



REVIEW ARTICLE / ПРЕГЛЕДНИ РАД

Women in science and equity in Serbia – so near, yet so far

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SUMMARY

The concept of diversity, equity, inclusion and belonging is essential for research and academic programs and institutions worldwide, but although women do not lag behind men at entry and graduation from Serbian universities, equitable leadership does and it further hinders outcomes in every way: from translational science via healthcare up to legislative efforts to protect children, women and elderly. Although all these may seem as *l'art-pour-l'art* issues when compared to mere survival in war zones on two continents and all issues women face under circumstances of displacement and bans on rights to education, healthcare and sounds of their own voices in public, still it is the ongoing fight for rights lost in silence and where one least expects it that has to push every human being to fight for the oppressed and underprivileged.

Keywords: COVID-19; sex differences; gender differences; women in medicine; women in cardiology; women in STEM

INTRODUCTION

The close of the second decade of the 21st century, marked by the and the SARS-CoV2 (COVID-19) pandemic, unveiled another Pandora's box – one highlighting the pervasive inequities faced by women. These ranged from adequate treatment as patients, initially underestimated due to erroneous assumption that their sex offered protection against the disease [1, 2, 3], to the harsh working conditions endured by women in the healthcare sector,

who bore the brunt of the pandemic's first wave [1–6], and culminating in the widening of gaps in research opportunities and academic promotions [1, 2, 3].

The fight against “bikini medicine” in the United States has been gaining momentum in crossing borders with global campaigns teaching patients, physicians, researchers, legislators and other advocates that heart disease does take more lives of women than all cancers combined not just in the United States [2], but worldwide as well, as it does in Serbia [7],

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Figure 1. NOVAK 2022 and Women's Heart Programs: A Bare Necessity of Diversity and Inclusion, not a Fashion Accessory of Innovation (October 29, 2022, Novi Sad, Serbia)

although different practices and legislation in healthcare tend to hinder progress in that regard and the pandemic has, actually, emphasized the necessity of tailored comprehensive care for women [2, 3, 8, 9, 10]. On the other hand, as history has taught us before, all times of crises – such as the COVID-19 pandemic and ongoing warzones on two continents – lower the threshold for violence, not only displaced women, and in particular women of color suffer the most [11, 12], but in the least expected places and sociodemographic strata [2, 13–16]. This, in turn, brings us back to the necessity of diversity, equity, inclusion and belonging (DEIB) programs of academic institutions and that of Women's Heart Centers/Programs [2, 17, 18] that should follow the needs of the underserved population that women remain, especially where they suffer most discrimination [2]. Despite different models of the women's heart centers [2, 17, 18], the Serbian one [2] proposed positioning of its program aiming to a broader reach for socially-responsible and equitable healthcare, teaching, research and advocacy, which was also reaffirmed by the latest Presidential Advisory of the American Heart Association [9].

Taking it all in consideration, likeminded research groups continue to endeavor to fill the growing gaps that have heavily influenced Serbian scientific and healthcare landscapes, for the growing number of recorded femicides in Serbia [19] – where femicide is still not recognized as a criminal offense, yet prosecuted as an aggravated murder – are facilitating normalization of all lesser forms of violence women are subject to: women who report bullying and harassment are discouraged to do so via social media, social pressures and lack of diligence by the police and justice departments while lengthy proceedings end

up with none whatsoever or mediocre sanctions for the perpetrators whom everyone else sees still flourishing in their professional and social roles.

SERBIAN EQUITY SCENE: 2022–2024

United around the same idea that equity and meritocracy – and not patriarchal personal preferences – share the keychain for a thriving society our group continued organizing educational events targeting a wide population.

NOVAK 2022: the “Dr Nanette Kass Wenger” Women's Heart Program session

With SARS-CoV-2 pandemic approaching its end, gathering a variety of experts [1, 2, 20, 21, 22] of different fields (Figure 1), we re-addressed the issue of women's health aiming to dispel myths that keep hindering long term cardiovascular health of women in Serbia where – among other issues – vaccination rates of pregnant women were low, while data on newborns' COVID-19 infections unknown, although our microbiologists were among pioneers in the field starting from the first wave [23]. During the first year of pandemic, pregnant women lacking previously acquired immunity had an increased risk for both severe morbidity and mortality following SARS-CoV-2 infection when compared to non-pregnant [24, 25, 26], although infection was associated with higher risk of preterm delivery [27]. Still, in most neonates and infants SARS-CoV-2 infection was either asymptomatic or mild [28]. However, as studies showed that anti-SARS-CoV-2 antibodies are detected in cord blood of women infected with SARS-CoV-2, it is likely that some degree of protection against infection

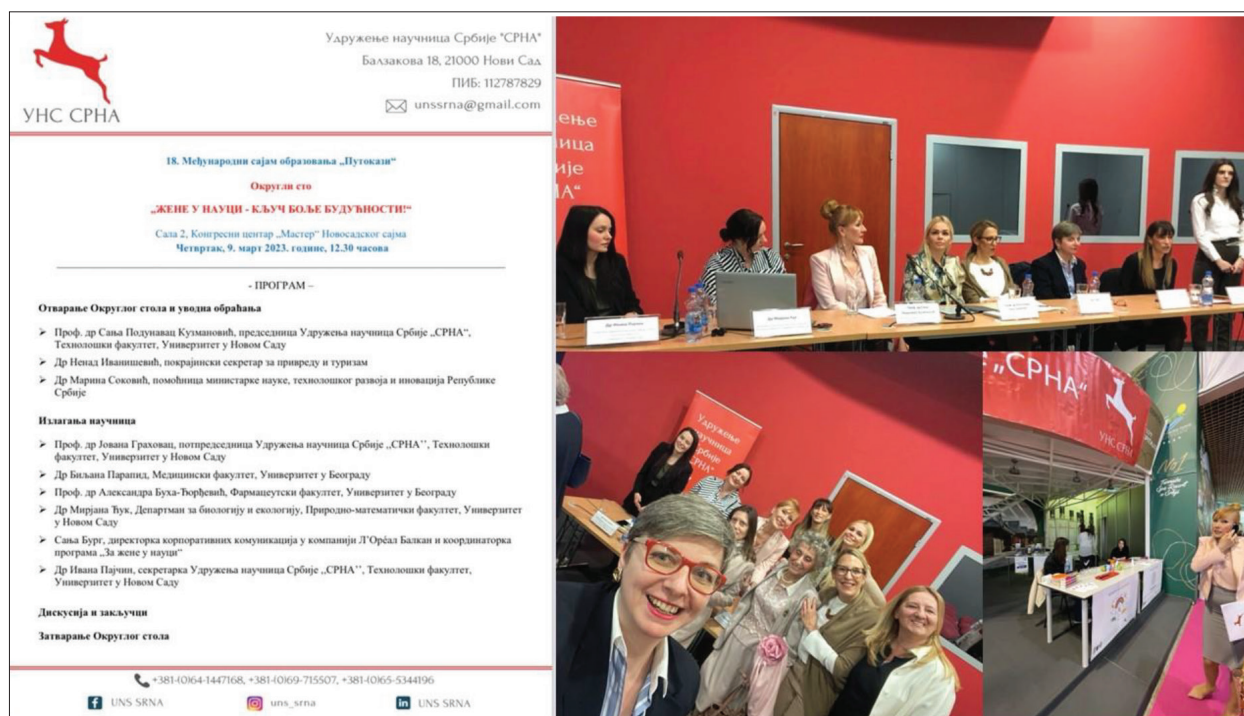


Figure 2. 18th International Fair of Education and SRNA's roundtable "Women in Science – Key to a Better Future" (March 9, 2023, Novi Sad, Serbia)

and/or risk reduction of developing severe COVID-19 in infants may be expected if the infants are born to women with pre-existing immunity [26, 29]. In order to beat the pandemic, the first COVID-19 vaccine based on messenger RNA technology was approved in December 2020 by the Food and Drug Administration and although this vaccine has been shown to be highly effective in real world setting, pregnant individuals were not included in the initial vaccines' efficacy trials [30]. For several months a clear universal evidence-based recommendation was expected for the immunization of this vulnerable population, which led to lesser acceptance of the vaccine in the pregnant population [31]. Also, it is considered that the benefits of vaccination have been communicated "confusedly" with lack of data about COVID-19 vaccine safety [26, 32]. Finally, in mid-2021 it was reported that of the top 20 countries affected by pandemic, 11 allow vaccination of pregnant women, of which two have classified pregnant women as a high-risk group for which vaccination is safe. On the other hand, only five of the 20 countries with high maternal mortality allow vaccination of pregnant women but none of these countries prioritized vaccination of pregnant women [33]. Pointing out the safety as the most challenging issue when it comes to vaccinating pregnant women, it is stated that prenatal mRNA COVID-19 vaccination did not show association with adverse immediate pregnancy outcomes or newborn complications [34]. Injection-site pain, fatigue and myalgia, as the most frequent reactions after COVID-19 vaccination in pregnant women, were reported at the same level among non-pregnant women [35] and more frequent after the second dose of mRNA vaccines. Moreover, the incidence rates of adverse pregnancy and neonatal outcomes (fetal loss, preterm birth, and neonatal

death) were similar between vaccinated pregnant women and the same population before the pandemic, but also between vaccinated and unvaccinated pregnant women during the pandemic [30, 34]. Safety concerns of COVID-19 vaccines' components and technological platforms were in detailed described by Ciapponi et al. [36], whose team did not find any evidence of pregnancy-associated safety concerns of COVID-19 vaccines (selected for review by the COVAX MIWG, COVID-19 Vaccines Global Access-Maternal Immunization Working Group) or their components and platforms when used in other vaccines. Still, vaccine naïve and sceptics were mostly encountered amongst nurses in our healthcare sector, even outside family planning concerns, although effects of repeated infections have been demonstrated to influence cardiovascular morbidity, extended absences from work, reassignment requests that hospital systems sometime cannot fulfill, which overall increases burnout [2, 8, 37] of an already exhausted workforce they represent.

SRNA roundtable: March 2023

As the educational fair coincided with the International Women's Day, SRNA – the pioneering #SheForShe team of Serbian academia – organized a roundtable (Figure 2) that gathered women researchers from different areas who discussed not only importance of their research fields in which both their sex is rare, but sex disparities tend to be neglected even when they influence the outcomes of their research: biology and biodiversity[38], medicine [2], pharmacy [39], sociology [15, 16, 40] and so many more. From the medical standpoint, it is well known that anatomy [41, 42, 43] and physiology mandate the response



Figure 3. The First Continuous Medical Education (CME) at the University of Belgrade, Faculty of Medicine “Gender differences recognition as a road to improving healthcare of women” held on February 22, 2024 (Belgrade, Serbia) was offering a six-hour-long CME and as refreshments muffins from MuffinStore (Belgrade, Serbia) as the first family-owned catering company in Serbia that hires only women over 40 years who were fired and cannot find employment elsewhere

to disease, as well as treatment, but still, women remain under-represented in research trials even when women are principal investigators [44] and despite ongoing era of modern pharmacology in cases of drugs that exhibit clear benefit for men in terms of long term survival and complications’ free follow up [45] and even in fields that should be in the scope of growing research as lactating mothers [46]. Yet, as we live in the era of sustainable development and modernizing legislations to keep up the pace with research and technology who are expected to further their collaborations in every way and to which Serbia has committed [47], equity is also invited to this party. Fortunately, challenging fields of under-financed research and research talents, has found one of its loudest advocates in the L’Oréal Fund for Women that has selflessly endorsed research led

by women in Serbia and some of the panelists shared their own experience as laureates or mentors of mentees whose research projects were supported by L’Oréal in Serbia via their annual grants.

CME at FMUB: 2023/2024

For the first time at the Faculty of Medicine of the University of Belgrade (FMUB), during the school year 2023/2024, a continuous medical education (CME) program (Figure 3) designed by basic science researchers [41, 42, 43, 48, 49], clinicians [1, 3, 13, 18, 20, 21, 22, 45, 50–61], public health [62] and legal [63] experts was proposed and approved as a six-hour-long CME credits aiming to help recognize and fight discrimination of different

patients' populations who often carry a stigma of their sex, gender, age, social determinants of health and personal choices that are not judged in other parts of Europe and the world: women, elderly, displaced people with emphasis on women and children, different addicts, prostitutes and LGBTQIA+ who face endless forms of discrimination from both medical and legal perspectives when seeking medical help for themselves or as caregivers/partners of ill or hospitalized LGBTQIA+ patient. The first, inaugural CME had been planned to be held during the "16 days of activism" of 2023 at the Ceremonial Hall, but eventually pushed for Heart Month of the AHA, i.e., February 2024, due to logistic reasons and it scored a remarkable 4.93/5 per FMUB's reports in Summer 2024 which encouraged the team to pursue re-accreditation in the 2024/2025 and promote further the round-table concept that encourages participants to exchange more easily on experience, advice seeking and ideas for improvement needed in their respective areas and medical and legal practices. The CME was endorsed by the Ministry of Education of the Republic of Serbia led by Professor Slavica Đukić-Dejanović, the Office of the Commissioner for Protection of Equality of the Republic of Serbia Ms. Brankica Janković and office of UN WOMEN in Serbia in particular Ms. Milana Rikanović and Ms. Nevena Marčeta.

"AND, WHAT NOW?" EN LIEU DE DISCUSSION

Discrimination in all walks of life comes in all sizes, shapes and colors and never goes under the DEIB radar where one is fully in function. Regrettably, in different corners of the world where one lacks in function of local politics, we – on the verge of the second quarter of the 21st century – witness girls and young women being stripped off their basic human rights as rights to education and

healthcare, which then makes misogyny in academia [44] and hospital corridors [64] almost seem like a ridiculous complaint of the "privileged". Yet, one cannot be considered privileged if all his or her peers do not share the same privileges worldwide. From a broader research perspective, inclusion must start from female mice in our labs – for they exhibit behavior more stable than that of their male counterparts in neuro-science research [65] – up to leadership positions free of covert misogyny that surely plays a yet not quantified role in science, technology and engineering and mathematics (STEM), so that #WomenInSTEM would not remain a mere hashtag trending on social media outlets on themed occasions together with #WIM (women in medicine).

CONCLUSION

DEIB is an everyday necessity that ensures all living in the 21st century with rights achieved in the previous one, while equality and equity need to start walking hand in hand whatever the journey might be called – research, education, healthcare or politics – for a society to thrive for the benefit of all.

Ethics: The authors declare that the article was written according to ethical standards of the Serbian Archives of Medicine as well as ethical standards of institutions for each author involved.

Conflict of interest:

BP: Boston Scientific EMEA (DE& I, 1st Female Cardiologist Advisory Board, position accepted Nov 30, 2021); THEMIS Foundation (Belgrade, Serbia), Founder. **DB, MM:** THEMIS Foundation (Belgrade, Serbia), Research & Development council.

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Жене у науци и равноправност у Србији – тако близу, а тако далеко

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САЖЕТАК

Концепт разноликости, једнакости, инклузије и припадности кључан је за истраживачке и академске програме и институције широм света. Међутим, иако жене не заостају за мушкарцима приликом уписа и дипломирања на универзитетима у Србији, праведно лидерство то чини, што додатно отежава исходе на сваки начин: од транслационе науке, преко здравствене заштите, па све до законодавних напора за заштиту деце, жена и старијих доба. Иако наведени појмови могу изгледати налик *l'art-pour-l'art* проблемима

када се упореде са пуким преживљавањем у ратним зонама на два континента и свим проблемима са којима се жене суочавају током расељавања, као и ускраћивањем права на образовање, здравствену заштиту и слободно изражавање мишљења на јавним местима, борба је непрестана за сва права која се губе у тишини и то на местима где се то најмање очекује. Свако људско биће мора да се бори за угњетене и обесправљене.

Кључне речи: ковид 19; полне разлике; родне разлике; жене у медицини; жене у кардиологији; жене у науци