

Sex-specific risk factor awareness, covert misogyny and long-term cardiovascular risk management: Pilot study



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Received: 26/11/2024

Revised: 03/12/2024

Accepted: 13/12/2024

Published: 11/04/2025

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DOI: 10.5937/medi58-55012



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Abstract:

INTRODUCTION: Health literacy is a cornerstone of prevention, while sex specific prevention of cardiovascular disease, a leading cause of death of women worldwide, remains less addressed and is still more a matter of local cultural habits than guideline-directed management. **METHODS:** A validated multiple-choice questionnaire (MCQ) designed to both educate patients and help the healthcare team learn about their traditional and sex specific modern risk factors (RF) management, including opting for comprehensive personalized long term follow up (FU) was offered to all in-patients. **RESULTS:** Out of 130 patients hospitalized at our department (Jan 1, 2024 - Feb 24, 2024) who were offered to fill in the MCQ, 37.7% accepted to do so, while 11.5% were excluded on ethical grounds. Women (49%) were older than men, had a more significant burden of traditional RF and possessed higher levels of knowledge and interest in RFs of both sexes, while men - especially those who declined to participate without a clear reason - even stated having no interest in their female relatives' risk profiles. Men, unlike women, showed no particular interest in a personalized and tech-savvy options of FU, although they equally use hand-held devices. **CONCLUSION:** These results confirm the findings obtained from a similar study conducted on an all-female sample in the same setting a year ago. However, results in men were surprising for the hostility exhibited towards junior and mid-career women which was absent when approached by a senior male member of the healthcare team. This confirms that misogyny needs to be actively suppressed.

Keywords: health literacy; heart disease; cardiovascular risk; sex specific risk factors; misogyny

INTRODUCTION

Cardiovascular disease remains the leading cause of morbidity and mortality in women and men, worldwide. Most precise statistics are offered annually by the American Heart Association [1] that recently started addressing not only United States' statistics, but also global statistics linked to both cardiovascular and cerebrovascular diseases. This report also highlights the status of the AHA's "Essential Eight" risk factors [2], which include traditional factors – glyce-

mia, cholesterol, and blood pressure levels-as well as lifestyle factors such as smoking, physical activity, diet, weight, and sleep habits, all of which collectively shape cardiovascular health. Risk factors were first identified based on findings from two major epidemiological registries. The **Seven Countries Study (SCS)** included only men from seven countries across three continents – the United States, Japan, Finland, the Netherlands, Italy, Greece, and former Yugoslavia (with Serbia's three cohorts continuing follow-up for

up to 55 years). At the time, in the post-WWII era, women were believed to be protected from heart disease until well into menopause. The **Framingham Heart Study (FHS)**, in contrast, included both men and women, though primarily of Caucasian descent. Notably, while maternal morbidity and mortality data were collected for SCS participants, this later proved to be both insightful and valuable. A 40-year follow-up revealed that men whose mothers had hypertension and/or heart disease experienced worse cardiovascular outcomes in terms of both morbidity and mortality [3]. However, it was the **Nurses' Health Study (NHS)** that first established a link between night shift work and an increased risk of developing diabetes [4] and obesity [5] – both of which, over time, contribute to a higher incidence and progression of cardiovascular and cerebrovascular disease. This association was further reinforced by findings from a 24-year follow-up, which demonstrated poorer overall health outcomes with aging [6]. Sex specific risk factors, however, reached the guidelines only in the 21st century with the American guidelines being the first to include them in 2019 [7], while European ones followed 2 years later [8]. Locally, despite coordinated efforts from all stakeholders [9] to provide comprehensive cardiovascular care for women in Serbia based on established global models [10][11], a major barrier persists: a form of covert misogyny that has yet to be quantified in national samples. Clinically, it closely resembles the systemic racism faced by women of color in accessing reproductive care and in experiencing higher peri- and postpartum morbidity and mortality – disparities that persist even among those with no barriers to healthcare access or insurance [12][12,13]. This stems from the misperception that sex-specific care beyond reproductive and oncological health is an extension of militant feminism rather than a medical necessity. The global need for a comprehensive approach is the central theme of *The Lancet Women and Cardiovascular Disease Commission* [14], which, in its latest revision, highlighted the impact of discrimination that endangers over 50% of the world's population. This issue has also been recently emphasized by leading experts in the field [15] and is the focus of the latest call to action [16], which seeks to improve risk stratification for young women at higher risk of developing acute coronary syndrome. Beyond the growing burden of cardiovascular risk factors among women of childbearing age [17], ageism itself poses a significant threat to women of all racial backgrounds in the United States. However, systematic efforts to address this issue have only emerged in the past decade [18]. Conversely, Serbia's annual statistical reports [19] do not provide precise

data on differences in non-communicable disease morbidity and mortality rates between men and women in the Roma population, despite their well-documented vulnerability due to social determinants of health (SDOH). Additionally, the ongoing migrant crisis, which began in 2015, is not accounted for – despite *United Nations High Commissioner for Refugees (UNHCR)* reports [20] indicating that Serbia has taken in far more refugees from African countries than initially deemed feasible, even before the influx from Ukraine and Russia in February 2022. Currently, no reports are available on health status of women refugeeed in Serbia, whether they are still displaced and live in camps or are in process of integration, although the generous universal coverage makes follow up exams possible for both groups.

Sex-specific risk factors, i.e., adverse pregnancy outcomes, early menopause irrelevant of mechanism, mental health, violence with an emphasis on intimate partner violence, are defined in the last State-of-the-Art Review for Primary Prevention of Cardiovascular Disease in Women [21]. However, the window of opportunity – often referred to as the “fourth trimester” [13] – remains largely overlooked, not only among African American women but across populations more broadly [22]. Fortunately, awareness of this critical period is increasing, as long-term health risks are now being recognized globally, including in Scandinavia [23].

The emergence of the SARS-CoV-2 virus and the COVID-19 pandemic exposed yet another layer of suboptimal care for women. Initially, misinformation suggesting that women were less susceptible to infection led to their disproportionate placement on the frontlines, increasing their exposure to patients more than men [24]. This was followed by numerous reports highlighting higher mortality rates, more complex clinical presentations, and increased morbidity among women. Finally, the lingering effects of long COVID, along with its cardiovascular complications and the confounding impact of vaccines, have further underscored these disparities [9][25][26][27][28][29]. All of the above has not only driven the need for more sex-specific research designs but also highlighted the importance of addressing the infodemic and the role of health literacy in its lingering detrimental effects.

Aims

Given the limited national data on this topic, we aimed to assess not only hospitalization rates among

women and men but also their awareness of risk factors for both themselves and the opposite sex. Additionally, we sought to explore preferred methods of communication with the healthcare system and their willingness to engage with telemedicine options.

METHODS

Our prospective research protocol was conducted at the Division of Cardiology of the University Clinical Center of Serbia from January 1st, 2024 to February 24th, 2024 with the ethical approval obtained from the Institutional Review Board of the Faculty of Medicine, University of Belgrade (December 2023).

During the specified timeframe, all patients hospitalized in two departments of our Division were systematically invited to participate in an educational interview and complete a multiple-choice questionnaire (MCQ). The questionnaire focused on patients' demographics, the presence and awareness of risk factors, preferred communication modalities for follow-up, and interest in telemedicine options. All patients signed an informed consent and provided contact information in case they wished to pursue follow up or refer family members they identified as unaware of cardiovascular burden.

The limitations of this pilot study included several factors: variations in local academic deadlines tied to the research protocol, which resulted in a two-week shortening of the study timeline; the holiday season, which added five days of complexity to patient inclusion, as well as the 14 weekend days; PCR positivity results for seasonal infections (COVID-19, Influenza A, Influenza B) led to mandatory immediate discharge by the hospital's infection control protocols, requiring follow-up and treatment at secondary or primary healthcare levels (as a result, patients not already included could not be retained for same-day participation or discharge); patients who underwent coronary angiography through the Day Hospital often stayed less than 12 hours in our department and were less motivated to engage with the local healthcare team providing post-catheterization care, resulting in early discharge the following day; denial of participation for various reasons; difficulty in understanding the questions posed; patients' critical condition, dementia, or psychiatric status at the time of screening.

STATISTICAL ANALYSIS

Due to the size, statistical analyses were limited to central tendency measures (mean), dispersion (SD, minimum and maximum), and absolute and relative frequency measurements, with a χ^2 test considered significant at a $p < 0.05$ or Fisher's exact test.

RESULTS

Out of a total of 130 patients of both sexes hospitalized between January 1st, 2024 and February 24th, 2024, 49 patients accepted to participate, 66 refused, while 15 had medically and ethically justified reasons for non-inclusion.

Men comprised 51.0% (25) and women 49.0% (24) of the included patients. The average age was 64.24 ± 12.35 years, with the youngest patient being 28 and the oldest 91. The age distribution is shown in Figure 1.

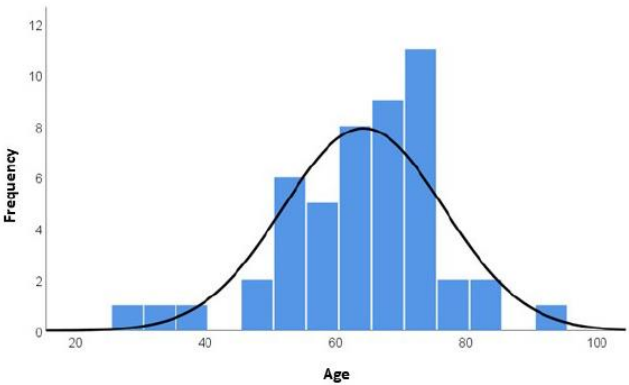


Figure 1.
Age distribution of the study population

In regard to risk factors' presence (detailed in Table 1) only dyslipidemia was significantly more present in women.

On the other hand, awareness levels for traditional and modern risk factors were low in both sexes and with no significant difference between the two groups, as show in Table 2.

Phone calls and text messages were the preferred modes of contact with the healthcare team, with no statistically significant difference between the sexes. As expected, women primarily served as household caregivers for the included men (Table 3).

Table 1. Frequency of risk factors according to sex

The presence of risk factors	Sex		p-value
	Men (n=25)	Women (n=24)	
Hypertension	18 (72.0)	16 (66.7)	0.686
Type 2 diabetes	10 (40.0)		0.115
Dyslipidemia	6 (24.0)	16 (66.7)	0.003
Obesity	12 (48.0)	13 (54.2)	0.666
Smoking	4 (16.0)	4 (16.7)	1.000
Migraine	1 (4.0)	5 (20.8)	0.098
Prior cancer treatment	1 (4.0)	5 (20.8)	0.098
Burnout	8 (32.0)	12 (50.0)	0.200
Physical activity	12 (48.0)	11 (45.8)	0.879
Alcohol	6 (24.0)	1 (4.2)	0.098
Data were presented as n (%)			

Table 2. Frequency of risk factors' awareness according to sex

The presence of risk factors	Sex		p-value
	Men (n=25)	Women (n=24)	
Hypertension	23 (92.0)	23 (95.8)	1.000
Type 2 diabetes	22 (88.0)	22 (91.7)	1.000
Dyslipidemia	20 (80.0)	20 (83.3)	1.000
Obesity	21 (84.0)	24 (100.0)	0.110
Smoking	23 (92.0)	21 (87.5)	0.667
Migraine	22 (88.0)	22 (91.7)	1.000
Family history	9 (36.0)	10 (41.7)	0.684
Early menarche	0 (0.0)	4 (16.7)	1.000
Late menarche	0 (0.0)	3 (12.5)	1.000
Infertility	0 (0.0)	3 (12.5)	1.000
In vitro fertilization	0 (0.0)	5 (20.8)	1.000
Adverse pregnancy outcomes	0 (0.0)	5 (20.8)	1.000
Peripartum complications	0 (0.0)	6 (25.0)	1.000
Prior cancer treatment	13 (68.4)	13 (54.2)	0.342
Burnout	20 (80.0)	14 (58.3)	0.100
Data were presented as n (%)			

Table 3. Frequency of preferential contact with the healthcare team and follow up according to sex

Telemedicine options	Sex		p-value
	Men (n=25)	Women (n=24)	
Phone call	19 (76,0)	18 (75,0)	1,000
Text message	15 (60,0)	11 (45,8)	0,321
Apps	6 (24,0)	7 (29,2)	0,682
Email	7 (28,0)	9 (37,5)	0,478
Social media engagement	3 (12,0)	3 (12,5)	1,000
Telemedicine, in general	1 (4,0)	2 (8,3)	0,609
Choice of healthcare team member for telemedicine	1 (4,2)	2 (8,7)	0,609
Societal support			
No one/Almost no one	12 (48,0)	16 (66,7)	12 (48,0)
Average/Maximum Support	13 (52,0)	0,187	
Data were presented as n (%)			

DISCUSSION

In our pilot study sample, we observed a lower hospitalization rate among women, who were older and had more comorbidities than men. These findings align with global data indicating a lower level of awareness regarding sex-specific risk factors and disease presentation, as well as delayed contact with the nearest healthcare service or emergency number, as noted in guidelines from both sides of the Atlantic [30][31][32]. Despite existing discrimination in the diagnostic and treatment approaches for conditions like MINOCA/INOCA, SCAD, and myocardial bridges [9][16][33][34][35][36][37], recent reports confirming a two-fold higher mortality in patients presenting with MINOCA during acute coronary syndrome [38] may help reduce the stigma surrounding these conditions, even in the face of ongoing appeals [14][16][33][35] and the challenges posed by the COVID-19 pandemic on interventional cardiology services [24][39][40].

Regrettably, when comparing the health literacy levels on both traditional and modern risk factors for the development and progression of cardiovascular disease in our unit's post-pandemic setting, the awareness levels were not significantly improved compared to the previous year [41]. However, women – particularly those over 60 years of age – were

more informed about the link between reproductive and cardiovascular health, recognizing that reproductive history serves as a window into later cardiovascular and cerebrovascular risks, morbidity, and mortality. These connections are well-established [7][21][42][43][44], but it is up to all stakeholders and policymakers to raise societal awareness about cardiovascular health beyond the reproductive health focus, which has been traditionally promoted through the “bikini medicine” approach [9][15][45], to ultimately improve long-term cardiovascular health [45][46].

All modern risk factors were poorly recognized, highlighting a pervasive low level of health literacy that appears to be thriving in the era of the COVID-19 infodemic, despite well-established medical [47][48][49][50][51][52][53] and obstetric [12][49][54][55][56][57] knowledge on conditions that increase long-term cardiovascular risk in pregnant individuals – a term still absent from the Serbian medical lexicon, despite recommendations from international medical societies dedicated to gynecology and obstetrics. This gap in understanding also extends to the offspring, regardless of the method of conception.

What was surprising was the high level of resistance encountered when attempting to engage in educational conversations with men, particularly those who showed little interest in understanding or addressing their own risk factors. None of these individuals took the opportunity to schedule follow-up exams for themselves or for family members they recognized as having suboptimally controlled risk factors, across any level of prevention – from primordial to quaternary. Additionally, an interesting observation was made by two mid-career male team members: hospitalized men exhibited a culturally typical familiarity that bordered on rudeness in their communication with the healthcare team, particularly in interactions with junior female team members (one fellow, three residents, and one student). However, they tended to avoid engaging in similar behavior with mid-career female professionals (three attendings). This pattern was later confirmed by nursing staff. The described hostility, which could be interpreted as misogyny, was not quantified and could be considered a secondary outcome. This was not anticipated initially, and the research protocol did not include a specific questionnaire to capture such experiences among the various existing ones. Additionally, a comparison of these experiences with those from international studies in different settings was

not deliberately made to avoid potential bias. A larger, more targeted study on this issue should be conducted in future.

In contrast to the denialists, men who agreed to participate in completing the MCQ reported female household members as their primary source of social support. This aligns with a global phenomenon, irrespective of cultural context [24][39], where women are often responsible for well-established forms of unpaid work, a situation further exacerbated by the COVID-19 pandemic [24][39][58].

Although telemedicine implementation in Serbia was derailed by COVID19, modest national attempts in the domain of cardiovascular health of women have been made [59][60], so our seeking to understand better the needs of the patients of both sexes led us to conducting the MCQ part on willingness to embrace new technologies that are still not used in medical practice regionally. In our current sample, the motivation to use various existing technologies – ranging from text messages and phone calls to health-focused mobile apps and social media – was low for both women and men. While no statistical significance was found, this motivation was notably higher in women just one year ago [41]. These results are not surprising, as previous studies have shown that university students in France, in general, use health-related websites and apps [61]. However, our own study of final-year medical and sports medicine students [62] revealed that sex-specifically being female – was a predictor for using health apps, but only for the sports medicine group, not the medical students. Alarming, only 30% of female medical students reported using menstrual apps, considered helpful for reproductive health, compared to 41.4% of female sports medicine students. The national results, gathered within a similar timeframe at Belgrade University, underscore the critical importance of women’s heart centers and programs [9][10][11], such as the one launched at the University Clinical Center of Serbia [9][63]. These centers provide interdisciplinary and multidisciplinary diagnostic services, along with timely treatment for women throughout their lifespan, aiming to protect the most vulnerable populations. Additionally, they play a crucial role in optimizing health literacy across all social strata, with a focus on local logistical considerations [9][16][64][65][66]. These results highlight the need to modernize the core curriculum, extending beyond workshops for biomedicine students [67] to include tailored sessions for general practitioners [59] and cardiologists [60][68][69][70]. Modest efforts have

already been made, such as the introduction of the concept of preventive measures across a woman's lifespan in the cardiology fellowship program since 2023, included in one of the Belgrade University Faculty of Medicine's "Q & A" manuals [71]. Furthermore, from a public health perspective, where low health literacy impacts expenditures within our still-solidarity-based universal coverage health insurance model, further research of this kind could offer valuable educational interviews with patients, while gathering essential data to optimize care standards and necessary metrics, moving us a step closer to improving healthcare outcomes.

CONCLUSION

Despite the numerous limitations of our snapshot pilot research, our findings revealed a modest level of health literacy when patients were questioned about both their own and the opposite sex's cardiovascular disease risk factors. As expected, the social support system predominantly relied on female household and family members. Although not initially planned, researchers – regardless of gender, sex, or age – encountered a level of misogyny that remains to be quantified. Additionally, our results emphasize the importance of leveraging telemedicine and social media as sources of healthcare information, particularly for women, who showed a higher interest in using handheld devices to improve their own health and that of their family members.

Acknowledgments

The authors wish to express their gratitude to Dr Nina Rajović (Department of Medical Statistics and Informatics, Faculty of Medicine, University of Belgrade) for her help with the statistical analysis presented in this paper.

Conflicts of interest

None to declare pertaining to the conducted pilot study.

Author contributions

Conception or design of the work: BP, NKW, ZL, SDjD, DS, VK.

Acquisition

ZG, OB, MDj, PS, JVB, SP, DDj, IPDj, BP.

Analysis and interpretation of data

AMM, BP.

Preparing the draft of the manuscript

BP, PS, AMM, MDj.

Ethical approval

Faculty of Medicine University of Belgrade IRB approval (Dec 2023).

Competing interests

The authors have declared that no competing interests exist.

Funding information

This research did not receive a specific grant from any public, commercial, or not-for-profit funding agency.

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Svest o polno specifičnim faktorima rizika, prikrivena mizoginija i dugoročna optimizacija kardiovaskularnog rizika - rezultati pilot studije

Sažetak:

UVOD: Iako se zdravstvena pismenost smatra temeljem prevencije, polno specifičnoj prevenciji faktora rizika za razvoj kardiovaskularnih bolesti, vodećem uzroku mortaliteta žena globalno, i dalje se ne pridaje dovoljno značaja, a ustaljena kulturološka uverenja prednjače u odnosu na zvanične preporuke. **METODE:** Validirani upitnik kreiran kako bi edukovao bolesnika, a sa druge strane pomogao zdravstvenom timu da uči o upravljanju tradicionalnim i polno specifičnim modernim faktorima rizika, uključujući mogućnost sveobuhvatnog individualnog dugoročnog praćenja, ponuđen je svim hospitalizovanim pacijentima. **REZULTATI:** Od 130 pacijenata hospitalizovanih na odeljenju u periodu od 01.01. do 24.02.2024. kojima je upitnik ponuđen, 37.7% prihvatilo je da učestvuje, dok je 11.5% bilo isključeno iz različitih etičkih razloga. Ispitivane žene (49%) bile su starije od muškaraca, imale su viši stepen opterećenja tradicionalnim faktorima rizika, ali su posedovale i viši stepen znanja i zainteresovanosti za faktore rizika kod oba pola, dok su muškarci, posebno oni koji su odbili da učestvuju u anketiranju iz nepoznatog razloga, pokazali nezainteresovanost za navedene faktore rizika čak i kod bliskih rođaka i ukućanki. Muškarci za razliku od žena nisu pokazali zainteresovanost za upotrebu savremenih modaliteta telemedicine, iako moderna sredstva komunikacije koriste u gotovo istoj meri kao žene. **ZAKLJUČAK:** Dobijeni rezultati u skladu su sa onim dobijenim tokom pilot istraživanja sprovedenog samo na ženama prethodne godine. Međutim, ono što iznenađuje kada su u pitanju muški ispitanici jeste hostilnost iskazana prema kako mlađim, tako i doktorkama srednje generacije, koja nestaje kada im se obrati muškarac starije generacije kao član zdravstvenog tima. Ovakav rezultat potvrđuje da je mizoginiju potrebno aktivno suzbijati.

Ključne reči: zdravstvena pismenost; kardiovaskularna bolest; kardiovaskularni rizik; polno specifični faktori rizika; mizoginija