Investigating the prevalence rate of hypertension in Iranian men and women: A study of systematic review and meta-analysis

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Abstract

Introduction: Based on the serious complications which are followed, hypertension is a common and asymptomatic health problem. This study aims to present a general statistics of the rate of the prevalence of systolic and diastolic hypertension in Iranian men and women based on the age range through the systematic review and meta-analysis method.

Materials and methods: In this study of systematic review and meta-analysis, some databases such as Google Scholar, Scope.com, Magiran, Iran Medex, Medlib, Sid, and Pubmed were searched by using keywords such as hypertension, men and women, Iran, and prevalence. The first and the last published articles in this field were in 1999 and 2012, respectively. Data were combined by random effects meta-analysis model and they were analyzed by STATA11.

Results: From 100 articles which were found in the searched references, 22 of them were finally analyzed. Among the selected final articles from 1999 to 2012, 96689 subjects were used in this study. The mean prevalence of hypertension was 17% (confidence coefficient of 95%, 17-17%). The prevalence rate of hypertension among the people above 20 was between 10-32% and its mean was 24% (confidence coefficient of 95%, 23-24%). The mean prevalence of hypertension among the people below 20 was 5% (confidence coefficient of 95%, 4-5%).

Conclusion: In the studies done in Iran, the prevalence rate of hypertension was high. Noticing that hypertension is an important and dangerous factor for cardiovascular diseases, it is a worrying issue in Iran and it is necessary to be programmed in order to control and prevent this disease.

Keywords: Hypertension, Men and Women, Iran, Prevalence

Introduction

Hypertension is among the most important controllable risk factors for cardiovascular and renal diseases (1). This disease and its complications can be controlled by enhancing people's knowledge about hypertension and the complications of this disease as well as the proper use of medicines (2). Nowadays, unlike many developments done in the field of diagnosis and treatment of hypertension, this disease is still among the main risk factors of the cardiovascular diseases and is considered as the agent of 20-

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50% of the deaths(3). This is a common and asymptomatic disease which can be easily diagnosed and controlled. But if not controlled, it will lead to many complications and costs (4). This common and asymptomatic disease can be easily treatable if it is diagnosed early (5).

Hypertension is among the threatening causes of health in developing countries (6). Due to today's lifestyle, hypertension is considered as a risk. It is necessary to do screening in the community and train people about nutrition, lifestyle and following-up the treatment in these patients (7). There are some inappropriate patterns of behavior about the nutrition, level of tension and physical activity in people with hypertension which makes it necessary to do inherent educations about the lifestyle and appropriate patterns of behavior (8).

People with hypertension are at the risk of depression and its risk is higher in women than men. (9). The life quality of patients with hypertension is at the lower level than the healthy people (10). and their daily sleepiness rate is high (11). Due to the complications which hypertension have, it is necessary to investigate the cause of its being high and the use of appropriate methods of prevention and treatment. Also, changing consumption patterns and using educational programs can be efficacious to control hypertension (12). The prevalence of hypertension has been reported differently in different parts of Iran. This study aims to present a general statistics about the prevalence rate of systolic and diastolic hypertension in Iranian men and women by age and through systematic review and meta-analysis method.

Materials and methods

Search strategy: This is a meta-analysis study that considers the Prevalence Rate of Hypertension in Iranian Men and Women. The reviewed documents were searched from internet and manual search in the library of Tehran University of Medical Sciences. Databases including Iranmedex, SID, Magiran, Irandoc, Medlib, IranPsych, Science Direct, ISI, PubMed, and Scopus were searched using Internet. The search was limited to 16 recent years updated to 2015 and involved theses, national and international scientific journals, papers presented at congresses and organizational reports.

To gain high sensitivity, the search inside the country was conducted only through keywords of prevalence, hypertension, men, women and Iran because some sites did not show sensitivity to the search operators (OR, AND, NOT). However, international databases were searched through the keywords of ("prevalence", "hypertension", "men","women "and "Iran"). The keywords were standard in MeSH and eventually (Iran AND Hypertension) strategy was used to search. In addition, reference lists of selected articles were evaluated for finding relevant studies.

Study selection: First, a list of titles and abstracts of all searched papers in national databases was prepared by two researchers independently. Then, articles with repetitive titles were excluded. Next, articles' abstracts were reviewed for finding appropriate studies. Study selection in international databases was similar to that of national databases, except that all search studies were saved in EndNotex6 software and the rest of the process was done by the software.

Study inclusion criteria were: (1) All descriptive studies (2) Referring to The Prevalence Rate of Hypertension in Iranian Men and Women (3) Studies conducted in the last 16 years. It should be noted that the minimum entry criteria were used to increase the sensitivity of article selection. But to find the most relevant and highest quality studies, exclusion criteria were as follows: (1) Non-related studies in terms of study method and research topic. (2) Studies which did not have

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enough information. The low quality of studies was assessed through the STROBE (13)checklist (Strengthening the reporting of observational studies in epidemiology). The quality of studies was evaluated using the STROBE checklist. The checklist has 22 sections that cover different parts of a report. Each section was given one point and higher points were given to other sections that we considered more important.

Data extraction: To reduce bias in reporting and error in data collection, two researchers independently extracted data using a standardized data collection form that was already prepared. The form was first designed by the study team and included the following items: The author's name, title of study, year of publication, journal name, study design, inclusion and exclusion criteria, sample size, etc.

Statistical analysis

This study analyzed The Prevalence Rate of Hypertension in Iranian Men and Women so as to estimate the point prevalence at 95% confidence interval. The variance of each study was calculated using the binomial distribution formula and heterogeneity between studies was examined through Cochran Q-test with a significant level of less than 0.1 and an indicator of heterogeneity-attributed changes (I^2). All statistical analyses were conducted through STATA Ver.11 using the command "metan". Significance level of the test was considered to be P>0.05.

Results

Inclusion method summary of studies to the meta-analysis: In the first phase of the search, 52 articles were selected and after reviewing the titles, only 39 relevant articles were identified and included in the second phase which was the evaluation of abstracts. Finally, 22 articles were accepted for inclusion in the meta-analysis (Figure 1). In 50% of the studies, the sample contained more than 1526 subjects .Forest plot indicated that the prevalence rate of hypertension was between 3-32% in 21 studies. The result of studies' combination indicated that the mean prevalence of hypertension was 17% (confidence coefficient of 95%, 17-17%). Due to the heterogeneity of the studies, the confidence interval for each study and for every single study was displayed based on random-effects model in Table 1.

The prevalence rate of hypertension in two groups of people above and below 20, forest plot showed that the prevalence rate of hypertension was 10-32% for people above 20 in 17 studies and the result of the studies' combination showed that the mean prevalence of hypertension was 24% in people above 20 (confidence coefficient of 95%, 23-24%) (Table 2).

Heterogeneity index among the studies was estimated 99.5% for the prevalence rate of hypertension in people above 20 which indicates that the results of studies done in Iran have had a lot of difference. In four studies, the prevalence rate of hypertension was 3-7% for people below 20 and the result of the studies' combination indicated that the mean prevalence rate of hypertension was 5% in people below 20 (confidence coefficient of 95%, 4-5%). Heterogeneity index among the studies was estimated 92.4% for the prevalence rate of hypertension in people below 20 which indicates that the studies' results have had a lot of difference (Figure 2).

General prevalence of systolic hypertension in different studies was 7-26% and its mean was 12% (confidence coefficient of 95%, 11-12%). The prevalence of systolic hypertension in people above 20 was 10-26% and its mean was 13% (confidence coefficient of 95%, 12-14%). Also, in one study, this prevalence in people below 20 was 7% (confidence coefficient of 95%, 6-9%) (Table1).

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General prevalence of diastolic hypertension in different studies was 1-32% and its mean was 4% (confidence coefficient of 95%, 4-4%). The prevalence of diastolic hypertension in people above20 was 7-32% and its mean was 10% (confidence coefficient of 95%, 10-11%). Also, in one study, this prevalence in people below 20 was 1% (confidence coefficient of 95%, 0-1%) (Table1).

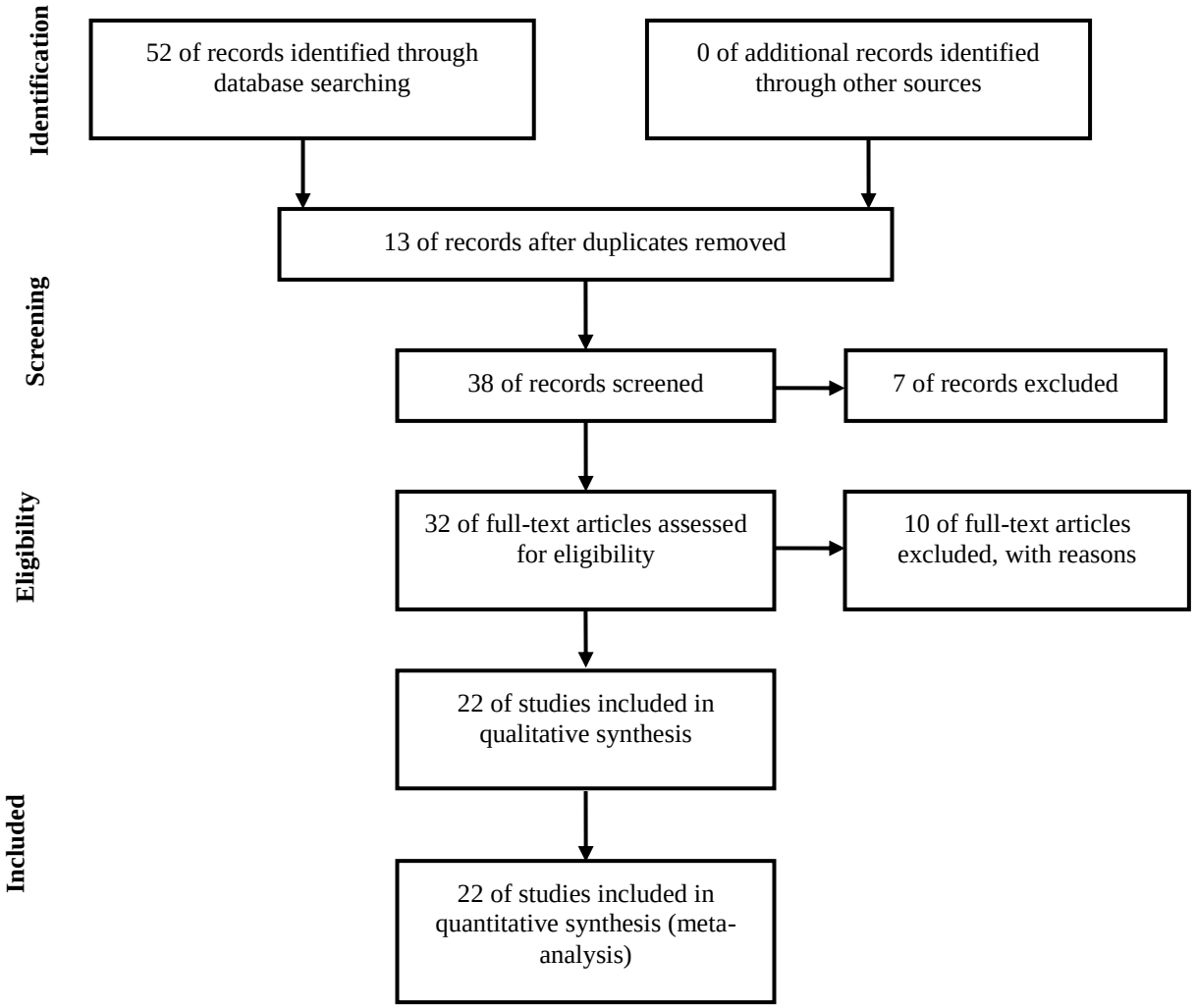


Figure 1. Flowchart of inclusion of studies to the systematic review and meta-analysis.

Table 1. Studies for meta-analysis general characteristics of selected.

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ID	Author	Year	City	Prevalence	Sample size
(14)	Fakhrzadeh	2012	Tehran	32.5	1573
(15)	Marasi	2012	Esfahan	22.2	3000
(16)	Moradmand	2011	Tehran	3.4	2040
(17)	Sharifi	2009	Kahrizak	61.9	268
(7)	Godarzi	2004	Zabol	13.9	1530
(18)	Ghorbani	2008	Semnan	24.4	3799
(19)	Delavari	2007	Mazandaran	30.4	48961
(2)	Behforoz	2008	Rafsanjan	23.3	2000
(20)	Salem	2009	Rafsanjan	10.2	1221
(21)	Beygzadeh	2009	Jahrom	26.5	1374
(12)	Mehr ali zadeh	2010	Semnan	6.7	2125
(22)	Zardast	2012	Birjand	7.4	1521
(23)	Sadeghi	2003	Ghazvin	17.2	12494
(24)	Zare	2008	Babol	17.4	277
(25)	Keshavarzi	2011	Gonabad	10.8	3997
(4)	Pezhhan	2008	Sabzevar	21.5	596
(26)	Bashardost	2006	Ardebil	64.9	80
(27)	Koushki	2005	Sabzevar	29.3	92
(28)	Chaman	2008	Shahrood	18.4	1500
(29)	Ataei	2007	---	0.8	6038
(30)	Javadi	1999	Ghazvin	22.4	1000
(31)	Khani	2002	Tarem	12.3	1500

Table 2. Prevalence rate of hypertension according to the age group in men and women.

Hypertension	Number of studies	Prevalence rate: (CI 95%)	Heterogeneity rate (P-value)	Heterogeneity rate (I^2)
Men above 20 years	7	25% (25-26%)	0.000	99.3
Men below 20 years	3	4% (4-5%)	0.016	75.9
Women above 20 years	7	27% (15-35%)	0.000	99
Women below 20 years	3	6% (5-6%)	0.048	67.1
General prevalence of systolic hypertension	5	12% (11-12%)	0.000	98.3
Systolic hypertension in people above 20 years	4	13% (10-26%)	0.000	98.4
Systolic hypertension in people below 20 years	1	7% (6-9%)	---	---
General prevalence of diastolic hypertension	5	4% (4-4%)	0.000	99.6
Diastolic hypertension in people above 20 years	4	10% (10-11%)	0.000	99.3
Diastolic hypertension in people below 20 years	1	1% (0-1%)	---	---

In meta-regression analysis of the prevalence rate of hypertension according to the sample size, it was indicated that in studies with greater samples, the prevalence rate of hypertension was higher. This increase was statistically significant (P= 0.000) (Figure 3).

Meta-regression analysis diagram of the hypertension prevalence in terms of year indicated that the prevalence rate of hypertension has had a decreasing process during 1999-2012. But this decrease has not been statistically significant (P=0.611) (Figure 4).

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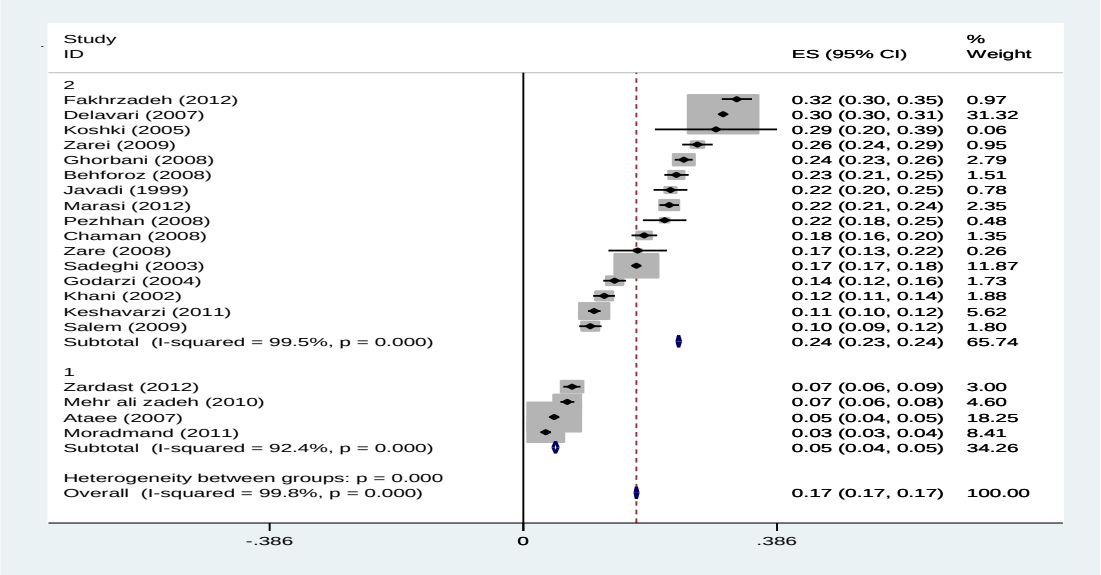


Figure 2. Forest plot of the prevalence rate of hypertension in two groups of people above and below 20. Length of line segments indicates the confidence coefficient of 95% of each study and a diamond shape indicates the result of all studies' combination.

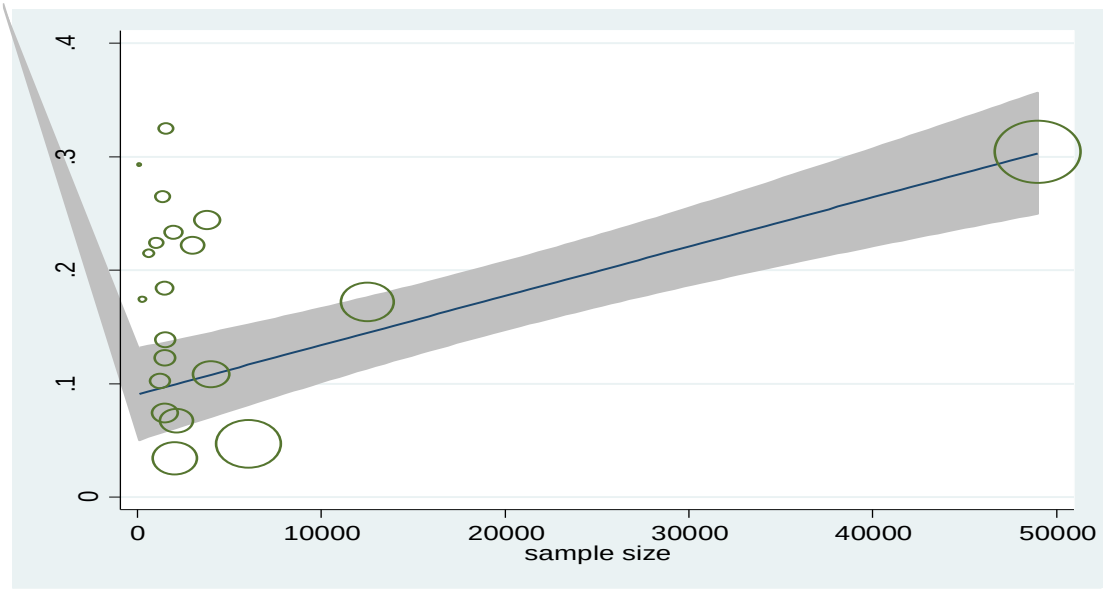


Figure 3. Meta-regression diagram of the prevalence rate of hypertension in terms of sample size, each of circles indicates the sample size and bigger and smaller circles indicate greater and smaller statistical populations, respectively.

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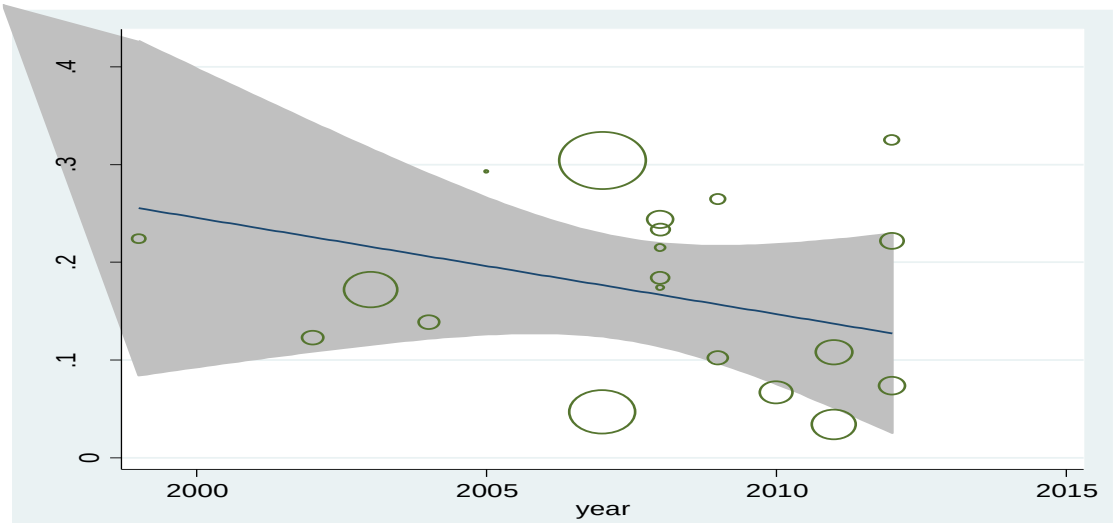


Figure 4. Meta-regression diagram of the prevalence rate of hypertension in terms of year, each of circles indicates the sample size and bigger and smaller circles indicate greater and smaller statistical populations, respectively.

Discussion

The existence of various and dispersed studies in Iran's different universities has led this study to be conducted for the first time in Iran. This study aimed to determine the prevalence of systolic and diastolic hypertension in Iranian men and women by age and through systematic review and meta-analysis.

The obtained results of this systematic review indicated that, in the studies done in Iran, the prevalence rate of hypertension is 17% which this rate is 24% in people above 20 and its prevalence rate is more than people below 20 which is 5%. Due to the fact that hypertension has been recognized as an important risk factor for the cardiovascular patients, this disease is a worrying issue in Iran. In the study of Pazhohan et al. which was done on the population above 18 in Sabzevar, the prevalence of systolic and diastolic hypertension was 21.5% and 25.8%, respectively which this result was significantly more in women than men.Also, this prevalence in people above 55 was reported 69.5% and 54%, respectively (4).The prevalence rate of hypertension of this study was more than our findings. In our study, the prevalence rates of hypertension in people above and below 20 were 25% and 5%, respectively. Moreover, according to the present study's findings, the prevalence of systolic hypertension was 12% and in people above and below 20, it was 13% and 7%, respectively. The prevalence of diastolic hypertension was 4% and in people above and below 20, it was 10% and 1%, respectively. In Zinat's study, the prevalence of systolic and diastolic hypertension in girls was 10.2% and 9.2%, respectively and it was higher in people with an abnormal weight (20). Ghorbani et al., who had done a stud on the adult population of Semnan province, reported the hypertension prevalence of 24.1% and 24.7% for men and women, respectively. In our study, hypertension in the men above and below 20 was 25% and 4%, respectively. Also, it was 27% and 6% in the women above and below 20. The hypertension prevalence in urban and rural areas was 24.1% and 24.8%, respectively. There has been a lack of knowledge and control about hypertension, and in 90% of

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cases, this disease has been at least associated with one risk factor for the cardiovascular patients. Prevention, diagnosis and treatment of this disease must be seriously considered (18).In the study of Behfrooz et al. which was done on people above 18 in Rafsanjan, the prevalence rate of hypertension was 23.3% (2). In the study of Sadeghi et al, the hypertension prevalence in men and women was 15.6% and 18.8%, respectively and it was more in women than men in all ages except people below 25 (23). In our study, the hypertension prevalence was higher in women than men. Marasi et al. estimated the general prevalence of hypertension as 22.2% among the population of Esfahan province where its rate was higher in women than men (15). The prevalence rate of hypertension was 31% in Golestan province (32). In the study of Vaghari et al. which was done on the population of Golestan province only 48.7% of people were aware of their disease, unlike 23.9% prevalence of hypertension. The knowledge of women was more than men (33).In their study, Godarzi et al. indicated that there was a significant relationship between fatness and overweight and hypertension (7). Fatness and overweight are two risk factors which have high prevalence in people with hypertension (34). There is a significant relationship between hypertension and body mass index (BMI), and weight control is an important part in controlling hypertension (35).

In the study of Barogh et al., it was indicated that lifestyle such as exercise and physical activity, smoking and fatness is an effective factor on hypertension and the lifestyle of these people is different from the healthy ones (36). The variables related to lifestyle are among the main causes of hypertension which appropriate actions must be done by education and prevention about the healthy lifestyle (15). Hypertension can be early prevented by balancing BMI, having healthy nutritive patterns such as having breakfast and wholemeal bread, and not drinking carbonated and caffeinated beverages (37). The most causes of un-controlling hypertension in the adult were not having knowledge and proper performance about the diet, not following-up medicinal treatment regularly, smoking and stress (6).

Conclusion

According to the findings of this study, the prevalence rate of hypertension in Iran is high (17%). Due to the consequences and negative effects which follow hypertension, it is necessary to be programmed in order to control and prevent this disease. The prevalence rate of hypertension has had a decreasing process during 1999-2012 but it has not been statistically significant. Due to the hypertension process in Iran, more effective policies and programs must be conducted to decrease this disease in this country.

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