White Rose Research Online

eprints@whiterose.ac.uk
https://eprints.whiterose.ac.uk
Universities of Leeds, Sheffield and York

Deposited via The University of York.

White Rose Research Online URL for this paper:
https://eprints.whiterose.ac.uk/id/eprint/159635/

Version: Accepted Version

Article:
Castillo-Garcia, Adrián, Naci, Huseyin, Valenzuela, Pedro L. et al. (2020) Infographic. How does exercise treatment compare with antihypertensive medications? British Journal of Sports Medicine. pp. 746-747. ISSN: 1473-0480

https://doi.org/10.1136/bjsports-2019-101522

Reuse
Items deposited in White Rose Research Online are protected by copyright, with all rights reserved unless indicated otherwise. They may be downloaded and/or printed for private study, or other acts as permitted by national copyright laws. The publisher or other rights holders may allow further reproduction and re-use of the full text version. This is indicated by the licence information on the White Rose Research Online record for the item.

Takedown
If you consider content in White Rose Research Online to be in breach of UK law, please notify us by emailing eprints@whiterose.ac.uk including the URL of the record and the reason for the withdrawal request.

UNIVERSITY OF LEEDS
University of Sheffield
UNIVERSITY of York

Infographic. How does exercise treatment compare with antihypertensive medications?

Adrián Castillo-Garcia,[1] Huseyin Naci,[2] Pedro L Valenzuela ,[3,4] Maximilian Salcher-Konrad,[2] Sofia Dias ,[5,6] Manuel R Blum,[7,8,9] Samali Anova Sahoo,[10] David Nunan ,[11] Javier S Morales ,[12] Alejandro Lucia,[12,13] John PA Ioannidis[8,9,14]

High systolic blood pressure (SBP) remains the major cause of premature death globally despite advances in pharmacological treatment.[1 2] The global direct medical costs associated with hypertension treatment are estimated at $370 billion/year worldwide, with the healthcare savings from effective management of this condition projected at about $100 billion/year.[3] Unfortunately, relatively little attention is given to non-pharmacological strategies, including structured exercise interventions. A recent network meta-analysis of randomised controlled trials (RCTs) published in the BJSM[4] aimed to compare the effects of exercise interventions and medications on SBP. We highlight the key findings of this network meta-analysis that are particularly relevant for clinical practice and health policy.

The study included 391 RCTs (39,742 participants), of which 197 (10 461 participants) evaluated exercise interventions (endurance, resistance, isometric exercise or a combination of endurance and resistance) and 194 (29 281 participants) evaluated antihypertensive medications. When the results from trials that included hypertensive populations (SBP > 140 mm Hg) were combined with those from trials that included populations with normal levels of SBP, all types of antihypertensive drugs, and also all exercise modalities or intensities were effective in lowering baseline SBP compared with control interventions (ie, no exercise and no drugs) (figure 1). Antihypertensive medications resulted in overall larger reductions in baseline SBP compared with exercise. When analysing hypertensive individuals (SBP > 140 mm Hg) separately, both exercise and antihypertensive medications appeared similarly effective in reducing baseline SBP. However, the results and their clinical implications should be interpreted with

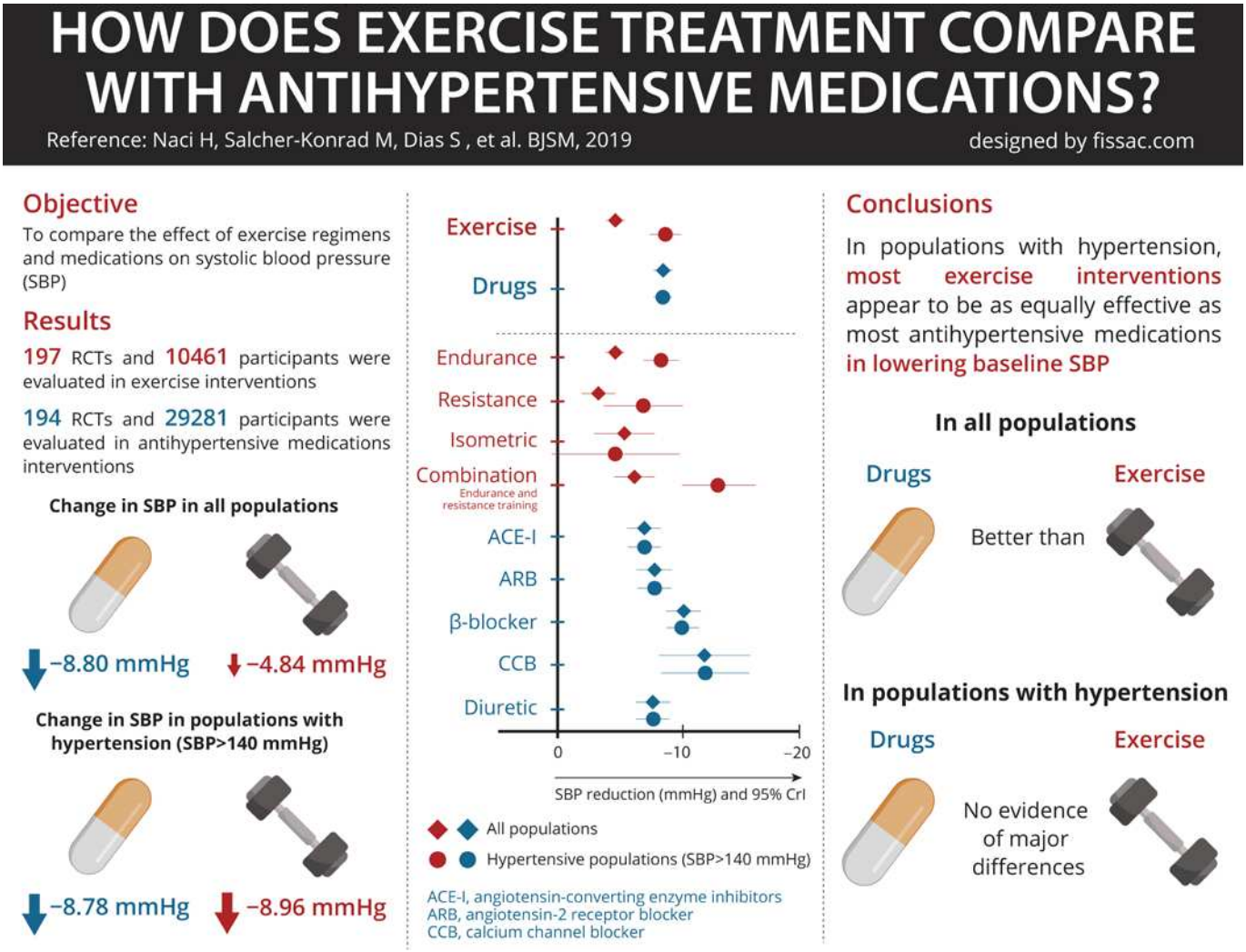

Figure 1 Infographic.

Br J Sports Med: first published as 10.1136/bjsports-2019-101522 on 19 December 2019. Downloaded from http://bjsm.bmj.com/ on April 17, 2020 at The Librarian J B Morrell Library. Protected by copyright.

caution, as none of the included studies directly compared antihypertensive medications *vs* exercise, exercise interventions were often evaluated in trials too small to adequately control for confounding and produce reliable effect estimates and populations were healthier than those in medication trials.

Further research is therefore needed to directly compare the blood pressure (BP) lowering effects of exercise and drug interventions. Recently published guidelines from the American College of Cardiology/American Heart Association[5] lowered the threshold to define hypertension in adults to 130 mm Hg (instead of 140 mm Hg). The recently updated European Society of Cardiology/European Society of Hypertension guidelines[6] define SBP 130–139 as 'high normal'. Many individuals who were previously not indicated for drug therapy are thus recommended to start medications to lower their BP. Whether exercise interventions can be considered as viable substitutes of antihypertensive medication for newly diagnosed hypertensive individuals needs careful evaluation. We also need more data to understand the combined effects of medications and exercise and whether exercise may allow reducing the number of antihypertensive agents used in patients treated with combinations of multiple drugs.

More research is also needed to determine the effects of exercise to prevent the risk (or as a coadjuvant treatment) of some hypertension phenotypes that are associated to a particularly high cardiovascular risk despite the use of drug combinations, such as resistant hypertension (a condition found in subjects receiving three drugs of different classes at maximally tolerated doses) and a more recently identified phenotype, the so-called 'masked uncontrolled hypertension', a condition found in some patients treated for hypertension with seemingly well-controlled BP in the office (or clinic) yet with high ambulatory BP.[7]

[1]Fissac, Madrid, Spain
[2]Department of Health Policy, London School of Economics and Political Science, London, UK
[3]Department of Systems Biology, University of Alcalá, Alcalá de Henares, Madrid, Spain
[4]Department of Sport and Health, Agencia Española para la Proteccion de la Salud en el Deporte, Madrid, Madrid, Spain
[5]Centre for Reviews and Dissemination, University of York, York, UK
[6]Bristol Medical School, University of Bristol, Bristol, UK
[7]Department of General Internal Medicine, Inselspital University Hospital Bern, Bern, BE, Switzerland
[8]Department of Health Research and Policy, Stanford University School of Medicine, Stanford, California, USA
[9]Meta-Research Innovation Center at Stanford (METRICS), Stanford University, Stanford, California, USA
[10]Department of Life Science and Management, University of Pennsylvania, Philadelphia, Pennsylvania, USA
[11]Nuffield Department of Primary Care Health Sciences, University of Oxford, Oxford, UK
[12]Faculty of Sport Sciences, Universidad Europea de Madrid, Madrid, Spain
[13]Research Institute, Hospital 12 de Octubre, Madrid, Spain
[14]Department of Medicine, Stanford Prevention Research Center, Stanford, California, USA

Correspondence to Pedro L Valenzuela, Department of Systems Biology, University of Alcalá, Alcalá de Henares 28871, Spain; pedrol.valenzuela@edu.uah.es

Twitter Pedro L Valenzuela @Fissac_es and Javier S Morales @javi_salud

Contributors All authors contributed equally.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient consent for publication Not required.

Provenance and peer review Not commissioned; externally peer reviewed.

© Author(s) (or their employer(s)) 2019. No commercial re-use. See rights and permissions. Published by BMJ.

Check for updates

To cite Castillo-Garcia A, Naci H, Valenzuela PL, *et al*. *Br J Sports Med* Epub ahead of print: [*please include* Day Month Year]. doi:10.1136/bjsports-2019-101522

Accepted 3 December 2019

Br J Sports Med 2019;**0**:1–2. doi:10.1136/bjsports-2019-101522

ORCID iDs
Pedro L Valenzuela http://orcid.org/0000-0003-1730-3369
Sofia Dias http://orcid.org/0000-0002-2172-0221
David Nunan http://orcid.org/0000-0003-4597-1276
Javier S Morales http://orcid.org/0000-0002-3255-3246

REFERENCES

1 Ezzati M, Lopez AD, Rodgers A, *et al*. Selected major risk factors and global and regional burden of disease. *Lancet* 2002;360:1347–60.
2 Forouzanfar MH, Afshin A, Alexander LT, *et al*. Global, regional, and national comparative risk assessment of 79 behavioural, environmental and occupational, and metabolic risks or clusters of risks, 1990–2015: a systematic analysis for the global burden of disease study 2015. *Lancet* 2016;388:1659–724.
3 Frieden TR, Jaffe MG. Saving 100 million lives by improving global treatment of hypertension and reducing cardiovascular disease risk factors. *J Clin Hypertens* 2018;20:208–11.
4 Naci H, Salcher-Konrad M, Dias S, *et al*. How does exercise treatment compare with antihypertensive medications? A network meta-analysis of 391 randomised controlled trials assessing exercise and medication effects on systolic blood pressure. *Br J Sports Med* 2019;53:859–69.
5 Whelton PK, Carey RM, Aronow WS, *et al*. 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA guideline for the prevention, detection, evaluation, and management of high blood pressure in adults: a report of the American College of Cardiology/American heart association Task force on clinical practice guidelines. *Hypertension* 2018;71:e13–115.
6 Williams B, Mancia G, Spiering W, *et al*. 2018 ESC/ESH guidelines for the management of arterial hypertension. *Eur Heart J* 2018;39:3021–104.
7 Banegas JR, Ruilope LM, de la Sierra A, *et al*. High prevalence of masked uncontrolled hypertension in people with treated hypertension. *Eur Heart J* 2014;35:3304–12.

Br J Sports Med: first published as 10.1136/bjsports-2019-101522 on 19 December 2019. Downloaded from http://bjsm.bmj.com/ on April 17, 2020 at The Librarian J B Morrell Library. Protected by copyright.