



Letter to the Editor re “Hypertension and Pre-Hypertension Among Iranian Adults Population: a Meta-Analysis of Prevalence, Awareness, Treatment, and Control” by Afsargharehbagh et al. (2019) Published in Current Hypertension Reports

Farid Najafi^{1,2} · Fatemeh Rajati²

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Dear Editor,

We read with interest the article “Hypertension and Pre-Hypertension Among Iranian Adults Population: a Meta-Analysis of Prevalence, Awareness, Treatment, and Control” by Afsargharehbagh et al. (2019) published in Current Hypertension Reports [1••]. This is a systematic review and meta-analysis of all available studies on prevalence, awareness, treatment, and control of prehypertension and hypertension among Iranian adults. Due to some methodological issues in this review, we have some questions.

Although combining available data on prevalence of hypertension is very informative, the validity of the estimated prevalence depends largely on the correct combination of similar studies. In fact, heterogeneity is an important issue that needs to be addressed in each meta-analysis. Authors selected a wide variety of studies (i.e., population-based, cross-sectional, and cohort) with different settings (national studies involving the data from routine primary cares vs. data from cross-sectional and cohort studies). Such combinations resulted in severe heterogeneity ($I^2 = 99.9\%$) and consequently misleading results. It is not recommended to combine such studies in a meta-analysis unless the sub-group analysis will cause to decline the heterogeneity between studies. However, the sub-group analysis by sex and study location have had subtle effect in decrease of observed variations between the result

of included studies ($I^2 = 99.8\%$ and 99.9% , respectively). The authors need to investigate the possible reasons for such a severe heterogeneity. In addition to the above-mentioned factors, authors should investigate the effect of combination of crude and age-standardized values and the methods used for blood pressure measurement as sources of observed heterogeneity between studies. From our point of view, meta-analyses basically are inappropriate in this condition and, therefore, the interpretation should be performed with caution.

The presented result shows that the prevalence of hypertension is higher in women than in men, but in reality such sex differences may be age-related. The authors should provide the possible reasons for such differences between men and women. Authors should address that women are protected against hypertension before the end of 4th decades of their life which is associated with estrogen [2•]. Another possible reason is likely to be related to their health-seeking behavior, especially among pregnant women. This might also contribute to higher prevalence of hypertension in women [3•].

For studying a risk factor such as hypertension, which is now one of the targets of sustainable development goals and subject to improvement over the time, one can expect to observe the effect of time trend on awareness, treatment, and control. The study reports that only less than half of 49.3% of hypertensive Iranian people were aware of their disease. It is observed that the proportion of awareness of hypertension has been reported much more than 50% in the study of Eghbali et al. (2017) [4••], Ghorbani et al. (2018) [5••], and Pakzad et al. (2018) [6••], which has been conducted in 2018, compared to studies performed over previous decade in Iran. In the same way, a similar improvement pattern is apparent in proportion of treatment (from 34% in 2008 [7••] to 63.9 in 2018 [4••]) and in control of hypertension (from 6% in 2008 to 51.9% in 2018) over time, meaning that Iranian hypertensive population has likely passed “the rule of halves” [8•]. It is

✉ Fatemeh Rajati
f.rajati@kums.ac.ir

¹ Kermanshah Cardiovascular Research Center, Kermanshah University of Medical Sciences, Kermanshah, Iran

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

consistent with what occurred in developed and some developing countries over time [9, 10]. While the rule of halves says that half of hypertensive patients are not aware of their hypertension, half of those who are aware are not treated and half of those treated are not controlled, Iranian hypertensive population are more likely to have passed such rules. A trend analysis over the data collected from literature could reveal such improvement in hypertension epidemiology in Iran.

Compliance with Ethical Standards

Conflict of Interest The authors declare no conflicts of interest relevant to this manuscript.

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.

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- Of importance
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