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Review Article

Meta-analysis of the association between marital status and hypertension: evaluating the impact of age and gender

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Abstract: Objectives: Hypertension is a risk factor for cardiovascular diseases and is more prevalent in the elderly. Due to the aging population, it is crucial to know the risk factors of hypertension to prevent it and its complications. One potential risk factor is marital status; therefore, this study investigates the impact of marital status on hypertension risk, considering the variables of gender and age. Methods: A comprehensive search was conducted in PubMed, Scopus, and Google Scholar until August 27, 2023. Study selection and data extraction were performed precisely. The pooled effect size for various marital status, age, and gender subgroups was calculated. Results: The overall effect size of the association between marital status and HTN was 32.01 (95% CI = [38.93, 35.09]). Single, married, divorced, and widowed subgroups showed an effect size of 17.67 (95% CI = [19.23, 19.12]), 54.89 (45.05, 64,13]), 16.11 (95% CI = [14.00, 18.23]), and 27.46 (95% CI = [23.63, 31.29]), respectively. The analysis based on age revealed an effect size of 0.52 (95% CI = [0.38, 0.65]) and 0.38 (95% CI = [0.24, 0.52]). For those aged above 40 and below 40, respectively. Finally, males and females were associated with HTN, with effect sizes of 0.38 (95% CI = [0.33, 0.43]) and 0.45 (95% CI = [0.39, 0.51]), respectively. Conclusion: Our findings revealed that married and divorced status is associated with the highest and the lowest incidence of hypertension, respectively. In terms of gender and age, males aged < 40 were related to lower hypertension risk compared to females and those aged ≥ 40. However, more extensive cohort studies are needed to further support our findings.

Keywords: Hypertension, HTN, marital status, age, gender, meta-analysis

Introduction

Elevated blood pressure (BP) is a prominent risk for CVD, which is foremost in causing mortality and morbidity [1]. Around 54% of stroke incidents and 47% of instances of coronary heart disease worldwide can be ascribed to elevated BP [2, 3]. This condition, known as hypertension (HTN), is a prevalent condition that demonstrates an augmented occurrence with advancing age, affecting approximately 65% of individuals above 60; conversely, by 2030, about 20% of the worldwide population will be above 65 [4, 5]. Many factors affect HTN

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development and prognosis. Marital status is one of the potential factors linked to HTN, and research findings on this relationship have displayed inconclusive results.

There is widespread consensus regarding the connection between marital status and the risk of all causes of mortality and the development of many chronic illnesses, especially CVDs [6-9]. A range of investigations have explored the correlations between marital status and other CVDs, such as HTN; however, a divergence of viewpoints exists regarding the outcomes they have obtained. Some studies yielded results demonstrating the absence of a strong association between marital status and HTN [10]. On the other hand, numerous investigations have provided evidence indicating that the marital status of an individual and its quality have a crucial influence on the onset and progression of cardiovascular diseases [11, 12]. Furthermore, certain studies have revealed that the impact of marital status on these diseases manifests divergent patterns among men and women [13-15] and across varying age groups [16, 17].

There could be several reasons for the possible effect of marital status on BP and hypertension risk. Emotional and social support provided by marriage may encourage healthier behaviors, higher compliance with treatment, and reduced stress - all of which may lower blood pressure, according to the study. On the other hand, marital or partner strain or lack of partner can lead to psychosocial distress, maladaptive coping, and negative neuroendocrine responses that might elevate hypertension risk [18, 19]. Notably, the effects of marital status may vary by gender and age. For example, younger males may be more advantaged by the protective functions of marriage (e.g. reduced risky behaviours) and older females may be more susceptible to widowhood and its consequent stressors [15, 20]. Similarly, divorced people may have greater psychological/financial stress, which has been linked to higher BP in many reports [21]. These distinctions underscore the need to incorporate gender and age in the evaluation of the relationship between marital status and hypertension.

Due to the heterogeneity and lack of disagreement observed across previous studies, comprehending the influence of marital status on HTN and its associated health ramifications remains a complex challenge despite the substantial volume of research conducted in this area. To the best of our knowledge, this systematic review is the pioneer in examining the connections between various marital statuses (married, never married, widowed, and divorced) and the occurrence of HTN. Indeed, this study thoughtfully incorporates age and gender variables, thereby adding more scientific credibility to our investigation.

Method

This systematic review and meta-analysis seeks to elucidate the influence of married status on hypertension, taking into account the effects of age and gender. Our technique adheres to the PRISMA criteria (Preferred Reporting Items for Systematic Reviews and Meta-analyses). The protocol for this study was registered on the Open Science Framework.

Literature search

We performed a systematic search of PubMed, Scopus, and Google Scholar through August 27, 2023 using combined control vocabulary and free-text terms for marital status (e.g., married, single/never married, widowed, divorced), and hypertension (e.g., hypertension, high blood pressure). Due to reviewer requests, we incorporated age modifiers (e.g., age, young adult, middle-aged, older/elderly) and gender/sex modifiers (e.g., male, female, men, women) as explicitly as possible into the search logic. Details of the database-specific strings and retrieval dates can be found in **Table 1**. There were no limits on publication date or language. Reference list searching in the included studies was also performed to help identify additional records.

Eligibility criteria

Inclusion criteria: Eligible studies had to fulfill all of the following: (1) Population: Adults (≥ 18 years) with stated marital status (e.g., married, single/never married, widowed, divorced). (2) Outcome: Hypertension, as documented by physician diagnosis, medical record, self-report, or standardized clinic measure (e.g., SBP ≥ 140 mmHg and/or DBP ≥ 90 mmHg). (3) Data extraction: Reports including quantitative measures of association (odds ratio, risk ratio, haz-

Table 1. Search strategy for current systematic review and meta-analysis

Database	Search strategy	Result	Date
PubMed	((“Marital Status”[Mesh]) OR (spouse*[Title/Abstract]) OR (widow*[Title/Abstract]) OR (Divorce*[Title/Abstract])) AND ((“Hypertension”[Mesh]) OR (High blood pressure*[Title/Abstract])) AND ((“Cardiovascular Disease*”[Mesh]) OR (myocardial infarction*[Title/Abstract]) OR (heart disease*[Title/Abstract]) OR (heart failure[Title/Abstract]) OR (cardiac events[Title/Abstract]) OR (cardiac[Title/Abstract]))	475	2023/08/27
Google Scholar	(Marital Status OR divorced OR spouse OR widow) AND (Hypertension or high blood pressure) AND (Cardiovascular Diseases OR myocardial infarction OR heart disease OR heart failure OR cardiac events OR cardiac)	102	2023/08/27
SCOPUS	(TITLE-ABS-KEY (marital AND status) AND TITLE-ABS-KEY (hypertension) AND TITLE-ABS-KEY (cardiovascular AND diseases))	532	2023/08/26

ard ratio, or prevalence data) between marital status and hypertension or containing raw data were included. (4) Stratification: Articles that presented or enabled the results to be extracted stratified by age and/or sex, or adjusted for these in their multivariable analysis.

Exclusion criteria: (1) Review, meta-analysis, case reports, conference abstracts, editorial, commentaries. (2) Studies in which hypertension was not clearly defined or marital status was not an exposure category. (3) Inclusion criteria: Articles involving only the pediatric population (< 18 years). (4) Multiple publications using the same cohort (in which case the largest or most recent publication was chosen). (5) Records with insufficient information for data extraction or meta-analysis.

Data extraction and study quality assessment

Two independent evaluators assessed the title and abstract of each article to ascertain its eligibility for inclusion in this meta-analysis. Studies that failed to meet our criteria were excluded. The complete texts of the remaining research were reviewed, and qualifying studies proceeded to the data extraction phase. The subsequent components were acquired for extraction in four sets: 1. research attributes (i.e., authorship, geographical area, publication year, and research design), 2. patient-specific variables (i.e., age, sex, marital status), 3. outcomes (i.e., hypertension). Two reviewers employed the critical appraisal checklists for cohort, case-control, and analytical cross-sectional studies created by the Joanna Briggs Institute (JBI) (https://jbi.global/critical-appraisal-tools). A third author was included in the process to address any discrepancies.

Statistical analysis

Stata version 13.1 (StataCorp, College Station, TX, USA) was used to perform all analyses. Odds ratios (ORs) with 95% confidence intervals (CIs) for the association between marital status (married, single, divorced, widowed) and hypertension were extracted or calculated for each eligible study. Effect sizes were then obtained if prevalence was reported in raw form in studies. When multiple estimates were present, the most adjusted model was selected. Pooled estimates were derived using a random-effects model (DerSimonian-Laird method) owing to the expected between-study heterogeneity. The degree of heterogeneity was assessed using Cochran's Q test and measured by the I^2 statistic; we considered $I^2 > 50\%$ to indicate significant heterogeneity.

Subgroup analyses were performed: (1) According to marriage status (married, single, divorced, widowed); (2) By age group (< 40 years/Greater than or equal to 40 years); (3) By gender (male vs female).

All subgroup estimates were reported as pooled estimates and 95% CIs.

Sensitivity analysis was performed, where one study was removed at a time (leave-one-out method) to examine the stability of the results. Publication bias was explored by both Egger's regression test and inspection of funnel plots. Where Egger's test indicated possible bias (e.g., in divorced, single, and widowed subgroups), we also assessed funnel plot asymmetry. All *p*-values were two-sided, and $P < 0.05$ was considered statistically significant.

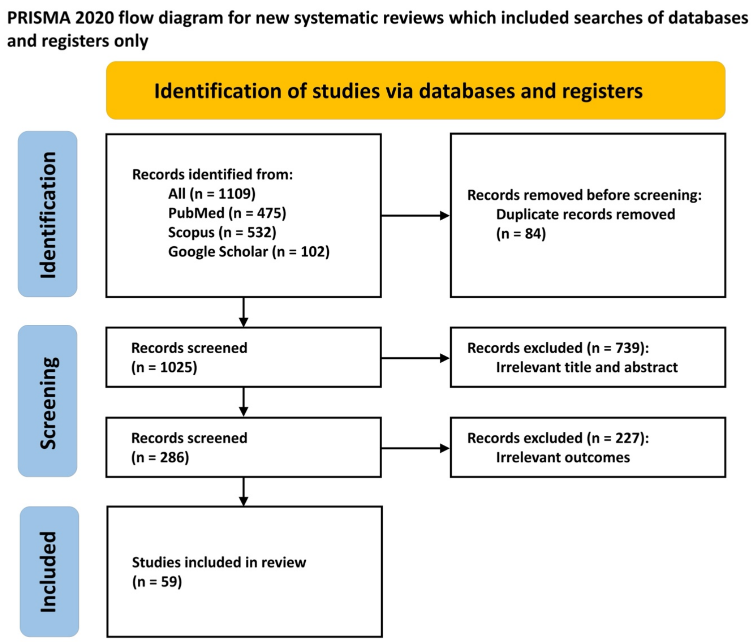

Figure 1. Flowchart of literature inclusion following PRISMA guidelines. After a thorough database search (PubMed, Scopus, Google Scholar), 1,109 articles were identified. After removing 84 duplicates, 1,025 articles were screened based on their titles and abstracts. This screening process resulted in 286 studies from which unrelated articles were subsequently excluded. After a detailed review of the full texts, 59 articles were selected for inclusion in the study.

Result

Study selection

In this meta-analysis review paper, 1109 articles from PubMed, Scopus, and Google Scholar databases have been selected for review. After eliminating duplicate papers and deleting articles that were not relevant based on their title and abstracts, a total of 286 papers were selected for full-text assessment. Finally, 59 articles have been selected for inclusion in this study (**Figure 1**).

Study characteristic

This study reports the effect of marital status on HTN from 59 studies with a population of 1,688,914, and 51.9 percent females were included in the study. The baseline characteristics of the participants are presented in **Table 2**. Information was obtained from cross-sectional, cohort, and randomized control trials. The analysis spans the period from the paper's publication in 1985 to 2023. The research was conducted in 25 nations, with China leading with eight published studies, followed by India with five, the USA with four, and Korea, Ethiopia, and Japan each with three. The rest of the countries are listed in **Table 2**.

Association of marital status and HTN

The relationship between marital status and HTN was analyzed in this meta-analysis. A total of 49. 51, 26, and 24 studies provided the information for single, married, divorced, and widowed individuals, respectively. Generally, the effect size of the association between marital status and HTN was 32.01 (95% CI = [38.93, 35.09]). Single persons showed an effect size of 17.67 (95% CI = [19.23, 19.12]). However, the married individuals demonstrated an effect size of 54.89 (95% CI = [45.05, 64.13]). Divorced and widowed status were associated with HTN with an effect size of 16.11 (95% CI = [14.00, 18.23]) and 27.46 (95% CI = [23.63, 31.29]), respectively (**Figure 2**). The heterogenicity of the study is considered severe, with $I^2 > 99\%$. Nevertheless, all relations were statistically significant ($P < 0.001$).

Association of age and HTN

A total of 21 studies, including 748,453 participants, reported the age relation of HTN with the age. The pooled analysis revealed an overall effect size of 0.45 (95% CI = [0.35, 0.54]). The subgroup analysis for the age above 40 showed an effect size of 0.52 (95% CI = [0.38, 0.65]). Moreover, the effect size for ages below 40 was 0.38 (95% CI = [0.24, 0.52]). The relationship between age and HTN was significant, with a *P*-value < 0.01. However, the studies displayed a severe heterogeneity with $I^2 > 99\%$ (**Figure 3**).

Association of gender and HTN

The analysis of 46 studies' data showed a significant association between gender and risk of

Table 2. Baseline characteristic of included studies

Authors	Year	Study Design	Population	Country	Married	Divorced	Widowed	Single	Female %	Outcome
Li et al. [37]	2019	Cross-Sectional	7178	China	6825	Not mentioned	Not mentioned	353	54.60%	Hypertension
Lebuso et al. [23]	2022	cross-sectional	3353	Lesotho	1758	49	253	1083	100%	Hypertension
Kim et al. [38]	2017	Cohort	980	South Korea	780	Not mentioned	Not mentioned	200	13%	Hypertension
Ke et al. [39]	2014	Cross-Sectional	1410	China	1085 (77%)	Not mentioned	Not mentioned	325 (23%)	56%	Hypertension
Kavishe et al. [40]	2015	Cross-Sectional	2011	Tanzania Uganda	1027	351 (D&W)	351 (D&W)	453	56.40%	Hypertension
Kanungo et al. [41]	2016	Cross-Sectional	18028	Bangal	13972	1919	Not mentioned	2126	63.40%	Hypertension
Ghanbari et al. [42]	2018	cross-sectional	750	Iran	579	Not mentioned	Not mentioned	171	56.10%	Hypertension
Freitas et al. [43]	2001	Cross-Sectional	688	Brazil	454	57	86	85	58.40%	Hypertension
Ferreiral et al. [44]	2009	Cross-sectional	54369	Brazil	Not mentioned	Not mentioned	Not mentioned	Not mentioned	53.90%	Hypertension
Devassy et al. [33]	2020	Cross-sectional	997	UK	824	55	55 with D	18	63.30%	Hypertension
Chuka et al. [36]	2020	Cross-sectional	3346	Ethiopia	2941	Not mentioned	Not Mentioned	405	49.90%	Hypertension
Causland et al. [19]	2014	RCT	325	USA	159	Not mentioned	Not mentioned	166	47.10%	Hypertension
Asfaw et al. [34]	2018	Cross-Sectional	524	Ethiopia	192	106	31	195	47.10%	Hypertension
Abu-Saad et al. [45]	2013	Cross-Sectional	763	Israel	633	Not mentioned	38	81	49.30%	Hypertension
Leung et al. [46]	2019	Cross-Sectional	13407	Canada	8733	Not mentioned	Not mentioned	4674	48.30%	Hypertension
wang et al. [47]	2023	Cross-Sectional	24309	China	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Hypertension
Tsuji et al. [48]	2018	Cohort	8815	Japan	2249	Not mentioned	Not mentioned	218	58.30%	Hypertension
Tian et al. [49]	2022	Cross-Sectional	4593	China	Not mentioned	Not mentioned	501	4092	50.70%	Hypertension
Tadewos et al. [50]	2017	Cross-Sectional	238	Ethiopia	214	6	6 with D	18	Not mentioned	Hypertension
Son et al. [32]	2022	Cross-Sectional	210413	South Korea	182631	5002	14135	4210	64%	Hypertension
Smits et al. [51]	2022	Cross-Sectional	361819	Netherlands	1688285	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Hypertension
Singh et al. [52]	2018	Cross-sectional	16636	India	12671	99	1813	2053	62.30%	Hypertension
Sibai et al. [9]	2007	Cohort	1567	Lebanon	1154	326	326 with D	87	56%	Hypertension
Segawa et al. [12]	2021	Cross-Sectional	1909	Bhutan	1545	216	216 with D	148	60.90%	Hypertension
Roy Lu et al. [53]	2016	Cohort	611	USA	152	Not mentioned	Not mentioned	459	47%	Hypertension
Ren et al. [54]	2022	Cross-Sectional	6846	China	6117	Not mentioned	Not mentioned	32	49.40%	Hypertension
Ramezankhani et al. [11]	2019	Cohort	9737	Iran	4153	46	46 with D	213	55%	Hypertension
Phaswana-Mafuya et al. [55]	2013	Cross-Sectional	3840	South Africa	2007	230	1020	512	55.90%	Hypertension
Perkins et al. [56]	2016	Cross-Sectional	9615	India	5586	Not mentioned	3585	Not mentioned	53.80%	Hypertension
Olack et al. [57]	2016	Cross-Sectional	1528	Kenya	1205	126	133	64	58%	Hypertension
Nyuyki et al. [58]	2017	Cross-Sectional	1337	Cameroon	1097	141	Not mentioned	99	68.20%	Hypertension
Nilsson et al. [59]	2008	Cohort	22444	Sweden	15710	Not mentioned	Not mentioned	6734	0%	Hypertension
Ni et al. [60]	2021	Cross-Sectional	124007	China	119314	565	3623	505	55.90%	Hypertension
Moussouni et al. [31]	2022	Cross-Sectional	6765	Algeria	4681	203	237	1644	56.10%	Hypertension
Momin et al. [61]	2017	Cross-Sectional	1493	India	1342	30	30 with D	121	21.20%	Hypertension
Mohanty et al. [25]	2021	Cross-Sectional	64427	India	49427	Not mentioned	12857	1938	57.90%	Hypertension
Marcus et al. [62]	2019	Cross-Sectional	7233	Israel	5643	Not mentioned	Not mentioned	1590	23.10%	Hypertension
Luoto et al. [63]	1994	Cohort	4346	Finland	3485	217	130	514	82%	Hypertension

Lindegard et al. [64]	1985	Cross-Sectional	34334	Sweden	27596	3047	Not mentioned	3691	0%	Hypertension
Marbaniang et al. [24]	2022	Cross-Sectional	112062	India	112062	Not mentioned	Not mentioned	Not mentioned	88%	Hypertension
Lim et al. [65]	2016	Cross-Sectional	53829	South Korea	Not mentioned	Not mentioned	Not mentioned	Not mentioned	25.20%	Hypertension
Li et al. [20]	2021	Cross-Sectional	13088	China	11953	427	Not mentioned	708	51%	Hypertension
Hosseini et al. [21]	2021	Cross-Sectional	28238	Canada	19617	3652	2565	2404	50.60%	Hypertension
Fukuda et al. [66]	2013	Cross-Sectional	6326	Japan	5428	Not mentioned	Not mentioned	898	57.90%	Hypertension
Fan et al. [67]	2109	Cohort	357	China	306	Not mentioned	Not mentioned	51	64.10%	Hypertension
Desormais et al. [68]	2019	Cohort	1777	Benin	1336	228	228 with D	213	60.90%	Hypertension
Dev et al.	2022	Cross-Sectional	33106	Asian countries	33106	23371	Not mentioned	3083	57.50%	Hypertension
Empanaa et al.	2008				848	Not mentioned	Not mentioned	3194		Hypertension
Erem et al. [69]	2008	Cross-Sectional	4809	Turkey	3737	Not mentioned	246	826	54%	Hypertension
Kamon et al. [13]	2008	Cohort	1582	Japan	1419	Not mentioned	Not mentioned	163	0%	Hypertension
Batubenga et al. [70]	2015	Cross-Sectional	251	South Africa	251	75	75 with D	33	63.80%	Hypertension
Chobufo et al. [71]	2020	Cohort	5569	USA	Not mentioned	Not mentioned	Not mentioned	Not mentioned	52%	Hypertension
Cubbin et al. [72]	2006	Cross-Sectional	380552	USA						Hypertension
Hee Ann et al. [30]	2022	Cross-Sectional	10581	South Korea	8481	183	310	807	Not mentioned	Hypertension
Tuoyire et al. [15]	2019	Cross-Sectional	13730	Ghana	5834	1211	1211 with D	4942	68.10%	Hypertension
Wei et al. [35]	2022	Cohort	19912	China	Not mentioned	Not mentioned	Not mentioned	1210	Not mentioned	Hypertension

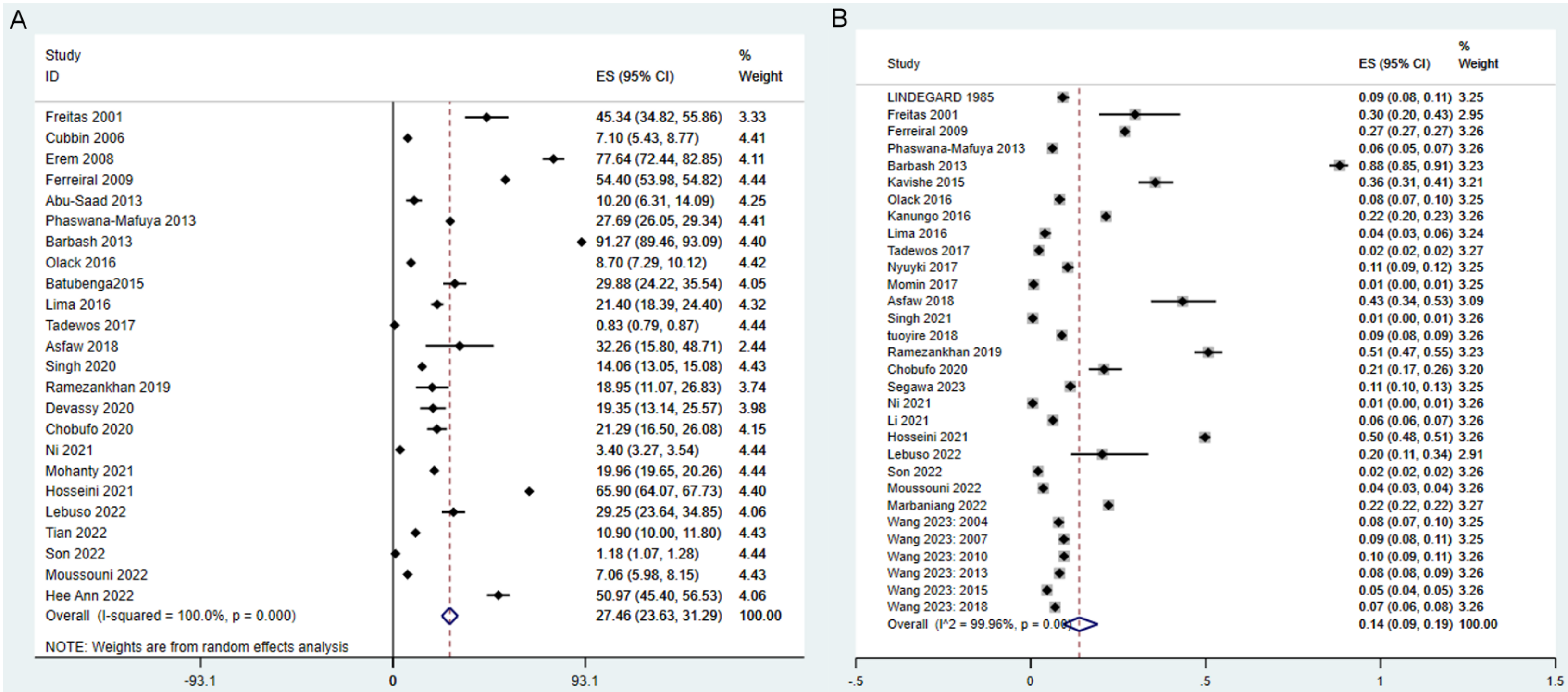

Figure 2. Forest plot for the association of marital status and HTN. (A) divorce status with an effect size of 16.11 (95% CI = [14.00, 18.23]), and (B) widowed status with an effect size of 27.46 (95% CI = [23.63, 31.29]).

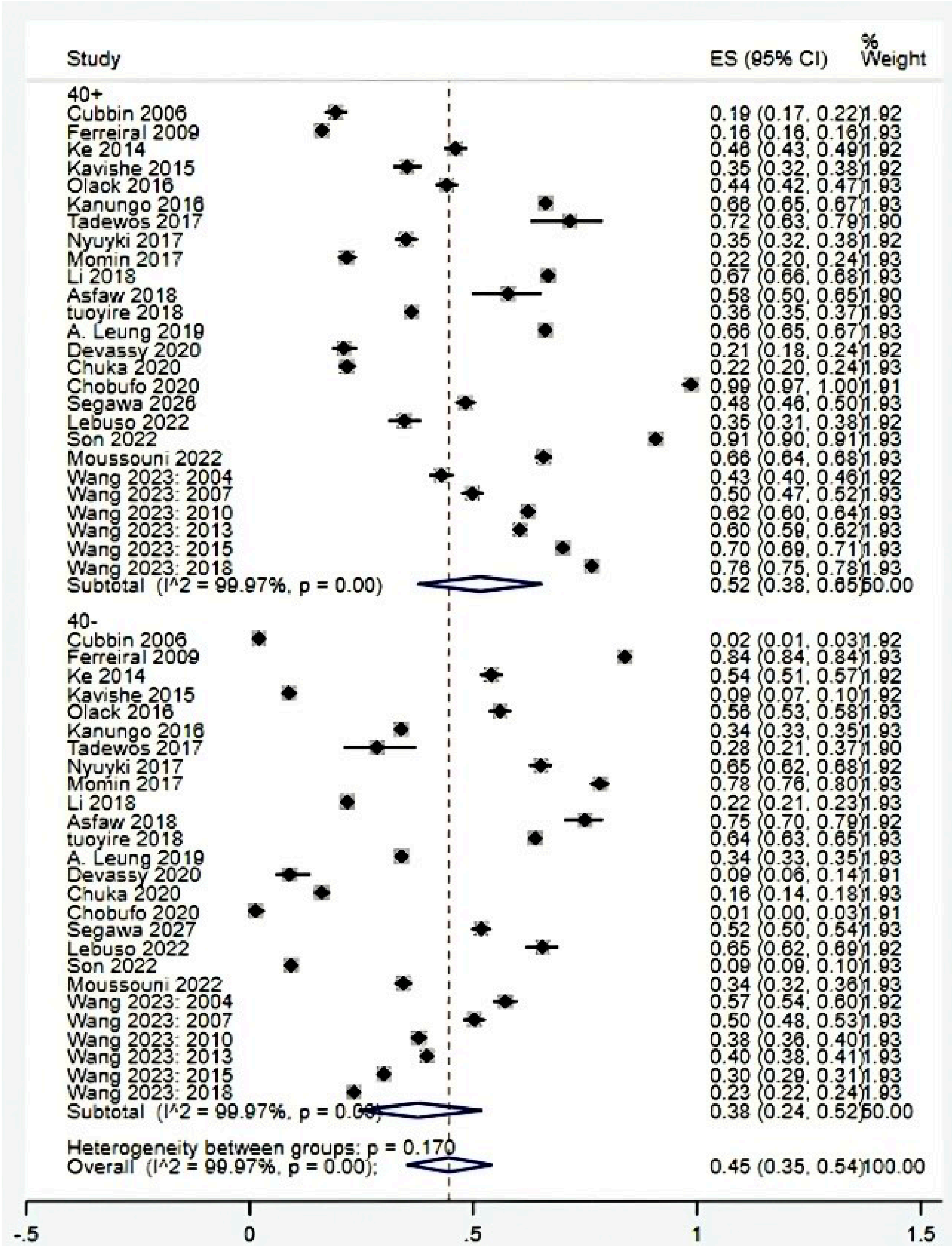

Figure 3. Forest plot for the association of age and HTN with the overall effect size = 0.45 (95% CI = [0.35, 0.54]).

HTN (P < 0.01). The overall effect size of the risk of HTN was 0.41 (95% CI = [0.38, 0.45]). However, the subgroup analysis was slightly different. The effect size for males and females was 0.38 (95% CI = [0.33, 0.43]) and 0.45 (95% CI = [0.39, 0.51]), respectively. The studies had a substantial heterogeneity with $I^2 > 99\%$.

Publication bias

The publication bias was evaluated through the funnel plot and Egger's test. Egger's test for divorced, single, and widowed status was significant (P > 0.05), suggesting possible publication bias. However, other subgroups did not show substantial Egger's test results. Moreover, the funnel plots (**Figure 4**) were symmetrical, indicating the absence of publication bias.

Discussion

To the best of our knowledge, this is the first comprehensive systematic review and meta-analysis to evaluate the association between marital status and the risk of developing HTN. The analysis included a total sample of 748,453 Individuals sourced from 21 Studies. The results of our meta-analysis showed noteworthy patterns that divorce was shown to decrease the likelihood of developing HTN but being married was strongly associated with an increased risk of HTN. This elevated risk was evident across various marital statuses, including single and widowed populations. Additionally, our analysis indicated a lower incidence of HTN among individuals younger than 40 compared to those aged 40 and older. Moreover, being male was associated with a decreased risk of hypertension.

Several investigations have documented a distinct correlation between marital status and HTN. The precise processes that explain the impact of marital status on HTN remain incompletely comprehended. Prior research has proposed various components that may account for the effects of marital status, such as psychopathological elements, neuroendocrine pathways, health behaviors (such as physical activity, diet, and adherence), biological mediators, and immunological pathways. Additional research has indicated that married men exhibit improved sleep quality, reduced stress levels, enhanced mood, and a healthier dietary regimen than men who have never been married [18, 19].

This meta-analysis reveals a significant association between married status and a greater incidence of HTN. Our investigation revealed that 54.9% of married individuals exhibited HTN (95% CI 45.06 to 64.73). These findings are consistent with the research conducted by Wang et al. [22] examined the prevalence of HTN in the Chinese population. The research disclosed that marriage serves as a prevalent risk factor for HTN, evident in both urban and rural areas. In connection with this observation, the researchers harbored a suspicion that married individuals may encounter notably elevated tension levels. A comprehensive study was undertaken by Lebuso et al. [23] to analyze the frequency and factors associated with HTN in female participants aged 15 to 49. It revealed a heightened prevalence of HTN among married women.

Additionally, separate studies by Marbaniang et al. [24] and Mohanty et al. [25] exploring HTN among the Indian populace consistently underscored a higher prevalence of HTN among those who were married. Some studies suggest that when people go through significant changes in their marital status, such as being married, it might have a negative impact on their physical health and raise the chances of developing particular diseases [26, 27]. However, alternative evidence suggests that married individuals have a higher level of protection against high blood pressure compared to those who are unmarried. This may be attributed to the support provided by their partner [28, 29].

The outcomes of our investigation unveil a significant and statistically noteworthy prevalence of HTN among widowed individuals, encompassing approximately 27.5% of this demographic (95% CI 23.63 to 31.29). A study by Hee Ann et al. [30] examined the influence of marital status on cardiovascular illnesses. This study analyzed a sample of 310 widowed individuals, revealing an HTN prevalence rate of over 50% within this population. This observation demonstrated statistical significance (*p*-value < 0.001) compared to their married counterparts. In a comprehensive examination involving 28,238 middle-aged Canadian individuals, Hosseini et al. [21] investigated the association between social connections and HTN in women and men. The findings unveiled a heightened prevalence of HTN within the widowed population, approximately 66%, compared to other demographic groups.

Furthermore, they found that the odds of having HTN were elevated among widowed women, with an odds ratio of 1.33 (95% CI: 1.16-1.51) compared to married women. These find-

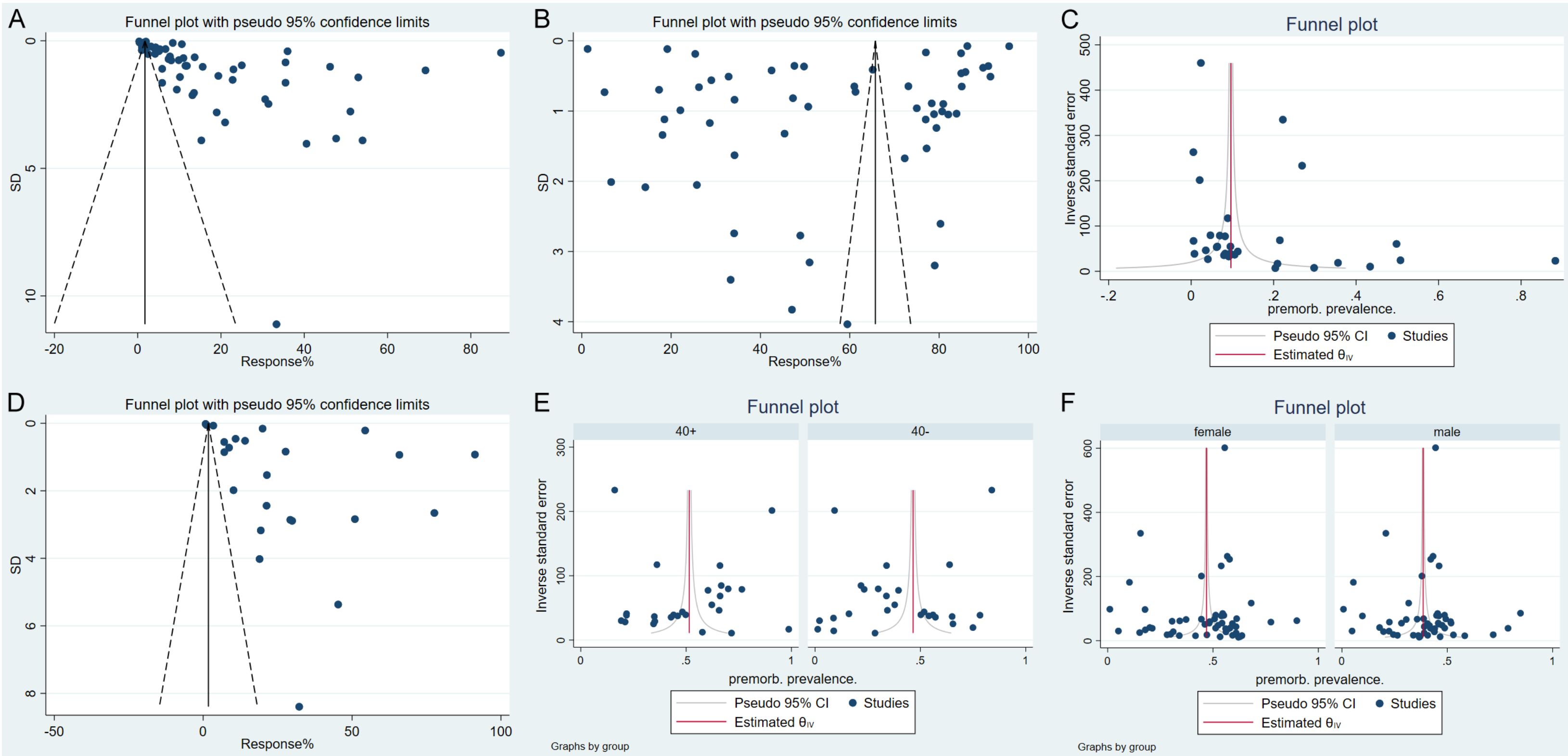

Figure 4. Funnel plot for evaluation publication bias. (A) single status, (B) married status, (C) divorced status, (D) widowed status, (E) age subgroups, and (F) gender subgroups.

ings are consistent with extant studies that examined the prevalence and risk factors of HTN in the Algerian population [31] and investigations into the effects of marital status on HTN in Korean individuals [32]. Notably, their findings indicate a statistically significant correlation between widowhood and a heightened likelihood of experiencing HTN. Nevertheless, certain studies exploring the risk factors associated with HTN did not identify a significant correlation between widowhood and an increased likelihood of HTN [33, 34].

Moreover, our data underscores a remarkable association between unmarried status and the incidence of HTN, revealing a prevalence of approximately 17.7% (95% CI: 45.06 to 64.73). Wei et al. [35] conducted a study investigating the influence of marital status on the quality of care and long-term prognosis for patients with acute myocardial infarction (AMI). Their findings indicated that unmarried patients exhibited a higher prevalence of HTN. Additionally, Hosseini et al. [21] demonstrated that single women are 28% more likely to experience HTN compared to their partnered counterparts. These results align with the findings of Chuka et al. [36], who explored the prevalence of HTN and associated factors among Ethiopian adults. Their study revealed that married participants were less prone (adjusted odds ratio 0.66, 95% CI: 0.51-0.85) to develop HTN compared to unmarried individuals. However, Son et al.'s investigation [32] yielded different results, particularly in females, where no significant correlation with being single was observed (95% CI: 0.49 to 1.97).

Our data highlights a meaningful correlation between the status of divorce and the occurrence of HTN, indicating a prevalence of approximately 0.14% (95% CI: 0.09 to 0.19). Marbaniang et al. [24] noted a positive association between divorce status and HTN. They observed that individuals who had experienced divorce exhibited a higher average blood pressure compared to those who were married. Also, Hosseini et al. [21] uncovered that both divorced women and men faced an elevated likelihood of HTN compared to their married counterparts. The study also identified noteworthy variations in mean blood pressure levels between divorced and married individuals. Specifically, married individuals had a mean systolic blood pressure of 121 mmHg, whereas divorced individuals exhibited a slightly higher mean systolic blood pressure of 121.8 mmHg. Although this difference is minimal, it is statistically significant. These findings align with those of Ramezankhani et al. [24] and Moussouni et al. [31] similarly observed a positive correlation between divorce and an increased likelihood of HTN in their respective investigations.

Our investigation reveals a significant positive correlation between age and the probability of developing HTN across diverse studies. Specifically, our analyses indicate a 60% reduced risk of HTN for individuals under 40, while those aged 40 and above experience a 49% reduced risk. Furthermore, our findings highlight that gender contributes to the reduced likelihood of developing HTN. To be more precise, the risk of HTN decreases by 55% for women and approximately 61% for males.

Our results imply that marital status could affect the risk of hypertension by several possible pathways, involving both psycho-social and behavioral and biomedical mechanisms. In our opinion, the protective relationship found in married participants may be related to more emotional and social support, healthier lifestyle and better adherence to treatment, while divorced and widowed ones could be more vulnerable due to psychological pressure, social isolation and financial difficulties. Crucially, the variation in age and sex indicates that the impact of marital status is not constant; i.e., younger men may derive the most significant benefit from marriage's protective aspects. In contrast, older women may suffer the most loss through widowhood. These explanations underscore the significance of marital and social context in the prevention and control of hypertension for physicians and policymakers.

This study thoroughly investigates the correlation between marital status and HTN, presenting an initial systematic review and meta-analysis. By integrating a wide range of significant studies from previous research, our findings become more robust in terms of their applicability, providing a solid basis for understanding the complex relationships between various marital situations and the likelihood of having HTN. While our meta-analysis yields valuable insights into the connection between marital status and HTN, a noteworthy limitation of our study lies in the heterogeneity observed among different marital status groups and the overall analysis. To mitigate this limitation in future research endeavors, it is crucial to systematically assess potential sources of heterogeneity. Performing subgroup analyses that account for crucial factors such as geographical location, cultural influences, socioeconomic status, and methodological variations among the studies could provide valuable insights into the nuanced correlation between marital status and HTN.

Conclusion

In conclusion, our investigation highlights significant associations between marital status and hypertension risk. A statistically significant prevalence of HTN is evident across the four scrutinized marital status groups (married, single/unmarried, widowed, and divorced). Among these groups, married individuals exhibit the highest prevalence of HTN, followed by widowed individuals, whereas the divorced population demonstrates a lower incidence compared to other marital status groups. Gender and age are also noteworthy factors, as men and individuals below 40 indicate a more pronounced reduction in HTN risk compared to women aged 40 and above, respectively. Due to the heterogeneity observed in our studies, it is essential to address these limitations in future research through detailed subgroup analyses, taking into account geographical, cultural, socioeconomic, and methodological variations.

Disclosure of conflict of interest

None.

Abbreviation

HTN, Hypertension.

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