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To cite this article: Christina Antza, Guido Grassi, Thomas Weber, Alexandre Persu, Jens Jordan, Peter M Nilsson, Josep Redon, Stella Stabouli, Reinhold Kreutz & Vasilios Kotsis (2024) Assessment and Management of Patients with Obesity and Hypertension in European Society of Hypertension Excellence Centres. A survey from the ESH Working Group on Diabetes and Metabolic Risk Factors., Blood Pressure, 33:1, 2317256, DOI: [10.1080/08037051.2024.2317256](https://doi.org/10.1080/08037051.2024.2317256)

To link to this article: <https://doi.org/10.1080/08037051.2024.2317256>



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Published online: 26 Feb 2024.



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## Assessment and Management of Patients with Obesity and Hypertension in European Society of Hypertension Excellence Centres. A survey from the ESH Working Group on Diabetes and Metabolic Risk Factors.

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### ABSTRACT

**Background:** Healthcare providers are faced with an increasing number of patients with obesity and arterial hypertension. Preventing obesity-associated hypertension and appropriately managing patients with established disease are both important. Hence, the aim of our study was to evaluate the clinical care of patients with obesity and hypertension among ESH Excellence Centres (ECs).

**Methods:** We conducted a cross-sectional, international 30-item survey through e-mails.

**Results:** In total, 70 representatives of ECs participated (78% men) with 66% of them practicing medicine for more than 30 years and working in well-equipped clinics. Most were internists (41%) and cardiologists (37%) and 73% reported training on the management of obese patients with hypertension. A majority weigh their patients (77%) and evaluate patients for sleep disorders (93%). However, only 47% spend more than 5min to advise for lifestyle modification in general, 59% for weight loss, 56% for salt intake and 64% for exercise. Finally, a minority of participants ask patients if they like their body (6%) or about previous attempts to lose weight (28%), evaluate 24h urinary sodium excretion rate (22%) and provide written (15%) or personalized (10%) dietary advices. If the patient suffers also from type 2 diabetes mellitus, 66% switch treatment to GLP1 receptor agonists and 60% to SGLT2 inhibitors.

**Conclusion:** Most clinicians in ESH ECs are well educated regarding obesity-associated hypertension, and clinics are sufficiently equipped to manage these patients, as well. However, several deficits were reported regarding efforts to address and implement obesity specific aspects and interventions to improve care in patients with obesity and hypertension.

### PLAIN LANGUAGE SUMMARY



- Hypertension and obesity still remain two of the main cardiovascular risk factors worldwide.
- There is a need to lower the incidence of obesity-induced hypertension, and to focus on practical guidelines for the evaluation and management of patients with obesity and hypertension.
- This is a web-based survey to understand the current clinical practices in assessing/managing patients with obesity and hypertension in ESH Excellence Centres.
- Most clinicians in ESH ECs are well educated regarding obesity-associated hypertension.
- Clinics are sufficiently equipped to manage these patients.
- Several deficits were reported regarding efforts to address and implement obesity specific aspects and interventions to improve care in patients with obesity and hypertension.


### ARTICLE HISTORY

Received 3 January 2024  
Revised 29 January 2024  
Accepted 31 January 2024

### KEYWORDS

assessment; ESH Excellence Centres; hypertension; management; obesity; survey

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 Supplemental data for this article can be accessed online at <https://doi.org/10.1080/08037051.2024.2317256>.

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**Abbreviations:** BP: blood pressure; BMI: body mass index; ESH: European Society of Hypertension; GLP-1 agonists: glucagon-like peptide-1 agonists; SGLT-2 inhibitors: sodium glucose cotransporter-2 inhibitors.

## Introduction

Despite huge efforts to improve prevention and management, hypertension and obesity still remain two of the main cardiovascular risk factors worldwide. (1) Obesity is a well-known and studied, independent, risk factor for hypertension; an observation already made decades ago. The Intersalt study including more than 10,000 participants, documented a positive association between blood pressure (BP) and body mass index (BMI) on a sufficiently large scale. (2) A few years later, a 44-year follow-up of the Framingham Heart study showed that obesity is responsible for 28% of the new cases of hypertension in women and 26% in men. (3) Conversely, a 2.27 kg/m<sup>2</sup> reduction in BMI could lower systolic and diastolic BP by almost 6 mmHg and 3 mmHg, respectively (4). The favourable effect of weight loss on BP seems to be independent of the type of intervention (diet, pharmacological treatment or bariatric surgery). (5)

The World Health Organization's global target for non-communicable diseases focuses on lowering the prevalence of hypertension by 33% from 2010 to 2030 (6). Whether this ambitious goal is achievable is questionable, taking into account the high reported incidence and prevalence of obesity worldwide as well as their association with hypertension. (7) Of note, almost 2 billion adults, 18 years and older, were overweight in 2016 and more than 650 million were obese. (7) Furthermore, the current use of BMI in adults and BMI-for-age in children and adolescents in the identification of obesity, seems to underestimate the prevalence of excess adiposity. Around half of all adults and at least 25–50% of children and adolescents defined as having a healthy BMI present excess body fat, that could have changed the status of overweight or obese if taken into account. (8, 9) Therefore, there is a need not only to lower the incidence of obesity to prevent obesity-induced hypertension, but also to focus on the practical guidelines for the evaluation and management of patients with obesity and hypertension.

The European Society of Hypertension (ESH) has published practice guidelines for the treatment of obese hypertensive patients, focusing on weight management with either lifestyle modification and/or pharmacological treatment, the selection of

appropriate anti-hypertensive therapy but also on the holistic management of metabolic syndrome. (10, 11) Furthermore, the latest guidelines (2023) provide also specific recommendations for these patients, covering both practical (i.e cuff size for BP measurement) and pharmacological aspects. (12) Even if both research and experts provide clear evidence for the management of obesity and hypertension, to what extent these recommendations are followed by clinicians remains unclear.

Accordingly, our aim was to design a web-based survey to understand the current clinical practices in assessing and managing patients with obesity and hypertension in ESH Excellence Centres.

## Methods

### Study design

We performed a cross-sectional, international survey on behalf of the Working Group on Diabetes and Metabolic Risk Factors of the European Society of Hypertension. In order to evaluate the assessment and management of patients with hypertension and obesity among ESH Excellence Centres, a 30-item survey ([Supplementary File 1](#)) was conducted electronically (through a link provided by e-mail). The target population comprised physicians, with expertise in the field of hypertension, working mainly as internists, cardiologists or nephrologists, who wanted to participate. There were no exclusion criteria for the participants. The survey was running for 8 weeks (10/05/2023 till 23/06/2023), with two reminders sent within that period. The questionnaire was accompanied by a cover letter, providing details regarding the aim of the survey, the organization behind the study and informing participants on the time needed to complete the survey, as evaluated by the investigators.

### Questionnaire

To ensure content validity and relevance, three experts in the field and three internists belonging to the target population planned and designed the research questions. The survey applied closed, with two exceptions: country of activity and medical specialty in case

it was not included in the pre-specified choices. Multiple-choice pre-coded type was used, with either a dichotomic (yes/no) or a wide range of responses depending on the question. The survey was divided into two parts. The first part included questionnaires aimed to assess the demographics of the participants and the second part to investigate how they access and manage patients with obesity and hypertension.

After finalization of the questionnaire by the investigators, 5 independent internists from the 3<sup>rd</sup> Department of Internal Medicine in Aristotle University of Thessaloniki, Greece with a specific interest in hypertension and obesity were asked to evaluate the questionnaire using a satisfaction scale from 0 to 10 (total score was 9.8/10). Minor comments have been made as presented in [Supplementary File 2](#).

### **Statistical analysis**

We use descriptive statistics to describe the overall characteristics of the survey. The results were represented as percentages and depicted as bar charts.

## **Results**

### **Descriptive statistics of the population**

A total number of 70 representative physicians (78% men) from 26 countries filled the questionnaire and were thus included in our survey. Most of them were internists (41%) and cardiologists (37%), while the rest of the study population had the specialty of nephrology (17%), and 4% reported another specialty (none specified which one). In all, 66% of the participants reported more than 30 years of practicing medicine, while none was practicing less than 10 years. All participants were treating urban population. The two most represented countries were Italy (14%) and Greece (14%).

Regarding their education, 73% of the participants reported that they had already received training on how to treat patients with obesity and hypertension. When they were asked to specify the type of education, 47% reported participation in congresses, 18% in seminars, 14% none of the proposed options, 8% on-the-job training, attending expert's clinics, 8% self-reading, 5% several days courses and finally 2% classroom-style training at hospital, organized by experts in the field.

### **Clinic Organization**

In terms of hypertension clinic organization, we also evaluated the equipment needed for the examination

of an obese patient with hypertension. All clinics (100%) had large cuffs (32-42cm) available for office blood pressure measurement, while 87% of the clinics had also extra-large cuffs (42-52cm). Additionally, 74% of the participants reported that their office medical equipment (for example gowns, chairs or exam tables) was appropriate for the evaluations of obese patients. Finally, 64% of the participants reported available equipment for the evaluation of sleep apnea in the office.

### **Clinical approach of patients with obesity and hypertension**

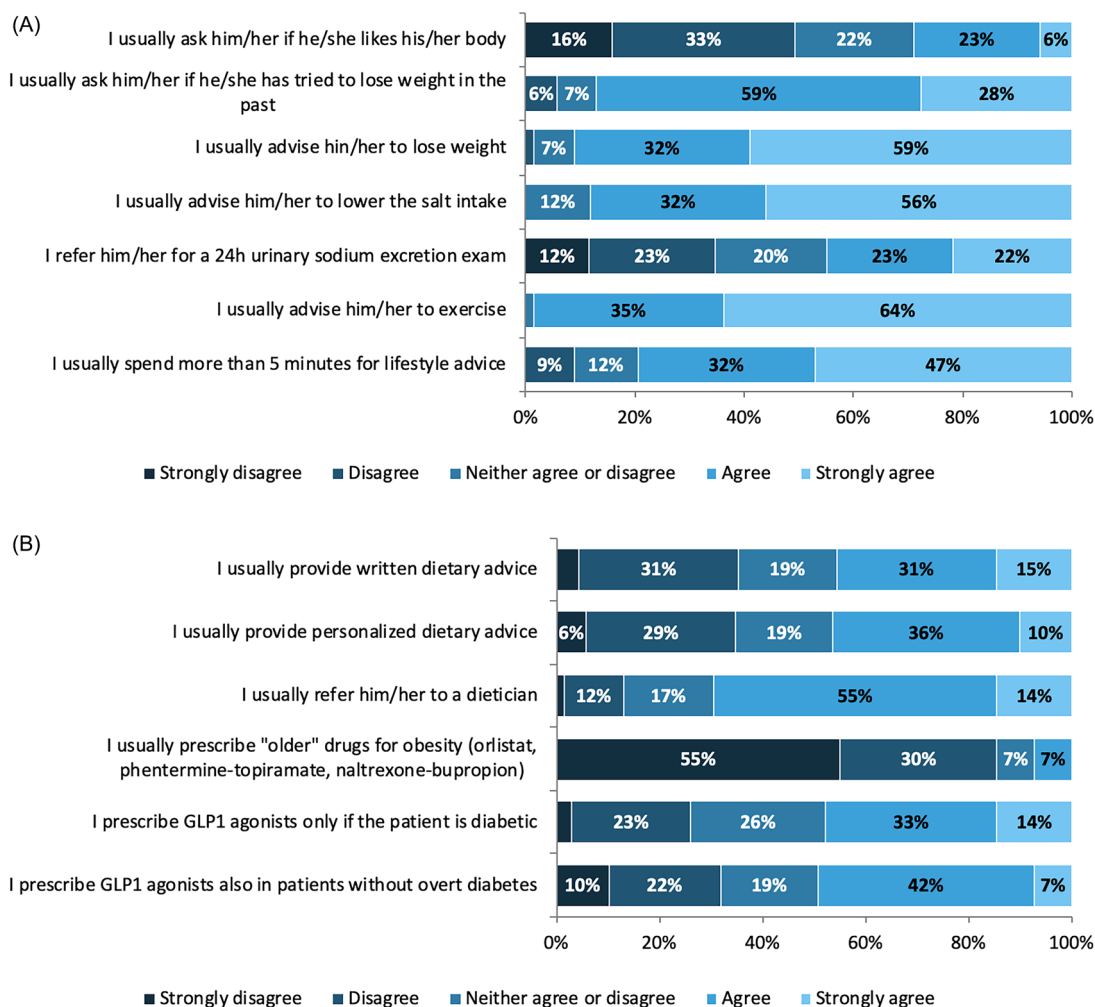
The majority of participants (72%) reported that they agree or strongly agree with the practice to determine the body weight of their hypertensive patients at every visit (77% respectively to calculate body mass index), while 34% of them reported agreeing or strongly agreeing with the practice to weigh hypertensive patients only if the last visit was at least two months ago.

Assessment and management of patients with hypertension and obesity is depicted in [Figure 1](#). The majority of the participants strongly agreed with the practice to advise patients to lose weight (59%), to lower their salt intake (56%), to exercise (64%) and almost half of them (47%) usually spend more than 5 minutes for lifestyle advice. Only 28% and 22%, respectively, strongly agreed with the practice to ask patients if they had tried to lose weight in the past or to refer them for a measurement of 24h urinary sodium excretion analysis. A minority of participants was asking patients if they like their body (6%) and provided either written (15%) or personalized (10%) dietary advices.

Regarding weight loss treatment, the majority (55%) seems not to prescribe "older" drugs (such as orlistat, phentermine-topiramate, naltrexone-bupropion). If type 2 diabetes mellitus is present on top of hypertension and obesity, 66% agreed or strongly agreed with the practice to switch treatment to glucagon-like peptide-1 (GLP-1) receptor agonists and 60% to sodium glucose cotransporter-2 (SGLT-2) inhibitors. Even if the patient is not diabetic, 47% of the participating physicians still prescribe GLP-1 receptor agonists. Finally, 84% of the physicians report that they know the guideline recommendation for referring a patient to bariatric surgery, but only 41% implement this recommendation.

### **Mediterranean diet**

Regarding diet, 87% of the participants advise their patients to follow the "Mediterranean diet" pattern in



**Figure 1.** The assessment and management of obese patients with hypertension.

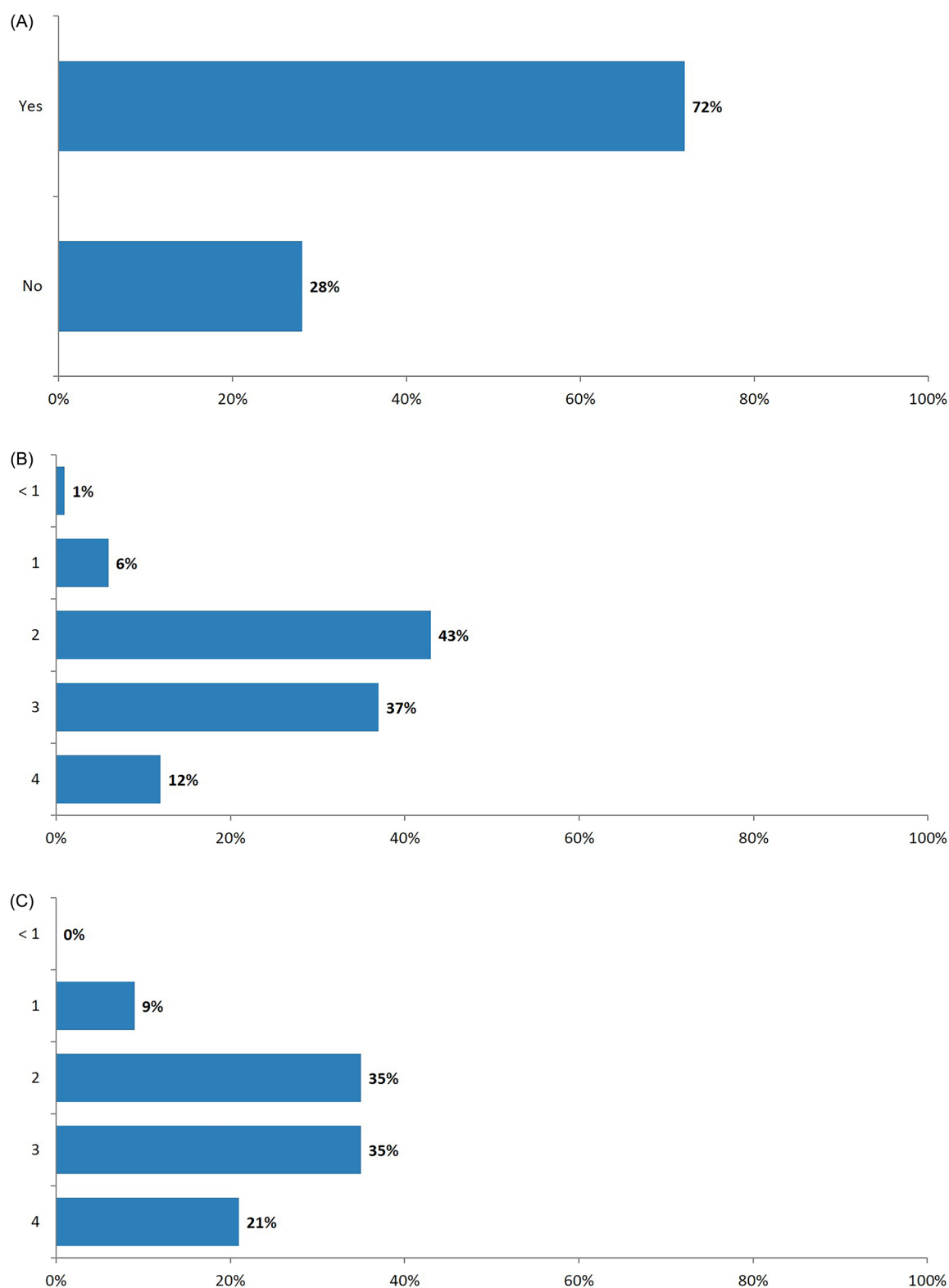
general. When clinicians were asked separately for some of the main “Mediterranean diet” aspects, it seems that 72% advise their patients to regularly eat chicken, turkey or rabbit instead of veal, pork, beef or sausage. From the study population, 9% advise for <2 servings per week of fish (100 - 150g) or seafood (200g), 7% for <2 servings (200g each) of vegetables per day, 12% for <1 or >3servings (80g each) of fruit per day, 3% for 2 servings (100 - 150g) of red meat/hamburgers/other meat products and 3% for >3 servings commercial sweets/pastries per week. Details are depicted in [Figure 2](#).

### Sleep

Most participants asked about sleep related behaviours (sleep hours per night, nightshifts, duration of sleep deprivation, restfulness in the morning) (93%) and sleep disruption (96%) in obese patients, while all participating physicians (100%) asked about snoring and respiratory pauses/apnea witnessed by the spouse during sleep.

### Discussion

Our survey provides valuable insight in current clinical practice in ESH Excellence Centres when assessing and managing patients with obesity and hypertension. In general, most of clinicians are well aware and sensitized regarding obesity-induced hypertension. Moreover, clinics are sufficiently equipped to examine this population. For example, in everyday clinical practice, more than half of participating centres weigh their patients and almost all evaluate patients for sleep apnea. Moreover, almost half of the centres report that they advise for lifestyle modification or weight loss and consider prescribing newer weight loss medications when indicated. However, there is room for improvement. For example, 24hour urinary sodium excretion rate is rarely prescribed, few physicians provide written/personalized dietary advice, physicians’ knowledge on healthy eating is limited, and less than 5 minutes are typically spent on lifestyle modification instructions.



**Figure 2.** Advices for Mediterranean Diet in obese patients with hypertension.

2A. Do you advise patients to regularly eat chicken, turkey or rabbit instead of veal, pork, beef or sausage?

2B. How many servings of fish (100 - 150g) or seafood (200g) do you advise your patients to eat per week?

2C. How many servings (200g each) of vegetables do you advise your patients to eat per day?

2D. How many servings (80g each) of fruit do you advise your patients to eat per day?

2E. How many servings (100 - 150g) of red meat/hamburgers/other meat products do you advise your patients to eat per day?

2F. How many servings of commercial sweets/pastries do you advise your patients to eat per week?

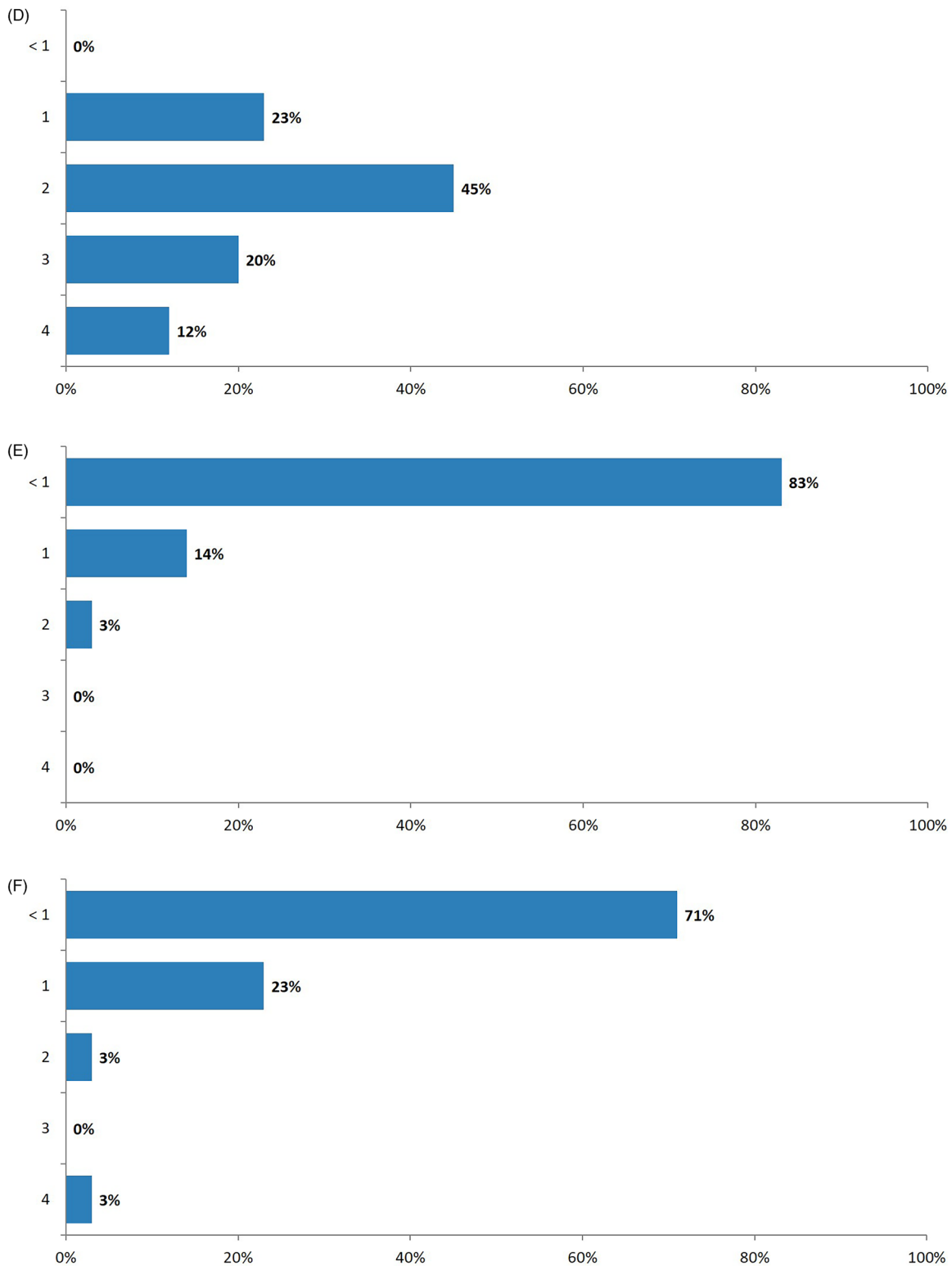


Figure 2. Continued.

Lifestyle modification, including weight loss, exercise, limited salt intake and Mediterranean diet, is usually recommended when managing patients with obesity and hypertension irrespective of BP lowering

treatment. The practice is well supported by evidence (observational studies and meta-analyses), and also by guidelines, which recommend lifestyle interventions as part of the first-line therapy in all

hypertensive patients. (10, 12) Specifically, low-caloric diet is a valuable way of lifestyle modification for BP reduction in both pre-hypertensive and hypertensive population, with meta-analyses suggesting approximately 1mmHg reduction not only for systolic but also for diastolic BP for each 1kg reduction of body weight. (13, 14) Importantly enough, the Trial of Nonpharmacologic Intervention in the Elderly (TONE) showed that moderate weight loss results in a 30% decreased need for antihypertensive therapy, for those being on a single antihypertensive drug. (15). Not only low-caloric diet but also Mediterranean diet has a positive impact on BP. In fact, high adherence to Mediterranean diet decreased by 36% the likelihood of hypertension in obese patients. (16) The effect of physical activity on BP is crucial, too, independently of the weight loss achievement. Aerobic exercise has the highest impact, lowering BP up to 5-8mmHg, but dynamic resistance and isometric training also elicit a beneficial effect. (17, 18) Recent data highlight the importance of a multicomponent exercise approach to improve cardiometabolic health. (19)

However, following successful weight loss, weight regain over few months is common and can lead to a so-called weight cycling phenomenon. Similarly, adherence to exercise training tends to decline over time. (20, 21) Hence, weighting patients at every visit is important to evaluate possible BMI changes. Furthermore, physicians must create new ways to support patients with both obesity and hypertension, to educate them and finally to convince them to adopt lifelong new healthy habits based on their individual needs and life circumstances. To encourage patients to be active is not always enough; free exercise community programs must take place or hospital-based specialized training. At this point, referral to a specialized dietician is also crucial. The role of dietician encompasses not only the need of providing low-caloric diet but also the education of the population. This need is highlighted by the results of our survey: even if almost 90% of the clinicians advise patients to follow a Mediterranean diet, many participants did not have the knowledge to provide correct dietary advice.

At this point, the results of the follow-up of the Evaluation of Losartan in the Elderly (ELITE) study must be considered in the evaluation of the results of this survey. Authors trying to identify possible reasons for lack of implementation of prevention measures, showed that individualized written education and lifestyle interventions could be the key to improve compliance. (22) In ESH Excellence Centres, only 6%

of the clinicians ask personal questions related to the weight status of their patients (for example if patients like their body), while only 10% and 15% provide written or personalized dietary advice, respectively. Hence, a more personalized approach has to be encouraged in ESH Excellence Centres to increase adherence and long-term lifestyle changes. For this purpose, also self-monitoring needs to be encouraged. For example, a mobile application for patients with both hypertension and obesity, aiming at weight loss, healthy eating and exercise, promoted a greater adherence and weight loss in participants wearing a pedometer. (23)

In patients with obesity and hypertension who cannot attain a healthy body weight through lifestyle interventions alone, on top of lifestyle modification, weight loss through medication or bariatric surgery is an important step in the treatment of hypertensive obese patients. (10, 11) This approach appears widely accepted among ESH Excellence Centres as most of the clinicians consider prescribing SGLT-2 inhibitors or GLP-1 receptor agonists in patients with a diagnosis of type 2 diabetes mellitus, prescribe the “older” drugs for obesity, but also know and follow the guidelines on the indications for bariatric surgery. Indeed, combining orlistat with a hypocaloric diet was more effective than diet alone to achieve blood pressure control in patients with obesity and hypertension. (24) Low dose topiramate/phentermine, which is not approved in Europe, reduces body weight and BP in patients with obesity and hypertension. (25, 26) Liraglutide, lorcaserin, or naltrexone/bupropion could also reduce BP (25), however, this effect is modest.

While there is a research gap regarding the effect of GLP-1 agonists and SGLT-2 inhibitors on BP control in patients with obesity and hypertension, but without type 2 diabetes mellitus, in patients with diabetes mellitus clinical trials data are clear and promising. The latest meta-analysis in the field regarding different anti-diabetic drug classes showed that GLP-1 agonists and SGLT-2 inhibitors not only reduce cardiovascular risk, but also cause body weight changes. However, the authors did not analyse the effect of these drugs on BP. (27) Still, previous data show the existence of a systolic BP reduction by these agents in patients, with diabetes from -1.8mmHg (95% CI: -3.5 to -0.20) to -4.6mmHg (95% CI: -7.2 to -2.0) for GLP-1 agonists (28) and from -2.3mmHg (-3.1 to -1.6) to -3.4mmHg (-4.3 to -2.5) for SGLT-2 inhibitors (29), when compared to placebo. Regarding weight loss, an even up to 20% body weight reduction has been observed when once weekly tirzepatide, dual



glucose-dependent insulinotropic polypeptide and GLP-1 receptor agonist, was administered on the highest 15mg dose (compared to 3% in the placebo group). (30) Systolic BP in the pooled tirzepatide group decreased 6.2mmHg, compared to placebo. (30) In patients with preexisting cardiovascular disease and overweight or obesity but without diabetes, semaglutide is superior to placebo in reducing body weight and cardiovascular death, nonfatal myocardial infarction, or stroke. (31)

Furthermore, bariatric surgery in patients with obesity and hypertension leads to fewer drugs, improved BP control and less risk of resistant hypertension. (32–34) The non-randomized Swedish Obese Individuals Study (SOS) showed that weight reduction through bariatric surgery improves cardiovascular morbidity and mortality in males and females with a BMI of at least 34 or 38kg/m<sup>2</sup>, respectively. (35) A recent meta-analysis comprising 269,818 patients submitted to bariatric surgery and almost 1,2 million controls confirmed the finding and further suggested a substantial reduction in the incidence of arterial hypertension in the bariatric surgery group. (36) Hence, consultation should not be restricted only to prescription of anti-hypertensive agents and lifestyle advice, but should also include a holistic approach of the hypertensive obese patient.

The association between obesity-induced sleep disorders with high blood pressure and their role in promoting cardiovascular disease (37–39) is well known by the clinicians of ESH Excellence Centres, as more than 93% ask questions to evaluate patients' sleep quality and sleep related problems. Even if obstructive sleep apnea is the best studied sleep disorder acting as a determinant of hypertension (40), 93% of the clinicians ask also for sleep insufficiency, including for sleep hours per night, nightshifts, duration of sleep deprivation, restfulness in the morning and 96% for sleep disruption.

Some limitations of this study need to be taken into account. This is a survey among ESH Excellence Centres and as so, the findings may not reflect the general knowledge or management in the medical community. Southern European countries are overrepresented in this survey, which could introduce a bias particularly when assessing life-style related items such as dieting. Furthermore, the findings may not reflect overall knowledge/awareness on the topic in Excellence Centres, as responders might be those with more interest/expertise in the topic. Finally, there might still be a gap between what the centers feel appropriate and what is effectively done in daily clinical practice.

## Conclusion

Most clinicians caring for patients with obesity-associated hypertension in ESH Excellence Centres are well informed regarding current management recommendations. However, several deficits were detected and could be thus improved by following practice guidelines recommendations for the specific management of patients with obesity and hypertension. In the future, a more comprehensive approach should be established when treating obesity-associated hypertension, focusing on personalized lifestyle modification programs, patients' referral to a specialised dietician or community/hospital lifestyle educating programs, and, should these measures fail, access to pharmacological weight loss or bariatric surgery.

## Acknowledgement

We are grateful for the invaluable help of Mandy Elgner, ESH Council Coordinator, with the setup and performance of the survey.

## Disclosure statement

The authors report there are no competing interests to declare.

## Data deposition

Available for reasonable research questions, if asked.

## Funding

None

## Data availability statement

None

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