



Letter to the Editor Re: Meta-Analysis of Cocoa Consumption and Blood Pressure in Middle-Aged and Elderly Subjects: Methodological Issue by Sadegh Jafarnejad, Mina Salek, Cain C. T. Clark, and Mohsen Taghizadeh

Mehdi Naderi¹ · Fatemeh Rajati²

Accepted: 2 September 2020 / Published online: 24 September 2020
© Springer Science+Business Media, LLC, part of Springer Nature 2020

Dear Editor

We read with great interest the article published by Jafarnejad et al. (2020) [1] Cocoa Consumption Does Not Improve Systolic Blood Pressure in Middle-Age and Elderly Subjects: A Meta-Analysis. Chocolate contains flavanols, which have been reported to improve endothelial nitric oxide formation, leading to an improvement in vascular health through vasodilation and blood pressure reduction. Considering the direct and indirect effect of flavanols on cardiovascular disease [2], recommending the most useful diets can be challenging for healthcare providers. This paper demonstrates the usefulness of cocoa consumption in reducing the level of both systolic and diastolic blood pressure. However, we have some methodological comments regarding this paper.

To our knowledge, this is the first systematic review evaluating the effect of cocoa consumption on middle-aged and elderly subjects. Databases including PubMed, Cochrane Library™, Google Scholar™, and Scopus were searched. But three studies were missed from the meta-analysis. The results of the 3 articles in the study of coca effect on blood pressure were as follows: (1) Mean change systolic and diastolic blood pressure of Njike et al. (2011) study on sugar-sweetened cocoa users were 2.2 (−1.5 to 5.8) and .50.5 (−3.4 to 2.3), respectively [3]. (2) Mean difference of systolic and diastolic blood pressure in two groups (coca-placebo) of

Muniyappa et al. study (2008) were −1 (−4 to 3) and −1 (−2 to 4), respectively [4]. (3). Another study was conducted by Rostami et al. (2015), which showed that high polyphenol chocolate consumption in comparison with the white chocolate decreases significantly the systolic (−5.93 ± 6.25 vs. −1.07 ± 7.97 mmHg, $P = 0.004$) and diastolic blood pressure (−6.4 ± 6.25 vs. 0.17 ± 7.9 mmHg, $P = 0.002$) [5].

We believe that the missing studies may be as a result of the search strategy, which in turn may be due to not performing the search in the [All fields]. Any conclusions on these fields should be supported by the above-mentioned methodology issues. Otherwise, misinterpretation cannot be avoided.

Acknowledgments The authors would like to thank Vice Chancellor for Research of Kermanshah University of medical Sciences.

Compliance with Ethics Guidelines

Conflict of Interest The authors declare that she has no conflict of interest.

Human and Animal Rights and Informed Consent This article does not contain any studies with human or animal subjects performed by any of the authors.

References

1. Jafarnejad S, Salek M, Clark CCT. Cocoa consumption and blood pressure in middle-aged and elderly subjects: a meta-analysis. *Curr Hypertens Rep.* 2020;22:1. Available from: <https://doi.org/10.1007/s11906-019-1005-0>.
2. Garcia JP, Santana A, Baruqui DL, Suraci N. The Cardiovascular effects of chocolate. *Rev Cardiovasc Med.* 2019/05/09. 2018;19:123–7.
3. Njike VY, Faridi Z, Shuval K, Dutta S, Kay CD, West SG, et al. Effects of sugar-sweetened and sugar-free cocoa on endothelial function in overweight adults. *Int J Cardiol.* 2011;149:83–8.
4. Muniyappa R, Hall G, Kolodziej TL, Kame RJ, Crandon SK, Quon MJ. Cocoa consumption for 2 wk enhances insulin-mediated

✉ Fatemeh Rajati
f.rajati@kums.ac.ir

¹ Clinical Research Development Centre, Taleghani and Imam Ali Hospital, Kermanshah University of Medical Sciences, Kermanshah, Iran

² Research Center for Environmental Determinants of Health, Health Institute, Kermanshah University of Medical Sciences, Kermanshah, Iran

- vasodilatation without improving blood pressure or insulin resistance in essential hypertension. *Am J Clin Nutr. United States.* 2008;88:1685–96.
5. Feigin VL, Nichols E, Alam T, Bannick MS, Beghi E, Blake N, et al. Global, regional, and national burden of neurological disorders, 1990–2016: a systematic analysis for the global burden of disease study 2016. *Lancet Neurol.* 2019;18:459–80.

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.