SYSTEMATIC REVIEW ARTICLE

Prevalence of HTN in Iran: Meta-analysis of Published Studies in 2004-2018

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Abstract: ***Introduction***: Prevalence of hypertension (HTN) is increasing in the developing countries like Iran. Various studies have reported different rates of HTN in Iran. The purpose of this study was to estimate an overall prevalence of HTN in Iran.

Methodology: Using the English and Persian key derived from Mesh, the databases including MagIran, Iran Medex, SID, Web of Sciences, PubMed, Science Direct and Google Scholar as a searching engine were reviewed: from 2004 to 2018. The overall prevalence of MA was estimated using Random effect model. The I2 test was used to assess the heterogeneity of the studies. Additionally, the quality of studies was evaluated using a standard tool. Publication bias was conducted with the Egger test. Meta-regression and analysis of subgroups were analyzed based on variables such as age, marital status, region and tools. Data were analyzed using STATA 12 software.

Results: Analysis of 58 primary articles with a sample size of 902580 showed that the prevalence of HTN in Iran was 25% (with 95% CI of 22-28). The highest prevalence of HTN was related to elderly (42%). The prevalence of HTN was 25% (95% CI: 19-31) in women and 24% (95% CI: 20-28) in men with no significant difference (p = 0.758). The results also indicated that the prevalence of HTN was not related to the year of studies (p = 0.708) or sample size (p = 769).

Conclusion: Despite the advancements in science and technology, along with health and prevention of diseases, the overall prevalence of HTN raised in Iran. Since HTN is a silent disease with significant health consequences and economic burden, programs designed to better HTN control seem vital to enhance community health.

Keywords: Prevalence, HTN, systematic review and meta-analysis, Iran, age, region.

1. INTRODUCTION

There is convincing evidence that the world is faced with an increased prevalence of hypertension (HTN) [1]. 31% of the world's adults had HTN in 2010 [2] (Mills, *et al.* 2015). HTN is a worldwide health problem and the most important factor in increasing the burden of disease in the world [3, 4]. Among the 25 factors leading to disability, HTN (HTN) was ranked fourth in 1990 and then ranked as the first factor in 2010 [5].

HTN is associated with a high incidence of debilitating complications, such as stroke, heart attacks, and renal failure, which impose a large economic burden on society. For example, estimates indicate that 54-6.64% of stroke and 47% of coronary heart disease worldwide are due to HTN [6, 7]. Findings revealed that HTN increases the risk of dementia [8, 9] and depression [10] in the elderly. Worldwide, costs to treat HTN and its consequences are substantial. For instance, it is predicted that the future cost of cardiovascular complications caused by HTN in the United States would be raised 238 % from 2010 to 2030 [11].

The prevalence of HTN varies across the world considerably. Its prevalence was 39.1% in Latin America, 26.9% in the Middle East and North Africa, 29.4% in South Asia,

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31.5% in European and Central Asia countries, 31.1% in Sub-Saharan Africa, and 35.7% in East China and the pacific [12]. The results of a meta-analysis study in 2012 indicated that the prevalence of HTN in China was 21.5% [13]. In Iran, two meta-analyses have been conducted related to the prevalence of HTN in 2008 and 2012. According to the first study, the prevalence of HTN in the 30-55 age group and older than 55 years, were 23% and 50%, respectively [14]. In 2012, the prevalence of HTN in adults was 22% [15]. In addition, various studies have been carried out on the prevalence of HTN in different parts of Iran which reported different rates [16-18]. Evidence suggests that in developing countries such as Iran, better care and more effective disease treatment has increased life expectancy that followed by increasing of elderly population; consequently raising of the elderly population leads to an increase in the prevalence of HTN [19, 20].

The prevalence of HTN can be affected by demographic factors, such as age, race, gender, and socio-economic status [21]. Iran is a large country in the eastern half of the Middle East with approximately 70 million people with different ethnicities. Ethnic diversity in Iran results in very different cultures, lifestyles, and socioeconomic status that may affect individuals' blood pressure. This study aimed to estimate an overall prevalence of HTN in Iran and provide more current estimates.

2. METHODOLOGY

The protocol of this review has been registered in the International prospective register of systematic reviews (PROSPERO) with the number of CRD42017068574.

2.1. Search Strategy

This systematic and meta-analysis of HTN in Iranian society was reviewed based on studies published in national and international journals between 2004 and 2018. We used the following databases: Magiran, Iran Medex, the Iranian Archive for Scientific Documents Center (IASD), the Iranian National Library (INL), Medline (PubMed, Ovid), Scopus, Web of Science Embase. Google Scholar and Google were used as a search engine. Also, grey literature was examined for related articles. The keywords including "systolic", "diastolic", "blood pressure", " hypertension", "white coat HTN", "Iran", "prevalence", and combinations of these using Boolean operators and "*" were used to search for primary studies. Given the definition of blood pressure by the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure (JNC 7), which determined HTN as BP ≥ 140/90 [22]; so our criteria of HTN in analyzed studies were SBP ≥140 mm Hg and DBP ≥90 mm Hg. The screening and selection process was conducted according to PRISMA guidelines [23].

2.2. Selection of Studies and Data Extraction

All observational (non-interventional) studies that referred to the frequency or prevalence of HTN in Iranian society were included in the study. Exclusion criteria were related to the interventional studies, letters to the editor, studies on pregnant women and children, and studies with poor methodological quality. Also, studies without keywords of

blood pressure, HTN, Iran, systolic, diastolic, and prevalence were excluded. For some articles which were published in both Persian and English language, we analyzed the one with more detailed data. For data extraction, the form we used included the variables of the first author of the studies, year of publication, setting, total sample size, sample size in men and women, number of patients with HTN in general and by sex. According to inclusion and exclusion criteria, titles and abstracts of primary studies were independently assessed by two researchers and for related articles, the full texts were extracted and assessed. In case of disagreement between the two researchers, the article was assessed by the third author who was an expert in the meta-analysis.

2.3. Evaluation and Review Articles

To assess the quality of the primary studies, we used a standard tool which has been applied in various internal and external studies [24-27]. The quality assessment form of the studies included 5 items including research design, sampling method, comparison group, sample size, instrumental psychometric properties. Each item was ranked from 0 to 3 and its overall score ranged from (0 to 15). Accordingly, the studies were divided into three groups: weak (0 to 5), moderate (5-10) and strong (10 up) [26]. The quality of the studies was investigated by two researchers (M.J. and R.G.) and the differences were resolved by the third author (F.M). All studies had moderate to high quality, then all of them were entered to the analysis.

2.4. Statistical Analysis

Regarding the prevalence rate with a binomial distribution, the variance of each research was calculated through binomial distribution variance. The weighted average was used to combine the prevalence rates of the studies. The weight assigned to each study was the inverse of its variance. The I2 index was used to examine the heterogeneity of data. Heterogeneity of data was divided into three classes of less than 25% (low heterogeneity), 25% to 75% (moderate heterogeneity) and over 75% (high heterogeneity). Given the high heterogeneity of the data, the random effects model was used. Subgroup analysis was performed based on gender, age, type of study and population. To assess trends of prevalence of HTN from 2004 to 2017, we categorized primary studies based on the study conducted time into four period time of 2004-2006, 2007-2009, 2010-2012, and 2013-2017. The increase in the period of 2013-2017 was due to the low number of primary articles. Meta-regression method was used to investigate the correlation between the prevalence of HTN and the year of study, and the number of samples. Publication bias was assessed with the Egger test. Data analysis was done with STATA 12 software.

3. RESULTS

In this study, all studies related to the prevalence of blood pressure in Iranian society from 2004 to 2017, were systematically assessed according to the PRISMA guidelines (Fig. **1**).

In the initial search, 1123 papers were identified, which eventually led to 58 eligible studies entered to the final analysis. The total sample size was 902,580 subjects with an
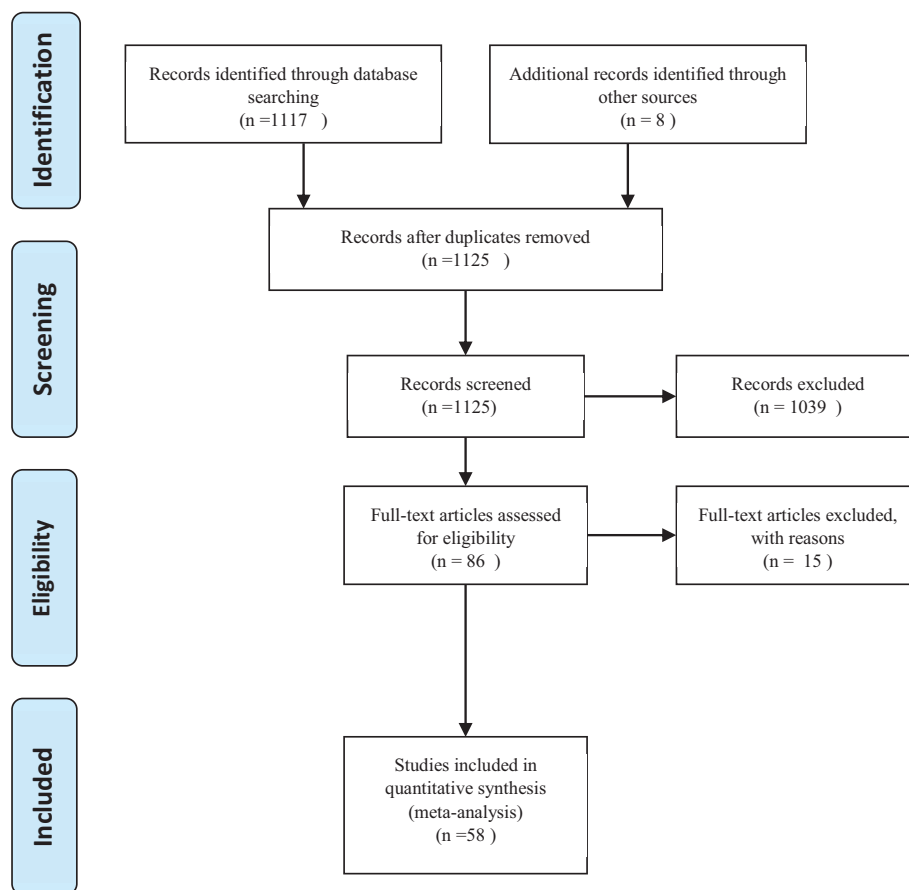
Fig. 1. The process of selecting articles based on PRISMA.

average of 15743 per study. The lowest and highest sample sizes were related to Akbarzadeh (2009) [28] and Faramarzi (2009) [29] respectively. 52 of the studies were cross-sectional, and five were cohort studies. The characteristics of the articles are presented in Table **1**.

The findings showed that the overall prevalence of HTN in Iranian society was 25% (95% CI: 22 - 28%). The prevalence of HTN in cross-sectional studies (27% with a 95% CI of 23-30) was more than cohort studies (22% with 95% CI of 11 - 33). The findings also showed that the prevalence of HTN in older adults was higher than other age groups (42% with 95% CI: 22-62), the prevalence of HTN was 25% (95% CI: 19-31) in women and 24% (95% CI: 20-28) in men, with no significant difference (p = 0.758). The findings showed that the highest and the lowest prevalence of HTN were in Region 3 (East Azarbaijan, West Azarbaijan, Ardebil, Zanjan, Guilan and Kurdistan provinces) and region 2 (Isfahan, Fars, Bushehr, Chaharmahal Bakhtiari, Hormozgan and Kohkiloyeh and Boyerahmad provinces) (33% versus 22%), respectively. Further details of the prevalence of HTN in the subgroups are presented in Table **2**. The pooled prevalence of HTN is shown in Fig. **2**.

The trend of prevalence of HTN in Iran, from 2004 to 2017 is shown in Table **3**. The prevalence of HTN in Iran was not significantly correlated with the year (p = 0.708), and sample size (p = 769), but In relation to the mean age of the samples, showed a significant correlation (p = 0.003)

(Fig. **3**). According to Fig. **4**, the results of the Egger test showed that the bias of publication of the preliminary studies is not significant (p = 0.172).

4. DISCUSSION

In our systematic and meta-analytical review, 58 primary articles were investigated to estimate the overall prevalence of HTN in Iran. This study covers all areas of Iran with 31 provinces. All data were collected from 2004 to 2017. A systematic study related to the prevalence of HTN in Iran has not been conducted recently, and the latest related study was done around 5 years ago [15]. Because the findings of the present study are based on a large number of primary studies, our study can be fitted to the needs of health providers.

The overall prevalence of HTN in Iran was 25%, which was different in cross-sectional and cohort studies, with a prevalence of 26% and 22%, respectively. Among the 51 European countries in 2014, the minimum and maximum prevalence of HTN were related to the United Kingdom (15.2%) and Estonia (31.7%) [30]. Analyzing studies until 2015 in low- and middle-income countries, have shownthat the overall prevalence of HTN was 32.3% [12].

Comparison of the results shows the prevalence of HTN in different countries varies, however, remains approximately near to each other. Variations in the reported prevalence in several countries can be due to genetic and environmental factors (like exercising), also it can be due to the

Table 1. **Characteristics of the final papers entered in the analysis.**

Row	First Authour	Study Design	Year	Sample Size	Setting	Target Population	Prevalence (%)	Language
1	Ghanbariyan *et al*.	Cross-sectional	2004	8491	Tehran	Adults	22	Persian
2	Taraghi *et al*.	Cross -sectional	2004	122	Sari	Adult drivers	36.9	Persian
3	Godarzi *et al*.	Cross -sectional	2005	1530	Zabul	Adults	13.9	Persian
4	Delavari *et al*.	Cross- sectional	2005	24525	national project	Adults	30.5	Persian
5	Delavari *et al*.	Cross -sectional	2005	13033	national project	Adults	29.2	Persian
6	Yousefinejad *et al*.	Cross-sectional	2006	1854	Sanandaj	Adults with blood transfering	3.4	Persian
7	Sharifi rad *et al*.	Cross- sectional	2007	255	Esfahan	elderly	46.7	Persian
8	Delavari *et al*.	Cross- sectional	2007	75112	national project	Adults	30.2	Persian
9	Rafiee *et al*.	Cross -sectional	2007	458	Arak	Postmenopausal women	65.5	Persian
10	Dabbaghmanesh *et al*.	Cross-sectional	2008	3245	Shiraz	Adults	27.5	Persian
11	Esteghamati *et al*.	Cross -sectional	2008	68250	national project	Adults	32	English
12	Esteghamati *et al*.	Cross -sectional	2009	5287	national project	Adults	26.6	English
13	Mardani *et al*.	Cross -sectional	2009	340	Arak	Adults	13.5	Persian
14	Akbarzadeh *et al*.	Cross-sectional	2009	107	Shiraz	Adult women	12.15	Persian
15	Akbarzdseh *et al*.	Cross-sectional	2009	107	Shiraz	Adult women	3.7	Persian
16	Amirkizi *et al*.	Cross-sectional	2009	370	Kerman	Women with reproductive age	14.3	Persian
17	Faramarzi *et al*.	Cross -sectional	2009	447251	Shiraz	Adults	21	Persian
18	Ramazani *et al*.	Cross sectional	2009	3670	Esfahan	Adults	20.7	English
19	Neghab *et al*.	Cohort	2009	140	Shiraz	Petrochemical personnel	20	English
20	Neghab *et al*.	Cohort	2009	140	Shiraz	Petrochemical personnel	12.8	English
21	Veghari *et al*.	Cross -sectional	2010	2497	Golestan	Adults	23.9	Persian
22	Sahebi *et al*.	Cross-sectional	2010	1027	Shiraz	Hospital staff	37	English
23	Kasai *et al*.	Cross -sectional	2010	1000	Zanjan	Adults	27.8	English
24	Ebrahimi *et al*.	Cross -sectional	2010	30000	National project	Adults	17.3	English
25	Sharifi *et al*.	Cross- sectional	2010	266	Tehran	Elderly	61	English
26	Damrchi *et al*.	Cross -sectional	2010	1218	Tehran	Drivers	35.4	Persian
27	Kalani *et al*.	Cross -sectional	2011	1130	Yazd	Adults	38.1	Persian
28	Ghazanfari *et al*.	Cross- sectional	2011	400	Kerman	Adults	23.8	Persian
29	Saharki *et al*.	Cross-sectional	2011	2300	Zahedan	Adults	27	English
30	Abtahi *et al*.	Cross-sectional	2011	3115	Shiraz	Teachers	18.2	English
31	Namayandeh *et al*.	Cross-sectional	2011	2000	Yazd	Adults	42.5	English
32	Khosh andam *et al*.	Cross-sectional	2011	400	Mazandaran	Drivers	20	Persian
33	Peyman *et al*.	Cross-sectional	2012	121	Ilam	Elderly	36.8	Persian
34	Moeni *et al*.	Cross-sectional	2012	2063	Esfahan	Elderly with heart disease	4	English
35	Ghari poor *et al*.	Cross sectional	2012	975	Esfahan	Adults	18.9	English

(Table 1) contd….

Row	First Authour	Study Design	Year	Sample Size	Setting	Target Population	Prevalence (%)	Language
36	Barikani *et al.*	Cross-sectional	2012	328	Ghazvin	women Adults	32	English
37	Maracy *et al.*	Cross sectional	2012	3000	Esfahan	Adults	22.2	English
38	Rezaiean *et al.*	Cross-sectional	2012	445	Hamadan	Kidney patients	22.2	English
39	Mahram *et al.*	Cross-sectional	2013	5231	Ghazvin	Water-containing arsenic consumer	7	English
40	Mahram *et al.*	Cross-sectional	2013	9838	Ghazvin	Above control group	3.7	English
41	Malek Zadeh *et al.*	Cross-sectional	2013	50045	Gholston	Adults	42.7	English
42	Ahmadi *et al.*	Cohort	2014	2570	Tehran	Patient with rectum cancer	13.4	English
43	Safari Moradabadi *et al.*	Cross sectional	2014	1531	Bandar abas	Adults	35.3	Persian
44	Chraghian *et al.*	Cross sectional	2014	69173	Tehran	Adults	5.3	English
45	Najafi poor *et al.*	Cross sectional	2014	5900		Adults	18.4	English
46	Talayi *et al.*	Cohort	2014	3283	Esfahan	Adults	25.4	English
47	Kalani *et al.*	Cross-sectional	2015	1130	Yazd	Adults	38.1	English
48	Yazdan panah *et al.*	Cross -sectional	2015	944	Ahvaz	Adults	17.6	English
49	Poorolajal *et al.*	Cross -sectional	2015	7611	Tehran	Clinical patients	9.1	English
50	Chraghi *et al.*	Cross- sectional	2016	476	Bahar	elderly	25	Persian
51	Gerayloo *et al.*	Cross-sectional	2016	227	Moraveh tapeh	Employees	8.3	Persian
52	Mojahedi *et al.*	Cross-sectional	2016	3608	Mashad	youngs	1.4	Persian
53	Esteghamati *et al.*	Cross- sectional	2016	8218	national project	Adults	25.6	English
54	Ghaffari *et al.*	Cross -sectional	2016	1071	Tabriz	elderly	68	English
55	Jamshidi *et al.*	Cross -sectional	2017	321	Hamadan	elderly	16.2	English
56	Ebrahimi *et al.*	Cross-sectional	2014	9762	Mashhad	Adults	23	English
57	Khajedaluee *et al.*	Cross-sectional	2016	2974	Mashhad	Adults	22	English
58	Khosravi *et al.*	Cohort	2013	5190	Shahroud	Adults	38.2	English

Table **1**. Selected articles for meta-analysis of hypertension in Iran 2004-2017.

heterogeneity of research methods and the rate of controlling of variables like age and sex in studies.

To study more accurately of the prevalence of HTN in Iran, the trend of prevalence of HTN was assessed from 2004 to 2017. The finding showed nearly a similar trend of prevalence of HTN during periods of 2004-2006, 2007 to 2009, and 2013 to 2017. Through the period from 2010 to 2012, the prevalence of HTN was lower than others. The major source of the low prevalence of HTN in this period of time could be related to the three primary studies [31, 32] that with a very low prevalence of HTN (below th 0.07) which has had a descending impact on the total prevalence of HTN over this period. Two of these three studies were conducted by Mahram *et al.* [31]{Mahram, 2013 #2724}, with population age of 30-60 years-old and the third one conducted by Mojahid *et al.* [32], with young people with the age of 20-29. It seems that the most important factor in reducing the prevalence of HTN in these three studies and subsequently in the period time of 2010 to 2012 was ages of subjects. Because the prevalence of HTN is directly related to age and all the samples studied in these three studies were young and adult. While other studies, in addition to low age groups, included elderly population too. By excluding of these three studies and re-analyzing, the prevalence of HTN was equal to other periods. Assessing the trend of prevalence of HTN shows that, the prevalence of HTN has not diminished versus progress and development in people's lives, and its rate has been roughly the same throughout 2004-2017. in Iran, comparing the results of previous same studies with the result of our study showed that the overall prevalence of HTN is increasing (25% versus 23% and 21%) [14, 15]. the prevalence of HTN in the United States and China was 28% [33] and 27% [34] in 2009 and 2007 which are lower than the recently reported prevalence of 29% [1] and 35/7% [12], respectively.

Considering the trend of prevalence of HTN over periods of years from 2004 to 2017 and increasing of overall prevalence of HTN in recent studies comparing to the past ones, it

Table 2.   Prevalence of HTN based on subgroup.

Variable	Categories	Number of Studies	Sample Size	Prevalence (%)	Confidence Interval 95 %	Hetrogenicity	
						I^2	P
Type of study	Cross sectional	52	898598	26	23-30	99.9	0.0001
	Cohort	5	6374	22	7-21	97.6	0.0001
Language of study	English	28	3510	25	19-29	99.9	0.0001
	Persian	21	362495	24	21-31	99.9	0.0001
Population	Drivers	3	1740	31	19-42	95.3	0.0001
	Patients	4	15081	12	-4)-60)	100	0.0001
	Women	5	1370	26	3-47	99.2	0.0001
	Elderly	6	2510	42	22-62	99.2	0.0001
	Adults	40	904972	24	18-26	99.9	0.0001
Gender	Male	23	404580	24	20-28	99.9	0.0001
	Female	23	383542	25	19-31	99.9	0.0001
Region	Region1	15	200736	24	14-30	100	0.0001
	Region2	15	472301	22	16-36	99.9	0.0001
	Region3	3	3925	33	(-5)-72	99.9	0.0001
	Region4	7	3105	28	15-40	98.9	0.0001
	Region5	11	31104	24	14-33	99.8	0.0001
	Unknown	7	162995	27	23-31	99.9	0.0001

Region 1: Provinces of Tehran, Alborz, Qazvin, Mazandaran, Semnan, Golestan and Qom; Region 2: Isfahan, Fars, Bushehr, Chaharmahal Bakhtiari, Hormozgan and Kohkiloyeh and Boyerahmad provinces; Region 3: East Azarbaijan, West Azarbaijan, Ardebil, Zanjan, Gilan and Kurdistan; District 4: Kermanshah, Ilam, Lorestan, Hamedan, Central and Khuzestan provinces; District 5: Khorasan Razavi, Southern Khorasan, Northern Khorasan, Kerman, Yazd and Sistan and Baluchestan provinces.

can found that with the advancement of technology, treatment, care and disease prevention, over the time, decreasing of the prevalence of HTN has not happened. A possible explanation of this trend of HTN may be related to economic development, urbanization, aging of population, lifestyle changes, bad diet and environmental degradation. In addition, an increase in obesity and overweight, lipid disorders, high salt intake, smoking, sedentary and inadequate lifestyle can also are exacerbating factors [13].

Because of the high heterogeneity in the primary studies, the prevalence of HTN was estimated based on sub-group analysis.

Subgroup analysis results showed that the elderly group has the highest prevalence of HTN (42%) compared to other groups, which is consistent with other studies like the United States with 63.1% [1], previous meta-analysis in Iran with 50% [14], and low- and middle-income countries with 65.6% [12]. The high prevalence of HTN in the elderly can be attributed to various factors such as atherosclerosis and their underlying conditions [35].

After the elderly group, drivers had the most prevalence of HTN. In this case, we can say that half of the drivers are at the pre-hypertensive stage and most of them were over-

weight and obese in Iran [36]. The lack of attention to health issues in this group has led them to suffer from HTN. The cause of overweight in the drivers may be because of the use of restaurant fatty foods and the lack of information on their diet and inactivity with being in more sitting position.

In the present study, the prevalence of HTN in men was slightly higher than women. However, this difference was not statistically significant and is consistent with other studies [12, 30, 33, 37, 38]. The reason for this difference may be that that middle-aged men are prone to cardiovascular disease [12]. Also, in Iran, Men are more likely to work outside the home with a stressful situation compared women and they are less concerned about their self-care, taking antihypertensive medications, and doing exercise, which could lead to an increased prevalence of HTN in them [39]. However, in the United States and the Netherlands, HTN was reported more frequently in women than men [34]. In Yemen, as a low-income country, HTN was slightly higher in women than in men (14.8% versus 14.2%) [40]. Nonetheless, the high prevalence of HTN in women, as compared to men, may be due to a higher BMI, lifestyle and menopause period [41].

The findings showed that the third region (provinces of East Azarbaijan, West Azarbaijan, Ardebil, Zanjan, Gilan
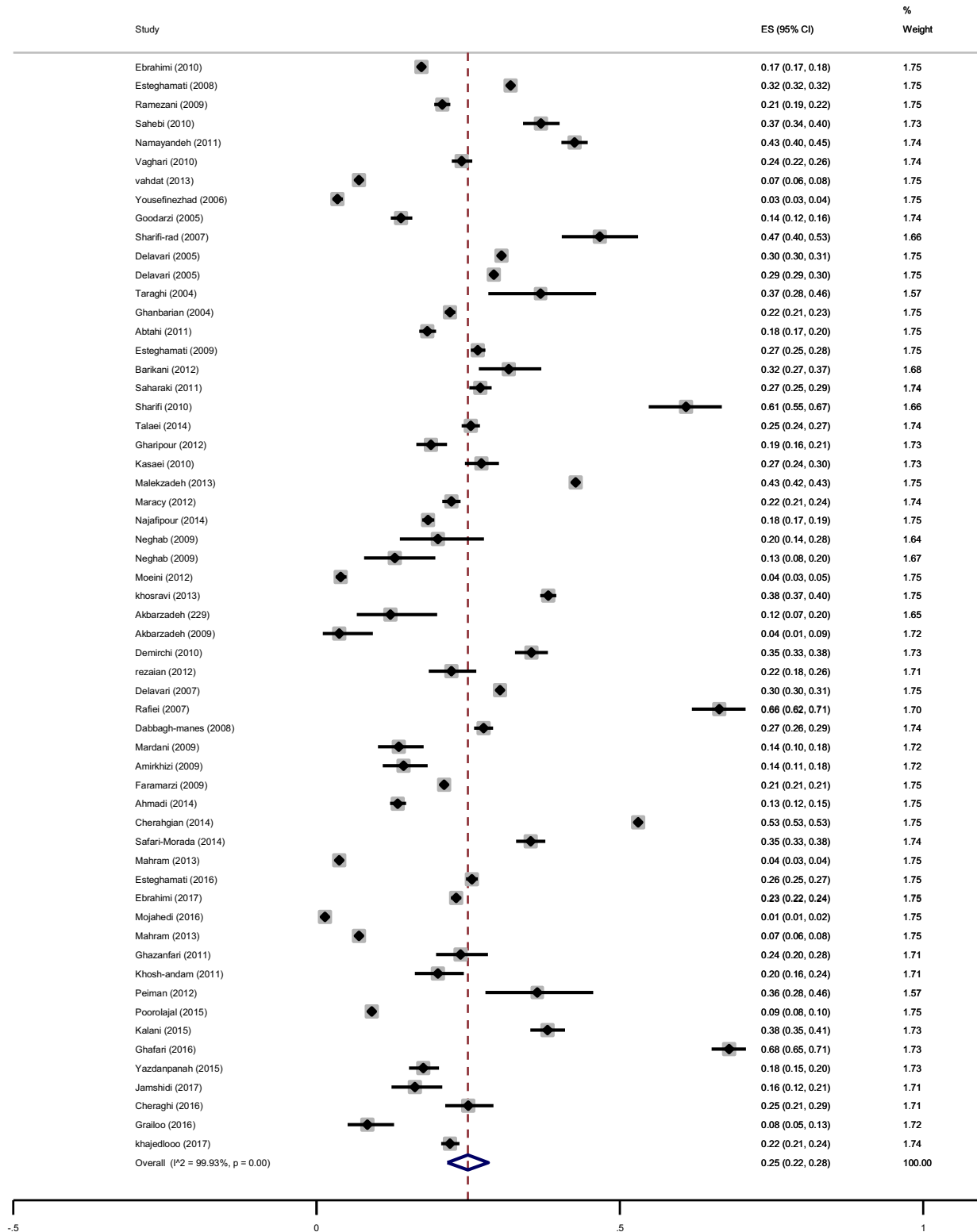
Overall prevalenc of hypertension

Fig. (2). The pooled Prevalence of hypertension based on the studies in Iran. The 95% confidence range for each study is in the form of horizontal lines around the original average. The dotted line in the middle represents the overall prevalence estimates. Diamond shape represents the overall prevalence is assured.

Table 3. Trend of prevalence of hypertension from 2004 to 2017 in Iran.

Years	Number of Studies	Prevalence (%)
2004-2006	14	26
2007-2009	25	26
2010-2012	11	22
2013-2017	8	26
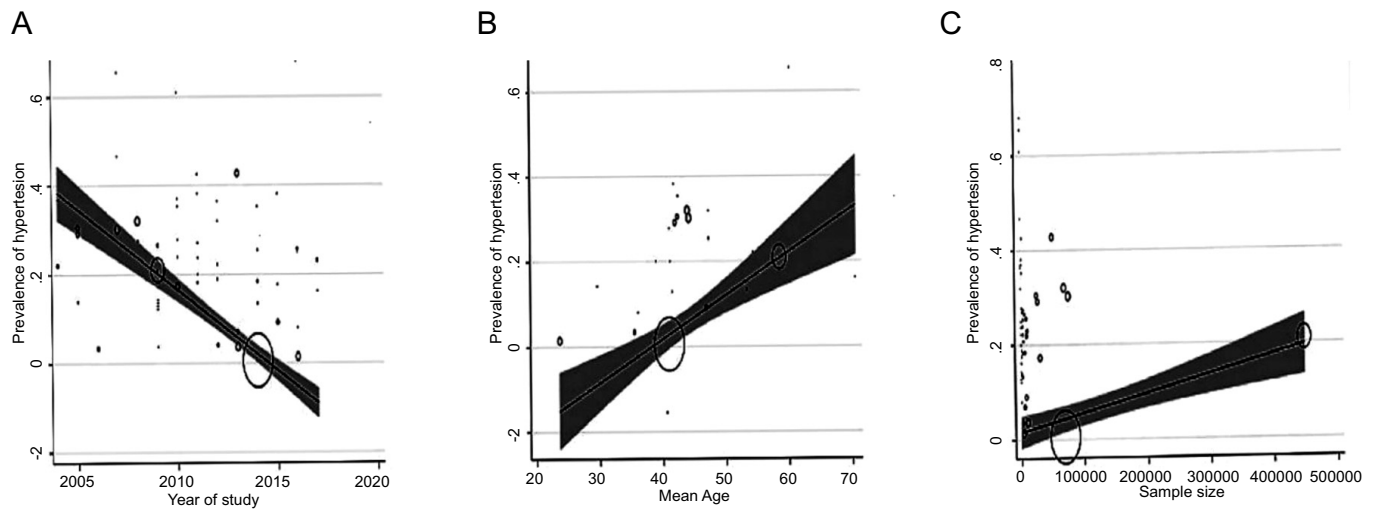
Fig. (3). Meta-regression prevalence of hypertension based on years of study (**A**), age of individuals (**B**), and sample size of studies (**C**).
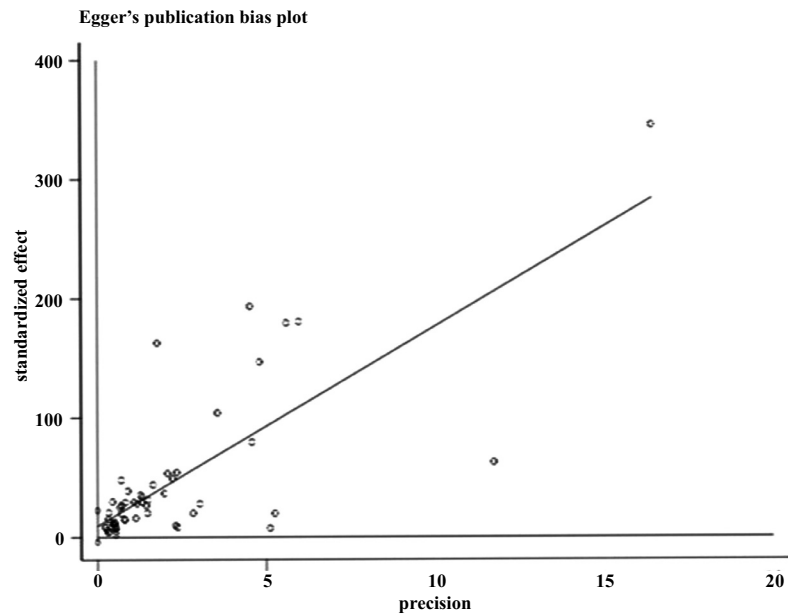

Fig. (4). Bias of publication of the preliminary studies.

and Kurdistan) and the second region (provinces of Tehran, Alborz, Qazvin, Mazandaran, Semnan, Golestan and Qom) have the highest and lowest incidence of HTN, respectively. Results of related studies with regard to the area of residence and size of cities and its relation to the prevalence of HTN indicated that cities with the average size compared to small size, had the highest prevalence of HTN (24.6% versus 20.6%) and large cities also had the lowest prevalence of HTN (18.9%) [42]. A study by Adeloye *et al*. showed that the prevalence of HTN in rural areas was lower than in urban areas (31% versus 26%) [43]. Also in African countries, the prevalence of HTN was even more among urban residents [43]. The higher prevalence of HTN among the third region populations may be due to their different lifestyle patterns.

Factors such as lack of mobility, air pollution, industrial stress, fast food and high fat and high-fat diet could increase the prevalence of HTN in industrial cities compared to semi-industrial cities and rural areas [44]. However, the results of some studies also indicated an increased prevalence of HTN in marginal and rural areas [45]. The possible reason for this could be that, although the rural areas are a stress-free environment for living, a low level of health literacy, less access to health centers, and educational facilities could lead to increased prevalence of HTN. In addition of environmental and lifestyle characteristics which are different in five regions of Iran and could effect on HTN prevalence ratio, also the study characteristics, such as the type of sampling, the age of the population studied, the amount of knowledge and experience of the researchers in the correct guidance of the study could also influence the difference of the prevalence in the different regions.

According to our meta-regression results, the prevalence of HTN in Iran was not significantly different based on year of study and sample size, except age. A study in China showed that, the prevalence of HTN in the years 2011-2007 was nearly similar in the years of 2006-2002 (20.6% *vs.* 21.9%) (13). Also, our meta-regression result indicated that with aging, the prevalence of HTN is increasing significantly, which is in line with previous studies [1, 12, 30].

CONCLUSION

The current prevalence of HTN is high and its trend over time, has been fixed without a reduction in Iran. There were differences in the prevalence of HTN and variables such as age, gender, population. Older adults as compared to other population groups have the highest rate of prevalence. The reasons for not reducing the prevalence of HTN should be investigated and strategies for controlling and reducing it should be planned.

One of the most important limitations of this study was the lack of adequate information reported by some studies. However, the study has strengths of covering more databases and comprehensive reviews made it possible to access the majority of related primary studies.

CONSENT FOR PUBLICATION

Not applicable.

FUNDING

None.

CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

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