3º Dia do Jovem Investigador
INSA| 8 de novembro de 2022

Association between grip strength and the risk of heart diseases among European middle-aged and older adults

Miguel Peralta[1], Carlos Matias Dias[2,3], Adilson Marques[1], Duarte Henriques-Neto[5], Mafalda Sousa-Uva[2,3]

[1]FMH, Universidade de Lisboa, Portugal; [2]ENSP, Universidade Nova de Lisboa, Portugal; [3]Epidemiology Department, INSA, Portugal; [4]CIDESD, ISMAI, Portugal

1. Introduction

Cardiovascular diseases (CVD) are the leading causes of mortality and morbidity worldwide [1]. Heart diseases led by coronary heart disease, are responsible for more than half of CVD prevalence and incidence [2]. Age, blood pressure, cholesterol, diabetes and smoking are known CVD risk factors present in most risk assessment tools for CVD [3]. More recently, lower grip strength has been associated to CVD mortality and proposed as a potentially indicator of cardiovascular health [4-5].

However, the association between grip strength and heart disease incidence in middle-aged and older adults, remains little explored in multi-country European studies considering population-based samples.

1.1. Aim

To analyse the longitudinal relationship between grip strength and the diagnosis of heart diseases in European middle-aged and older adults.

2. Methods

2.1. Study design and data source

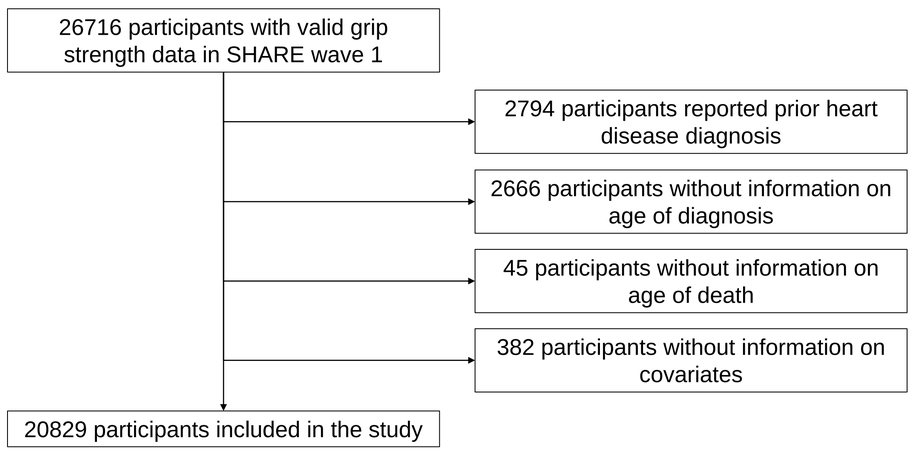
A multi-country prospective cohort study, using longitudinal data from the Survey of Health, Ageing and Retirement in Europe (SHARE) project was employed. For this study, longitudinal data from 2004 (wave 1) to 2017 (wave 7) was used. In the SHARE project, data is collected through a face-to-face computer-assisted personal interview.

SHARE SURVEY OF HEALTH, AGEING AND RETIREMENT IN EUROPE | 50+ IN EUROPE

2.2. Participants

The sample comprised of 20829 participants from 11 European countries (Austria, Germany, Sweden, the Netherlands, Spain, Italy, France, Denmark, Greece, Switzerland and Belgium) and Israel. Participants flow-chart can be found on figure 1.

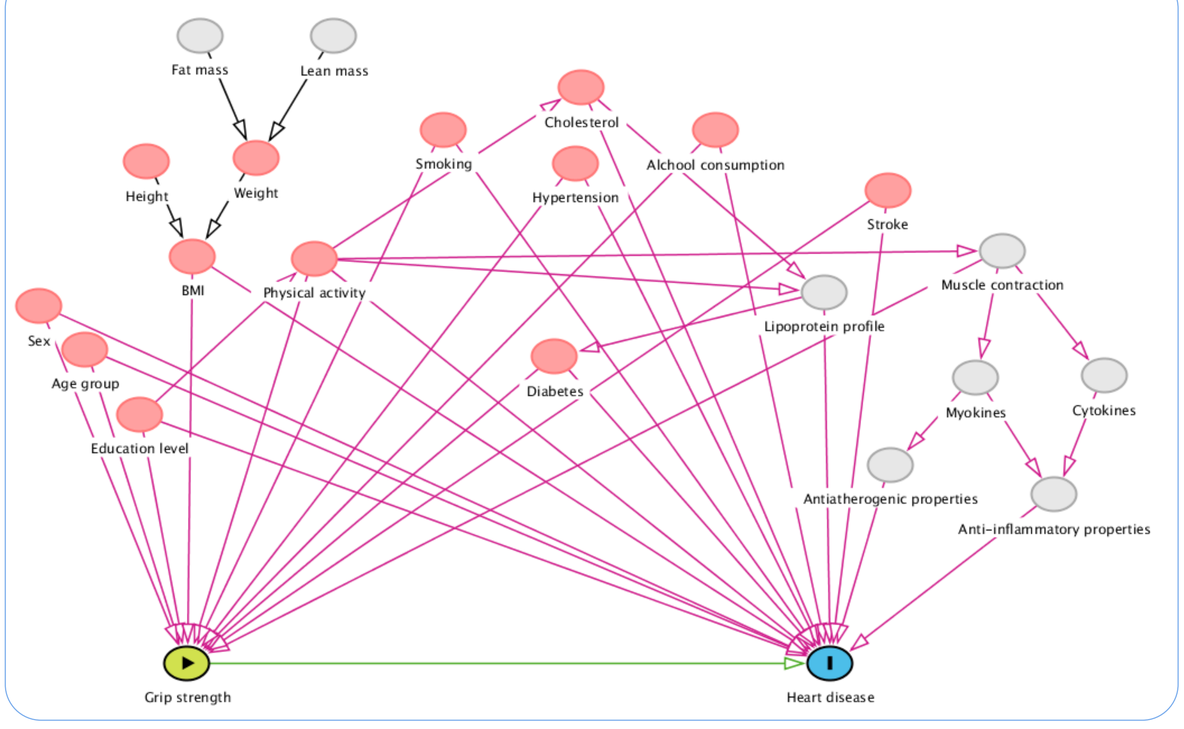
Fig 1. Participants flow-chart.



2.3. Measures

Measures used in this study are presented in the directed acyclic graph (figure 2). Heart diseases diagnosis (outcome variable) was self-reported, along with the age at the time of the diagnosis. Grip strength (exposure variable) was measured using a handheld dynamometer and transformed to sex- and age-adjusted quartiles.

Fig 2. Directed acyclic graph.



2.4. Statistical analysis

Cox proportional hazards regression was conducted to estimate the hazard ratio (HR) and the 95% confidence interval (CI) for the association between grip strength (and the diagnosis of heart diseases, for the whole sample and stratified by sex.

3. Results

Overall, 11489 (55.2%) women, mean age 63.1 years, and 9340 (44.8%) men, mean age 63.0 years, participated in the study. The events and HR for the diagnosis of heart diseases according to grip strength quartiles in European adults aged 50 years or more are presented in table 1.

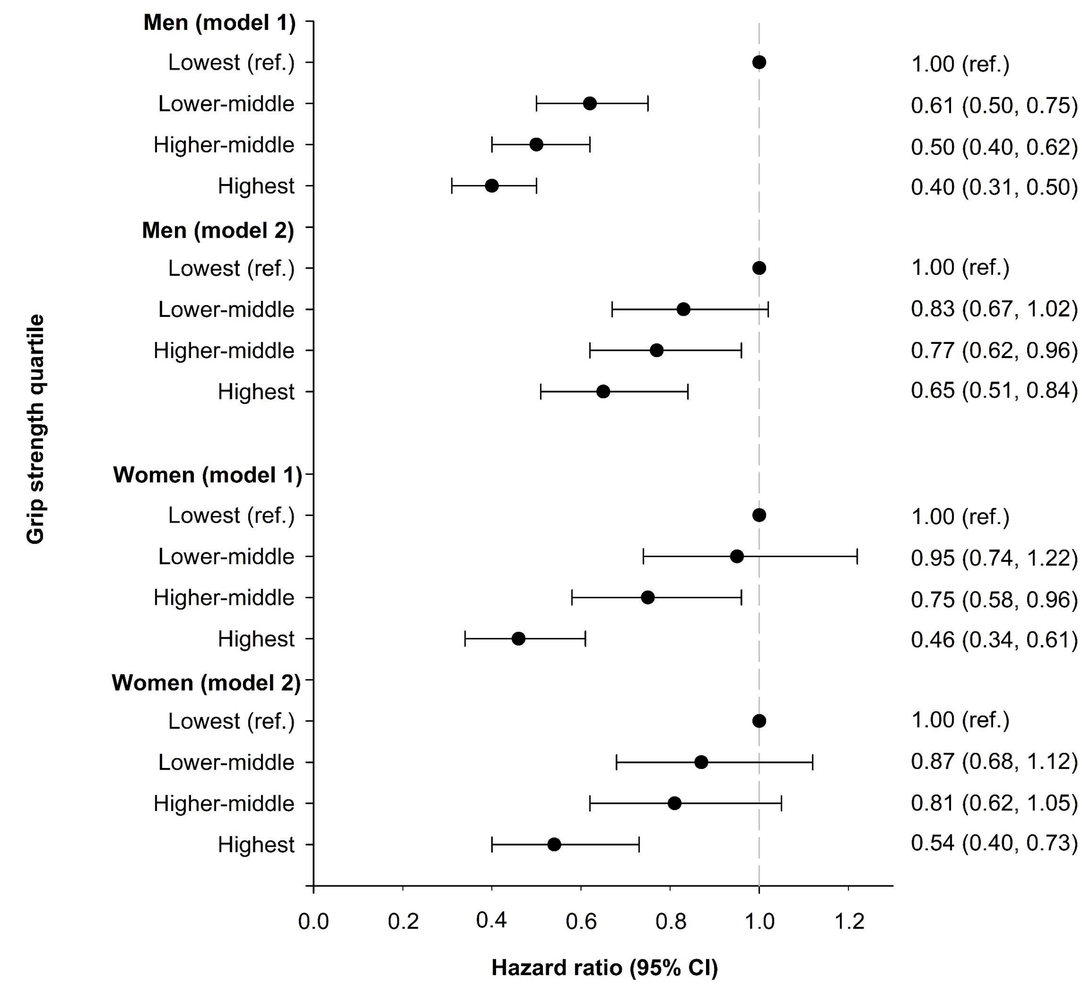
Tab 1. Events and hazard ratio for the diagnosis of heart diseases.

	n / events	Events 100 000 person-years	Hazard ratio (95%CI) Model 1	Hazard ratio (95%CI) Model 2
Grip strength				
Lowest	4943/367	930	1.00 (ref.)	1.00 (ref.)
Lower-middle	4830/272	670	0.72 (0.62, 0.85)	0.91 (0.77, 1.07)
Higher-middle	5445/245	530	0.58 (0.50, 0.68)	0.84 (0.71, 0.99)
Highest	5611/178	380	0.41 (0.34, 0.49)	0.64 (0.53, 0.78)

Abbreviations: CI, confidence interval.
Model 1: Unadjusted. Model 2: Adjusted for sex, age, education, country, physical activity, body mass index, alcohol and smoking, hypertension, cholesterol, stroke and diabetes.

When the analysis was stratified by sex different pattern of associations between the grip strength quartiles and heart disease incidence have emerged (figure 3).

Fig 3. Hazard ratio for the diagnosis of heart diseases (men and women).



Abbreviations: CI, confidence interval.
Model 1: Unadjusted. Model 2: Adjusted for sex, age, education, country, physical activity, body mass index, alcohol and smoking, hypertension, cholesterol, stroke and diabetes.

4. Conclusion

This is the first prospective cohort study that presented the incidence rate of heart diseases according to the grip strength quartiles. Main conclusions were:

- Higher grip strength was associated with a decreased hazard of heart diseases, highlighting its possible role as an indicator of heart disease to be used in risk assessing scores.
- Findings uncovered possible gender differences in the association between grip strength and heart diseases.
- Future studies should explore the inclusion of grip strength in CVD risk assessment scores to assess whether its potential role can be achieved.

5. References

1. GBD 2017 Causes of Death Collaborators. Global, regional, and national age-sex-specific mortality for 282 causes of death in 195 countries and territories, 1980-2017: a systematic analysis for the Global Burden of Disease Study 2017. Lancet. 2018;392(10159):1736-88. doi:10.1016/S0140-6736(18)32203-7.
2. Timmis A, Townsend N, Gale CP, Torbica A, Lettino M, Petersen SE et al. European Society of Cardiology: Cardiovascular Disease Statistics 2019. Eur Heart J. 2020;41(1):12-85. doi:10.1093/eurheartj/ehz859.
3. Lind L, Sundstrom J, Arnlov J, Lampa E. Impact of Aging on the Strength of Cardiovascular Risk Factors: A Longitudinal Study Over 40 Years. J Am Heart Assoc. 2018;7(1). doi:10.1161/JAHA.117.007061.
4. Wu Y, Wang W, Liu T, Zhang D. Association of Grip Strength With Risk of All-Cause Mortality, Cardiovascular Diseases, and Cancer in Community-Dwelling Populations: A Meta-analysis of Prospective Cohort Studies. Journal of the American Medical Directors Association. 2017;18(6):551 e17- e35. doi:10.1016/j.jamda.2017.03.011.
5. Leong DP, Teo KK, Rangarajan S, Lopez-Jaramillo P, Avezum A, Orlandini A et al. Prognostic value of grip strength: findings from the Prospective Urban Rural Epidemiology (PURE) study. The Lancet. 2015;386(9990):266-73. doi:10.1016/s0140-6736(14)62000-6.

U LISBOA | INSa | Escola Nacional de Saúde Pública UNIVERSIDADE NOVA DE LISBOA | UNIVERSIDADE DA MAIA – ISMAI