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Determinants of hypertension and treatment-seeking behavior among reproductive-age women in India: a cross-sectional study

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Cite this Article

Sharma N, Thakur A, Santos C, Sengupta P, Khubchandani J, Determinants of hypertension and treatment-seeking behavior among reproductive-age women in India: a cross-sectional study. The Evi. 2023:1(1):4-11. DOI:10.61505/evidence.2023.1.1.1

Available From https://the.evidencejournals.com/index.php/j/article/view/1/

Received:	2023-07-20
Accepted:	2023-09-21
Published:	2023-10-12

Evidence in Context

Prior Evidence: Previous studies have indicated a rising burden of non-communicable diseases, particularly hypertension, globally and in India. Hypertension has been identified as a leading risk factor for various health issues, especially among women of reproductive age. Socio-demographic determinants, such as age, socio-economic status, and BMI, , have been recognized as risk factors for developing hypertension in various regions.

Evidence added by this study: This study delves deeper into the socio-demographic determinants influencing hypertension and treatment-seeking behavior among reproductive-age women in India using NFHS-5 data. It reveals that about 5% of these women are hypertensive, with a significant number not seeking treatment. The study emphasizes the need for tailored health promotion campaigns and strategies for this demographic in India.

To view Article

Abstract

Background: The burden of non-communicable diseases (e.g., hypertension) has become exceedingly high as a consequence of the epidemiological transition. Further insights into the socio-demographic determinants of hypertension specifically among women are much needed for prevention initiatives.

Objective: The objective of this study was to examine the impact of sociodemographic determinants on the prevalence of hypertension and treatment-seeking behavior among reproductive-age women in India.

Methods: In this study, we focused on a population of reproductive-age women from India comprising 116,318 participants. Data from the National Family Health Survey (NFHS) of India were analyzed. We examined the relationship between reported hypertension prevalence and socio-demographic factors such as age, education level, place of residence, employment status, and income level. Logistic regression was also employed to calculate adjusted odds ratios (aOR) and their corresponding 95% confidence intervals (95% CI) to examine these relationships.

Results: Out of the 116,318 participants in the study, 6,008 individuals (5.17%) reported having hypertension, with only 74.37% of them seeking treatment. Multivariable model analysis revealed that women in higher age groups had a higher risk of reporting hypertension [aOR= 1.45, 95% CI= 1.43-1.47]. Additionally, those belonging to the wealthiest families were also significantly more likely to report hypertension [aOR= 1.75; 95% CI= 1.57-1.94].

Conclusion: This study highlights that about 5% of women in the reproductive age group were found to be hypertensive, and a considerable number of them did not seek treatment. The findings warrant tailored health promotion campaigns for hypertension prevention among women of reproductive age in India.

Keywords: *Hypertension Reproductive-age women Socio-demographic determinants Treatment-seeking behavior India NFHS-5 (National Family Health Survey-5) Prevalence Non-communicable diseases (NCDs) Cardiovascular disease (CVD) Logistic regression*

Introduction

Non-communicable diseases (NCDs) are the leading causes of global mortality and morbidity. In 2015, NCDs accounted for more than 50 million deaths worldwide (equivalent to 70% of all deaths) [1]. Since the past few decades, cardiovascular diseases have consistently ranked among the top causes of death worldwide [2]. More specifically, hypertension has been ranked as a leading risk factor for premature mortality and health loss, mostly from ischemic heart disease and stroke[3]. In the 20th century, NCDs such as cardiovascular diseases were mostly a concern in developed countries[4]. However, NCDs are now causing a large number of deaths worldwide, irrespective of whether the country is developed or developing. Among all NCDs, cardiovascular disease (CVD) stands as the primary cause of death among women in both developed and developing countries. Various studies show that women are more likely to experience more than one metabolic risk factor, which directly increases the prevalence of NCDs among them. Hypertension is a well-established, prevalent, and modifiable risk factor for cardiovascular disease[3, 5, 6, 7].

In India, one of the largest countries by population, the prevalence of hypertension was reported to be 27.1% among men and 26.4% among women (which could be higher than some of the neighboring countries) [8, 9]. Furthermore, the risk of developing hypertension in India has been reported to be 6 to 8 times higher in elderly individuals and 2 to 3 times higher in the age group of 35 to 59 years compared to those in the 20 to 34-year-old age group[9]. Also, hypertension and hemorrhage have been identified as leading causes of death among reproductive-age women in India [10]. Less than 10% of Indian men and women are aware of their hypertensive condition, while the majority remain unidentified. Among those with hypertension, more than half have been reported to actively seek treatment[9, 10, 11]. Studies have also found that in India, almost a fifth of the women of reproductive age have undiagnosed hypertension with profound regional differences (e.g. 17.09% in rural areas and 21.73% in urban areas according to one study)[11]. Also, the contribution of pregnancy-induced hypertension to maternal mortality is likely underestimated[12].

Much of the research on hypertension prevalence, determinants, and prevention has focused on individuals in developed countries. Also, hypertension control programs predominantly target the elderly population, thus overlooking the early screening of other vulnerable groups like women, especially those of reproductive age [13-16]. In this study, we investigated the factors that affect hypertension-related treatment-seeking behavior among women in India. Also, we explored the variation in hypertension prevalence among women in the reproductive age group and its association with age groups and socioeconomic status. We utilized data from the 2019–2020 National Family Health Survey (NFHS-5), India focusing on women of reproductive age.

Methods

Ethical considerations

The study does not include any identifiable information about the participants involved in the survey since it utilizes secondary data. The dataset used in the study is readily accessible from the public domain for research purposes. Therefore, approval through an institutional review board is not required.

Study Design and Sample

This study is based on the secondary data obtained from the NFHS-5 conducted in 2019–2020. The data was synchronized from the latest fifth NFHS survey in the series. It is a multi-round, large-scale survey conducted throughout India with a representative sample of households. The NFHS was first launched by the Ministry of Health and Family Welfare, New Delhi, in 1991. To date, a total of five rounds of NFHS have been conducted by the International Institute of Population Sciences (IIPS) in Mumbai under the supervision of the Ministry of Health & Family Welfare, Government of India.

The survey provides vital information on household populations and housing characteristics, basic demography, and socio-economic characteristics. It also shines a light on crucial indicators like infant and child mortality, fertility, family planning, anemia, nutrition, morbidity, women's empowerment, maternal and child health, and domestic violence. This information is provided for both the entire country and discretely for every State/Union Territory in India. In NFHS-4 (2015–2016), it was the first time that information on emerging health issues, and non-communicable diseases like hypertension and diabetes mellitus, was gathered. The primary objective of conducting successive rounds of NFHS is to make essential health information and its indicators available. It also focuses on emerging health-related issues of the population. Therefore, the information obtained from NFHS assists policymakers in identifying public health needs and introducing programs for specific health issues. Organized questionnaires were administered, and women aged 15–49 and men aged 15–54 in the selected sample of households were eligible for interviewing. A total of 610,000 individuals were interviewed. This study analyzes the prevalence of hypertension and its treatment-seeking behavior among women of reproductive age (N= 116,318), and its association with socio-demographic variables (age, level of education, place of residence, employment, and income level).

Outcome variable

The prevalence of hypertension and its treatment-seeking behavior serve as the outcome variables. These variables were constructed with the help of certain questionnaire items. For instance, the survey included a specific question, "Question 1: Do you presently have hypertension?" This question aimed to assess the prevalence of hypertension among women in the reproductive

Age group. In addition, the question, "Have you sought treatment for hypertension?" was used to identify treatment-seeking behavior among hypertensive women.

The participants were asked if they currently have hypertension, and if they do, whether they have sought treatment for it.
A correct response to the above-mentioned questions falls within the provided options: "yes," coded as "1," and "no," coded as "2." The option "don't know" is also available and is coded as "8." If the participants are recorded as hypertensive, a further question regarding treatment-seeking behavior is asked. The responses are recorded as "1" for "yes" and "2" for "no."

Exposure variables

Socio-demographic variables, including age, level of education, place of residence, employment, and income level, were considered as exposure variables. These variables were selected based on a review of the literature. They were further categorized as follows: age group (15–19, 20–24, 25–29, 30–34, 35–39, 40–44, and 45–49), The study examined various demographic factors, such as type of residence (urban or rural), highest level of education (no education, primary, secondary, or higher), and wealth index (categorized as poorest, poorer, middle, richer, and richest). These factors were analyzed to assess their influence on the prevalence of hypertension among women in the reproductive age group. They were derived from the latest NFHS to determine the association between the prevalence of hypertension, its treatment-seeking behavior, and the exposure variables.

Statistical analysis

The socio-demographic characteristics of women in the reproductive age group were summarized using descriptive statistics. To understand the hypertension status of the women, we first calculated the percentages and frequencies and then presented the data in tabular form. The prevalence of hypertension and its treatment-seeking behavior, as outcome variables, were categorized as "Having hypertension" and "Not having hypertension". In this study, we investigated the relationship between socio-demographic determinants (exposure variables) and the prevalence of hypertension, as well as the behavior of seeking treatment for hypertension among women in the reproductive age group (outcome variable). To assess the strength of this association, we conducted a multivariate logistic regression analysis. The results were presented in the form of adjusted odds ratios (aOR), along with their corresponding 95% confidence intervals (CI) and p-values ($P \leq 0.05$) to determine statistical significance. Data analysis was performed using Stata.

Results

A total of 115,379 women in the reproductive age group participated in the study and Table 1 presents the frequency distribution of their sociodemographic characteristics The prevalence of hypertension was highest in the age group of 45–49 years, with 1,756 individuals (29.23%), followed by the age groups of 40–44 years, with 1,292 individuals (21.50%), and 35–39 years, with 1,010 individuals (16.81%). The lowest prevalence of hypertension was observed in the age group of 15–19 years, with 188 individuals (3.13%). The study reveals that most of the participants resided in rural areas (70.92%) while 29.08% lived in urban areas. The majority of the respondents, 43.39%, had completed secondary-level education, followed by 30.34% with no education. Only a small fraction of respondents, 9.35%, had achieved higher education. The combined wealth index revealed distribution across all economic statuses, with 22.69%, 23.04%, 21.30%, 18.22%, and 14.74% falling into the categories of poorest, poorer, middle, richer, and richest, respectively. Figure 1 shows the treatment-seeking behavior of hypertensive women in absolute numbers and percentages. Of the total hypertensive respondents (6008), 4468 (74.37%) had sought treatment for hypertension, whereas 1540 (25.63%) had not.

Table 1 Basic socio-demographic characteristics of study participants based on hypertension status (N= 1,15,379)

Variables	Hypertensive, no (%)	yes (n=6008)(%)	Total (115379)(%)	P-value
Age in 5-year groups				0.000
15-19	19152 (17.51%)	188 (3.13%)	19340 (16.76%)	
20-24	18107 (16.56%)	377 (6.27%)	18484 (16.02%)	
25-29	17377 (15.89%)	629 (10.47%)	18006 (15.61%)	
30-34	14613 (13.36%)	756 (12.58%)	15369 (13.32%)	
35-39	14439 (13.20%)	1010 (16.81%)	15449 (13.39%)	
40-44	12416 (11.35%)	1292 (21.50%)	13708 (11.88%)	
45-49	13267 (12.13%)	1756 (29.23%)	15023 (13.02%)	
Type of place of residence				0.000
urban	28344 (25.92%)	1747 (29.08%)	30091 (26.08%)	
rural	81027 (74.08%)	4261 (70.92%)	85288 (73.92%)	
Highest educational level				0.000
no education	26606 (24.33%)	1823 (30.34%)	28429 (24.64%)	
primary	12732 (11.64%)	1016 (16.91%)	13748 (11.92%)	
secondary	54571 (49.90%)	2607 (43.39%)	57178 (49.56%)	
higher	15462 (14.14%)	562 (9.35%)	16024 (13.89%)	
Wealth index combined				0.000
poorest	25137 (22.98%)	1043 (17.36%)	26180 (22.69%)	
poorer	25272 (23.11%)	1317 (21.92%)	26589 (23.04%)	
middle	23310 (21.31%)	1271 (21.16%)	24581 (21.30%)	
richer	19784 (18.09%)	1234 (20.54%)	21018 (18.22%)	
richest	15868 (14.51%)	1143 (19.02%)	17011 (14.74%)	
P-values by t-test for continuous variables and Chi2 test for binary/categorical variables.				

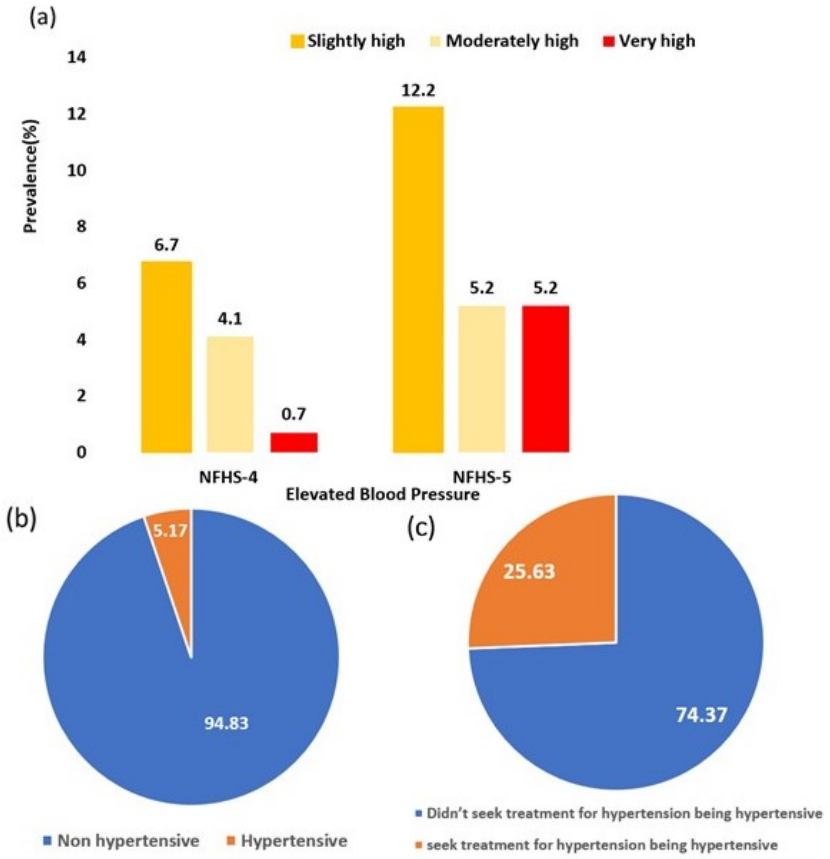

Figure 1: (a) Comparison of hypertension prevalence between NFHS-4 and NFHS-5; (b) prevalence of hypertension among women of reproductive age group (N= 6008); (c) treatment-seeking behavior among women of reproductive age group (N=1540).

Table 2 presents the results of the multivariable logistic regression analysis, which aimed to assess the association between the prevalence of hypertension and the sociodemographic characteristics of the study participants. We found significant associations between the prevalence of hypertension and the following socio-demographic characteristics: respondent's current age [adjusted odds ratio (aOR) = 1.08, 95% confidence interval (CI): 1.06–1.11], type of residence (rural vs. urban) [aOR = 0.95, 95% CI: 0.89–1.02], highest educational level (no education vs. higher education) [aOR = 1.18, 95% CI: 1.06–1.33], primary education [aOR = 1.62, 95% CI: 1.44–1.81], secondary education [aOR = 1.36, 95% CI: 1.23–1.50], and wealth index (poorest vs. poorer) [aOR = 1.23, 95% CI: 1.13–1.33], middle [aOR = 1.25, 95% CI: 1.14–1.36], richer [aOR = 1.44, 95% CI: 1.31–1.58], and richest [aOR = 1.72, 95% CI: 1.55–1.91].

Table 2: Multiple logistic regression analysis for the association between hypertension and socio-demographics of study participants (N= 1,15,379)

Variable	aOR [95% CI]	P-value
Respondent's current age	1.08 [1.08, 1.08]	0.00
Type of place of residence: base rural		
Urban	0.95 [0.89, 1.02]	0.17
Highest educational level: base higher		
no education	1.18 [1.06, 1.33]	0.00
primary	1.62 [1.44, 1.81]	0.00
secondary	1.36 [1.23, 1.50]	0.00
Wealth index combined: base poorest.		
poorer	1.23 [1.13, 1.33]	0.00
middle	1.25 [1.14, 1.36]	0.00
richer	1.44 [1.31, 1.58]	0.00
richest	1.72 [1.55, 1.91]	0.00

Table 3 presents the results of another multivariable logistic regression analysis, which aimed to determine the association between the treatment-seeking behavior of hypertensive women in India and sociodemographic characteristics. The sociodemographic variables significantly associated with treatment-seeking behavior among hypertensive women were current age [(aOR) = 1.04, 95% confidence interval (CI): 1.03–1.04], place of residence (rural vs. urban) [aOR = 0.96, 95% CI: 0.83–1.11], highest educational level (no education vs. higher education) [aOR = 1.60, 95% CI: 1.27–2.02], primary education [aOR = 1.89, 95% CI: 1.47–2.42], secondary education [aOR = 1.54, 95% CI: 1.26–1.89], and wealth index (poorest vs. poorer) [aOR = 1.05, 95% CI: 0.87–1.26], middle [aOR = 1.22, 95% CI: 1.00–1.48], richer [aOR = 1.28, 95% CI: 1.04–1.57], and richest [aOR = 1.48, 95% CI: 1.18–1.86].

Table 3: Multiple logistic regression analysis for the association between hypertension treatment-seeking behavior and socio-demographic characteristics of study participants (N= 6008)

Variable	aOR [95% CI]	P-value
Respondent's current age	1.04 [1.03, 1.04]	0.00
Type of place of residence: base rural		
urban	0.96 [0.83, 1.11]	0.58
Highest educational level: base higher		
no education	1.60 [1.27, 2.02]	0.00
primary	1.89 [1.47, 2.42]	0.00
secondary	1.54 [1.26, 1.89]	0.00
Wealth index combined: base poorest		
poorer	1.05 [0.87, 1.26]	0.63
middle	1.22 [1.00, 1.48]	0.05
richer	1.28 [1.04, 1.57]	0.02
richest	1.48 [1.18, 1.86]	0.00

Discussion

This study sought to investigate the influence of socio-demographic determinants on hypertension and treatment-seeking behavior among women of reproductive age in India. Our findings underscore a significant association between socio-demographic factors, hypertension prevalence, and treatment-seeking behavior. Of the 116,318 study participants, 6008 (5.17%) reported currently having hypertension, with only 74.37% of them having sought treatment. A positive relationship between sociodemographic factors and hypertension indicates the importance of these factors in the prevalence of hypertension and possibly many related diseases. Our study outcomes align with a previous study conducted on hypertension disorders during pregnancy among women in the reproductive age group of 15–49 in India, which utilized data from the recent nationally representative survey, NFHS-4. In a similar study, a sample size of 1,07730 women participated, and out of these, 6260 women were found to be hypertensive, which concluded that 5.8% of women were hypertensive[17]. Comparable findings were seen in another Indian study, indicating that about 1 in 10 women of reproductive age, specifically between 15–49 years, suffer from hypertension, and the overall prevalence among them was observed to be 11.3%[18].

According to our study, of the 6008 hypertensive respondents, only 4468 have sought treatment for hypertension, leaving 1540 who have not. This shows that 74.37% have sought treatment while 25.63% of hypertensive women have not. Also, our study reveals a higher prevalence of hypertension among participants aged 45–49 years, followed by those aged 40–44 years (21.50%), and 35–39 years (16.81%). These results align with other studies that demonstrate an increased risk of hypertension with age[19][20]. Studies from other developing countries and in the Southeast Asia region have also highlighted a higher prevalence of hypertension in women over 30 years of age compared to those in the 15–29 age group. Furthermore, we found a higher prevalence of hypertension among rural women, in line with previous studies from developing countries [21]. These findings also highlight the rapid increase in hypertension among the rural population as per NFHS-4 data. Place of residence, therefore, is a significant sociodemographic determinant of hypertension prevalence and treatment-seeking behavior in Southeast Asia. Previous studies have shown that rural populations tend to add more salt to their food compared with urban populations and may have other lifestyle risk behaviors potentially leading to higher hypertension prevalence and lower tendencies to seek treatment [13-16, 22, 23].

Our findings are similar to another Indian study where the prevalence of undiagnosed hypertension was 18.63%. This study reports a similar overall weighted prevalence of undiagnosed hypertension among women of the reproductive age group (15–49)[11]. It also reports that the self-reported hypertension was at 8.86%[11]. Furthermore, a study by Ramakrishnan and colleagues [24] estimated an overall hypertension prevalence of 30.7% (95% confidence interval [CI]: 30.5, 30.9), with women specifically at 23.7% (95% CI: 23.3, 24), indicating that approximately a third of the Indian adults are affected by hypertension. Other regional studies have also suggested that the prevalence of hypertension among pregnant Indian women could range from 5-15% [25, 26, 27].

Previous evidence from the studies has shown that women of reproductive age group suffer the most significant morbidities in endemic areas[13]. Specific and tailored strategies are needed to help women overcome these challenges and develop treatment-seeking behaviors. Patient-centered prevention interventions should be introduced as the control of hypertension is less expensive than treatment[13]. Integration of hypertension care services at the grassroots level of primary health care may prove beneficial for women. Women who seek treatment and those who have developed treatment-seeking behavior often find accessing healthcare services difficult and many of them in turn avoid visiting health care centers[14]. Improving the accessibility of services at the primary health care level is essential as it directly impacts the approachability of care provided at the health care center[14]. Therefore, irrespective of socio-demographic factors, women should be enabled to seek treatment. The strategies should be culturally appropriate, applicable, and focused on the self-management of hypertension among women[15]. Considering the disparities in hypertension prevalence among women in India it is also crucial that national-level strategies be developed with a focus on education and awareness [16]. Interventions targeting behavior change through different approaches, such as education, provision of tailored services, training for self-care management, and involvement of the targeted group in policymaking and execution, are needed. This study provides a robust estimate of the overall prevalence of hypertension within a large sample representing women in the reproductive age group (15–49) in India. It sheds light on the impact of sociodemographic factors on hypertension prevalence and treatment-seeking behavior, contributing to a better understanding of the subject matter.

Limitations

The results of this study have a few limitations. First, given the cross-sectional nature of the study, causal relationships cannot be inferred with certainty. Second, this study is confined to the information available in the NFHS-5 dataset and may not reflect population estimates from across India. Third, the NFHS-5 questionnaire asked, "Do you currently have hypertension?" to determine the prevalence of hypertension. The self-reported prevalence of hypertension by the participants may be biased, leading to potential underreporting of hypertension or treatment-seeking behavior. The data should ideally be matched or cross-verified with healthcare center records. Also, we could not analyze some important factors, such as perceived severity among women exhibiting poor treatment-seeking behavior, as well as the distance and time required to reach healthcare centers for treatment. Despite these limitations, our study is one of the largest that indicates the influence of sociodemographic factors on hypertension and treatment-seeking behavior among women of reproductive age group in India. The factors include age group, place of residence, education level, and wealth index.

Conclusion

This national study of hypertension among reproductive-age women in India found that approximately 5.17% of women in this group were diagnosed with hypertension and a significant proportion of these women are not actively seeking treatment. Sociodemographic factors were associated with hypertension prevalence and treatment seeking for hypertension. Tailored health promotion campaigns specifically targeting the prevention of hypertension among women in this age group in India are warranted as such campaigns hold immense potential to increase awareness, facilitate early identification, and promote effective management of hypertension, thereby leading to a reduction in premature mortality and ameliorating health loss. By addressing the gaps in treatment-seeking behavior, these initiatives can also substantially contribute to the overall well-being of women in the reproductive age group.

Supporting information
None

Ethical Considerations
None

Acknowledgments
None

Funding
This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Author contribution statement: Neonika Sharma: Conceptualization (lead); writing – original draft (lead); formal analysis (lead); writing – review and editing (equal). **Ananya Thakur**: conceptualization, Software (lead); writing – review and editing (equal). **Celso Augusto Guimarães Santos**: conceptualization, Software (lead); writing – review and editing (equal). **Paramita Sengupta**: conceptualization, Software (lead); writing – review and editing (equal). **Jagdish Khubchandani**: Conceptualization (lead); writing – original draft (lead); formal analysis (lead); writing – review and editing (equal).

Data availability statement
Data included in article/supp. material/referenced in article.

Additional information
No additional information is available for this paper.

Declaration of competing interest
The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article. Celso Augusto Guimarães Santos, and Jagdish Khubchandani are authors of this paper. Therefore, the peer review process was managed by alternative members of the Editorial Board and the authors had no involvement in the decision-making process.

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