

Citation:

Vischer UM, Safar ME, Safar H, Iaria P, Le Dudal K, Henry O, Herrmann FR, Ducimetière P, Blacher J. Cardiometabolic determinants of mortality in a geriatric population: is there a “reverse metabolic syndrome”? *Diabetes Metab.* 2009;35(2):108-114.

PubMed ID: [19237305](#)

Study Design:

Prospective Cohort Study

Class:

B - [Click here](#) for explanation of classification scheme.

Research Design and Implementation Rating:

NEUTRAL: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

To determine the impact of cardiometabolic risk factors on mortality in a prospective cohort study of 331 elderly subjects hospitalized in geriatric wards.

Inclusion Criteria:

- Age ≥ 70 years
- History of cardiovascular (CV) disease such as coronary heart disease (CHD), stroke, hypertension or other CV events
- Mini-Mental State Examination score $> 15/30$
- Absence of disease with life expectancy < 1 month
- Willingness to give written informed consent

Exclusion Criteria:

- Patients with cachexia (BMI < 17 kg/m²), cancer or renal failure (creatinine > 250 μ mol/L)

Description of Study Protocol:**Recruitment**

From May 2000 to November 2001, patients entering the geriatric departments of the Charles-Foix and Emile-Roux Hospitals, Île de France, were included if they met the inclusion criteria.

Design: Prospective cohort study

Blinding used (if applicable) Not described

Intervention (if applicable) Not applicable

Statistical Analysis

- Subjects' characteristics were compared using Fisher's exact test for qualitative data and Student's unpaired t test for quantitative data.
- Survival was analyzed using the Kaplan-Meier life-table method, and survival curves for each quartile were compared using log-rank statistics.
- Simple and multiple Cox proportional-hazards models were used to estimate the relative influence of individual risk factors on mortality.
- Pearson's correlation coefficients were determined among continuous variables.

Data Collection Summary:

Timing of Measurements

- Parameters recorded on study entry included gender, age, weight, height, history of CV events, presence of diabetes, dyslipidaemia and hypertension, smoking, previous diseases and medications.
- Blood pressure, BMI, total cholesterol, HDL cholesterol, LDL cholesterol, albumin, C-reactive protein (CRP), and insulin sensitivity (derived from HOMA-IR and QUICKI) were measured by standard methods.
- Follow-up lasted from the baseline examination (May 2000 to November 2001) until April 2004. Subjects were followed up until either death or the last medical contact. Information was obtained from patients, relatives or general practitioners.

Dependent Variables

- Two-year total mortality

Independent Variables

- Diabetes
- BMI
- Diastolic blood pressure (DBP)
- Total and HDL cholesterol
- Previous CV events

Control Variables

- Age
- Albumin
- CRP
- Creatinine

Description of Actual Data Sample:

Initial N: not described. In total, 331 were enrolled.

Attrition: Final N=331 (86 men; 245 women). It was noted that three were lost to follow-up.

Age: Mean age by diabetic status as follows: diabetes: 83.6±7.33 years; non-diabetes: 86.32±6.77 years

Ethnicity: not described

Other relevant demographics: There was no significant difference between groups on age.

Anthropometrics: There were significant differences between groups on body weight and BMI.

Location: France

Summary of Results:

Key Findings

- Two-year total mortality was predicted by age, diabetes, low BMI, low diastolic blood pressure, low total and HDL cholesterol, and previous CV events.
- The effect of diabetes was explained by previous CV events. In non-diabetic subjects, mortality was predicted by high insulin sensitivity, determined by HOMA-IR and QUICKI indices.
- In multivariate analyses, the strongest mortality predictors were low BMI, low HDL cholesterol and previous myocardial infarction.
- The malnutrition marker “albumin” was associated with blood pressure, total and HDL cholesterol, and HOMA-IR.
- The inflammation marker CRP was associated with low total and HDL cholesterol, and high HOMA-IR.

Author Conclusion:

- In elderly geriatric patients, low BMI, low DBP, low total and HDL cholesterol, and high insulin sensitivity predict total mortality, indicating a “reverse metabolic syndrome” that is probably attributable to malnutrition and/or chronic disorders.
- These observations emphasize the limited prognostic value of cardiometabolic risk factors in elderly patients.
- Previous CV events and low HDL cholesterol are strong predictors of mortality.
- Future studies should determine if and when the prevention and treatment of malnutrition in the elderly should be incorporated into conventional CV prevention.

Reviewer Comments:

Strengths

- *Sample size was relatively large and duration of follow-up was long enough, providing adequate study power.*
- *Follow-up rate was high enough to minimize the possibility of selection biases.*

- *Measurements and analyses of blood pressure and biological parameters were described adequately and were based on standard methods.*
- *Adjustments in statistical analysis were made to ensure groups were comparable on important confounding factors.*
- *The conclusion was supported by results given important confounding factors were taken into consideration.*
- *Study limitations (e.g., lack of generalizability of the results) were identified and discussed.*

Limitations

- *The participants were not a representative sample of the general elderly geriatric population.*
- *It was unclear that blinding was used for data collectors and subjects to prevent introduction of bias.*

Research Design and Implementation Criteria Checklist: Primary Research

Relevance Questions

1.	Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies)	N/A
2.	Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about?	Yes
3.	Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice?	Yes
4.	Is the intervention or procedure feasible? (NA for some epidemiological studies)	N/A

Validity Questions

1.	Was the research question clearly stated?	Yes
1.1.	Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified?	Yes
1.2.	Was (were) the outcome(s) [dependent variable(s)] clearly indicated?	Yes
1.3.	Were the target population and setting specified?	Yes
2.	Was the selection of study subjects/patients free from bias?	Yes
2.1.	Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study?	Yes
2.2.	Were criteria applied equally to all study groups?	Yes

2.3.	Were health, demographics, and other characteristics of subjects described?	Yes
2.4.	Were the subjects/patients a representative sample of the relevant population?	No
3.	Were study groups comparable?	Yes
3.1.	Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT)	Yes
3.2.	Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline?	Yes
3.3.	Were concurrent controls used? (Concurrent preferred over historical controls.)	Yes
3.4.	If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis?	Yes
3.5.	If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.)	N/A
3.6.	If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")?	N/A
4.	Was method of handling withdrawals described?	Yes
4.1.	Were follow-up methods described and the same for all groups?	Yes
4.2.	Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.)	Yes
4.3.	Were all enrolled subjects/patients (in the original sample) accounted for?	Yes
4.4.	Were reasons for withdrawals similar across groups?	Yes
4.5.	If diagnostic test, was decision to perform reference test not dependent on results of test under study?	N/A
5.	Was blinding used to prevent introduction of bias?	No
5.1.	In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate?	N/A
5.2.	Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.)	No

5.3.	In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded?	No
5.4.	In case control study, was case definition explicit and case ascertainment not influenced by exposure status?	N/A
5.5.	In diagnostic study, were test results blinded to patient history and other test results?	N/A
6.	Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were intervening factors described?	Yes
6.1.	In RCT or other intervention trial, were protocols described for all regimens studied?	N/A
6.2.	In observational study, were interventions, study settings, and clinicians/provider described?	Yes
6.3.	Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect?	Yes
6.4.	Was the amount of exposure and, if relevant, subject/patient compliance measured?	N/A
6.5.	Were co-interventions (e.g., ancillary treatments, other therapies) described?	N/A
6.6.	Were extra or unplanned treatments described?	N/A
6.7.	Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups?	N/A
6.8.	In diagnostic study, were details of test administration and replication sufficient?	N/A
7.	Were outcomes clearly defined and the measurements valid and reliable?	Yes
7.1.	Were primary and secondary endpoints described and relevant to the question?	Yes
7.2.	Were nutrition measures appropriate to question and outcomes of concern?	Yes
7.3.	Was the period of follow-up long enough for important outcome(s) to occur?	Yes
7.4.	Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures?	Yes
7.5.	Was the measurement of effect at an appropriate level of precision?	Yes
7.6.	Were other factors accounted for (measured) that could affect outcomes?	Yes
7.7.	Were the measurements conducted consistently across groups?	Yes
8.	Was the statistical analysis appropriate for the study design and type of outcome indicators?	Yes

8.1.	Were statistical analyses adequately described and the results reported appropriately?	Yes
8.2.	Were correct statistical tests used and assumptions of test not violated?	Yes
8.3.	Were statistics reported with levels of significance and/or confidence intervals?	Yes
8.4.	Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)?	N/A
8.5.	Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)?	Yes
8.6.	Was clinical significance as well as statistical significance reported?	Yes
8.7.	If negative findings, was a power calculation reported to address type 2 error?	N/A
9.	Are conclusions supported by results with biases and limitations taken into consideration?	Yes
9.1.	Is there a discussion of findings?	Yes
9.2.	Are biases and study limitations identified and discussed?	Yes
10.	Is bias due to study's funding or sponsorship unlikely?	Yes
10.1.	Were sources of funding and investigators' affiliations described?	Yes
10.2.	Was the study free from apparent conflict of interest?	Yes

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