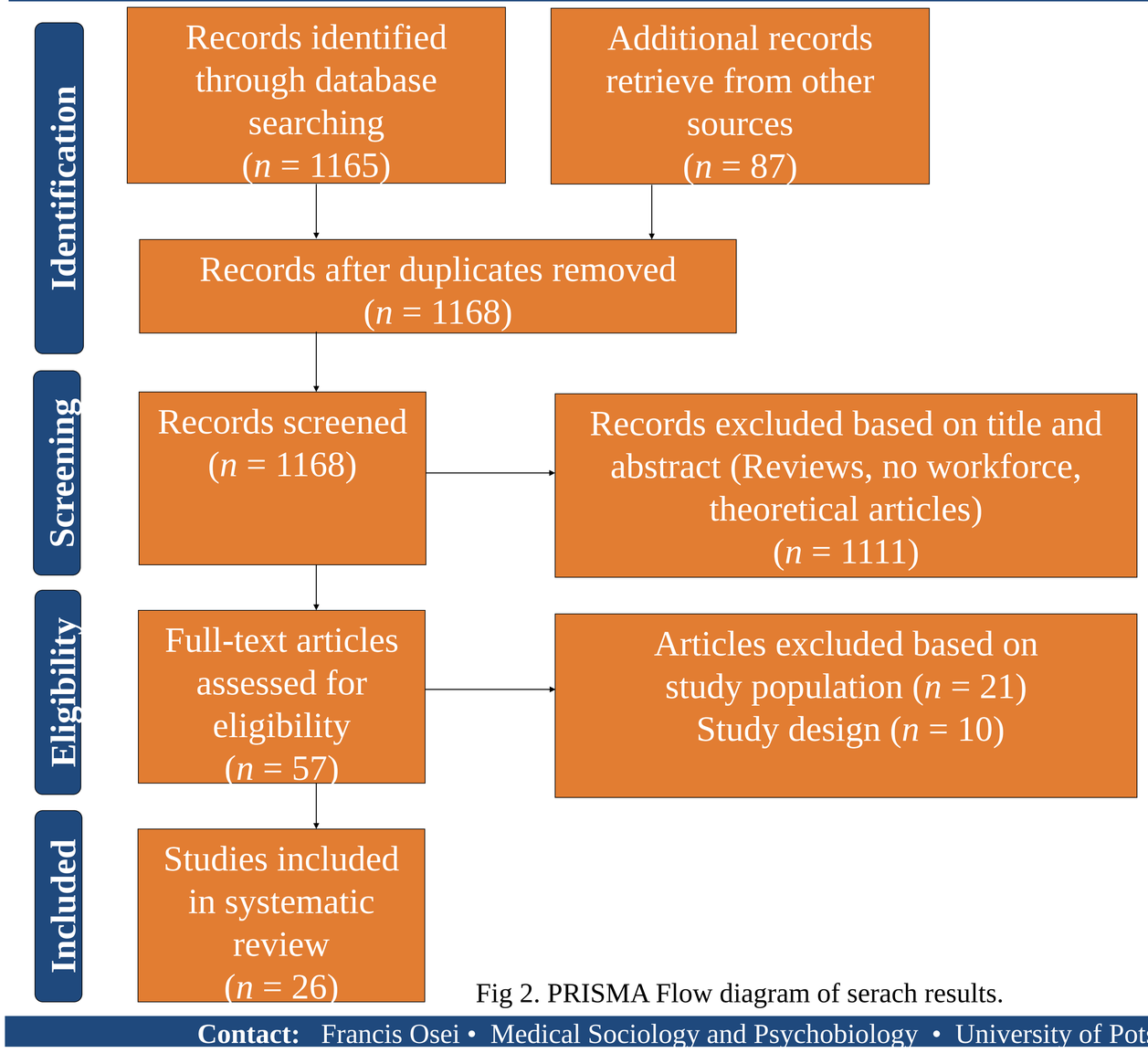

Fig 2. PRISMA Flow diagram of serach results.

- *N* = 26 studies included: 88.5% cross-sectional (*n* = 23), 11.5% case control (*n* = 3)
- *N* = 23 (88.5%) studies were considered very good to excellent (6 – 10 points) and *n* = 3 (11.5%) studies were considered fairly-good (5 points) [5]
- *N* = 15,170 partcipants, 16 - 89 years

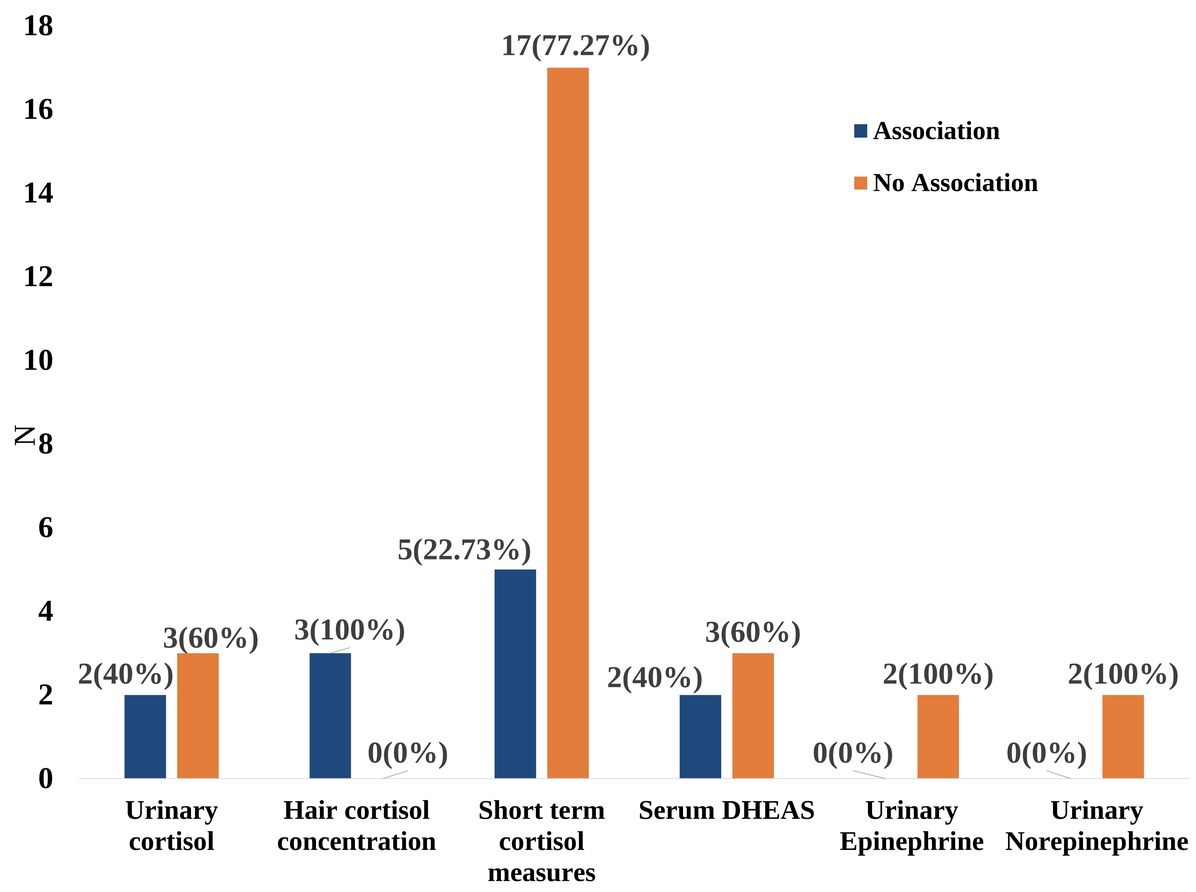

Fig 3. Association between primary mediators of AL and MetS

Key: N, number of primary mediators of AL measures in the included studies; %, percentage of associations of primary mediators of AL and MetS; Short term cortisol measures: saliva, serum and plasma cortisol.

Discussion

- Studies that reported on short term cortisol measures (i.e., plasma, serum) found no association with MetS indicating that biomarker with circadian rhythm fluctuations in their secretion may not reflect long term stress exposure very well.
- Higher levels in urinary and hair cortisol concentrations were associated with MetS reflecting chronic HPA axis activation leads to hypercortisolaemia in MetS patients.
- Low serum DHEAS levels are associated with MetS. However, age-related declines in DHEAS could be attributed to MetS pathophysiology [6].
- Epinephrine and norepinephrine are involved in insulin secretion which are altered in MetS patients [7]. However, no associations were found between epinephrine, norepinephrine and MetS.

Conclusion

- High hair cortisol concentrations are associated with MetS.
- There seems to be a tendency for the association between high urinary cortisol levels, and low serum DHEAS levels with MetS.
- Future studies focusing on longitudinal data are warranted for clarification.

References

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