



A Quantitative Analysis of the Prevalence of High Blood Pressure and Its Significant Correlates from Rajasthan, India

¹Dr. Sandhyarani Pati, ²Dr. Bijaya Lakshmi Nanda, ³Dr. Susanta Kumar Nahak, ⁴Dr. Soumyaranjan Mishra

¹Assistant Professor (Gen. Medicine), MKCGMCH, Berhampur, Odisha

²Assistant Professor, Dept of Biochemistry, MKCG Medical College Berhampur, Ganjam, Odisha

³Assistant Professor (Gen. Medicine), MKCGMCH, Berhampur, Odisha

⁴Senior Resident, MKCGMCH, Berhampur, Odisha

(Received: 07 October 2023

Revised: 12 November

Accepted: 06 December)

KEYWORDS

Blood Pressure,
Hypertension,
Risk Factor,
Lifestyle
Promotion,
Health
Education

ABSTRACT:

The current strategies and interventions to achieve optimal control of blood pressure (BP) are not as successful as they could be which presents significant challenges. There is still a significant difference in the effective management and regulation of blood pressure, despite advances in medical science and healthcare practices. This ongoing challenge highlights the need for more studies, creative thinking, and a thorough comprehension of the various factors influencing blood pressure control in order to improve the overall effectiveness of hypertension management techniques. This study's objective was to explore the pervasiveness of chance elements, pulse levels, and mindfulness in an example of Rajasthan's populace. The discoveries of unequivocally approve the need of continuous training effort zeroed in on precisely advancing sound ways of life and bringing issues to light of fitting pulse control. Our perceptions demonstrate that to accomplish suitable pulse control and decrease cardiovascular gamble in these subject classes, exceptional consideration should be given to ladies, more youthful subjects, older subjects, and diabetic patients.

1 INTRODUCTION

One of the main factors contributing to higher rates of morbidity and death in developed nations is high blood pressure (BP). The prevalence of the hypertensive condition has been steadily rising despite greater efforts to enhance diagnosis and treatment. In actuality, the objective of bringing the blood pressure of all hypertensive patients down to optimal levels is still far from being accomplished, even with the application of guidelines and the massive amount of evidence offered by large randomized clinical trials. Additionally, individuals belonging to the general public often underestimate the significance of taking their blood pressure, which leads to an ignorance of their hypertensive condition. Medical education programs that are supported by the media have a significant impact on raising public awareness of the dangers associated with hypertension and the importance of receiving an appropriate antihypertensive treatment. In actuality, a significant amount of time and energy is dedicated to

raising awareness of high blood pressure throughout the world on a yearly basis through the World Hypertension Day celebration. This time, emergency clinics are sans offering blood pressure checks to individuals of any age alongside a concise meeting to decide their own cardiovascular risk profile. Alongside proposals for forestalling cardiovascular illness, they additionally get extensive data about the risks related with their hypertensive status and the best accessible demonstrative and treatment choices.

1.1 Techniques in Measurement of BP

The direct and indirect methods are the two common BP measurement techniques used in laboratories. Because direct methods can more thoroughly monitor the highly dynamic nature of blood pressure, which fluctuates quickly based on a subject's physiological state, they are always preferred over indirect methods in the laboratory. Carotid artery cannulation of experimental animals is the



most widely used direct method of measurement for research and experimentation, while the tail-cuff technique is the most often used indirect method.

The earliest and most famous procedure for estimating blood pressure is cannulation, which includes embedding a catheter loaded up with heparinized liquid into the carotid course and interfacing it to an estimating gadget. This technique is truly adaptable and can be applied to long haul, persistent blood vessel pressure observing in cognizant creatures as well as intense examinations in creatures that have been calmed. For long haul consistent recording, the catheter can be associated with a pressure transducer by means of a turn gadget and tie framework that allows the creature to move about somewhat uninhibitedly. For ongoing examinations, the exteriorized part of the catheter will be kept in a defensive sleeve and got to at whatever point blood pressure estimations are required.

The tail-sleeve procedure applies critical warm and limitation stress, which is known to affect blood pressure, pulse, and stress chemicals, at last impacting blood pressure readings despite the fact that the rodents were prepared and given opportunity to adjust. Accordingly, it is prompted that reviews using the tail-sleeve strategy be affirmed through direct blood pressure checking.

1.2 Hypertension Study

A huge health concern is hypertension. In spite of the fact that there are various lines of proof connecting maturing and hypertension, different reports have additionally shown the way that hypertension can strike teens. Thus, despite the fact that the predominance of hypertension is fundamentally higher in the old, age isn't the essential factor in that frame of mind of the condition.

Exploratory arrangements for the investigation of hypertension and the investigation of novel hypotensive mixtures constantly involve a few nosy methods that are not proper for human use, like carotid cannulation, nephrotomy, denervation, and intracerebral infusions. Hence, concentrates on hypertension require the utilization of trial creatures.

Various qualities of human hypertension are likewise present in creature models of hypertension. A significant

number of these models have been made by using the etiological factors, like high salt admission, hyperactivity of the renin-angiotensin framework (RAS), and hereditary factors, which are believed to be the reason for hypertension in people. While pigs, hares, monkeys, and mice have likewise been used to make exploratory hypertension, rodents stay the most well-known creature model for hypertension.

1.3 Research Objectives

- Analyse and assess the differences in the population under study's effective blood pressure control and regulation.
- Examining and recording the most common risk variables linked to blood pressure regulation, such as lifestyle choices, genetic predispositions, and socioeconomic circumstances, is important.
- Measure and evaluate blood pressure readings in a variety of demographic groups in order to get a sense of the prevalence and variances in hypertension in the general population.
- Improving Awareness: Determine what aspects of blood pressure control study participants are currently unaware of and what needs to be improved.

2 LITERATURE REVIEW

In Lucknow, Uttar Pradesh, Sunni Muslim pupils' blood pressure and adiposity markers are examined in great detail in Chakraborty and Mandal's 2022 study. The primary goal of the study is to examine the complex relationships that exist between blood pressure and obesity in this particular population, potentially illuminating risk factors that are particular to Sunni Muslim students in the area. Acknowledging the significance of appreciating the relationships that exist between blood pressure and adiposity markers, the research aims to provide answers that are critical to understanding the health consequences for this specific population. Given the interaction of genetics, lifestyle factors, and possibly distinct environmental elements that may affect health outcomes, the inquiry is critical in the context of Lucknow.



Chen and Wang's groundbreaking 2008 work uses a thorough systematic review and meta-regression analysis to explore the complex trajectory of blood pressure growth from childhood to adulthood. Their main goal is to shed light on how blood pressure changes over time and offer insightful information about the long-term patterns of this vital physiological parameter. The study guarantees a thorough and well-organized examination of the body of literature pertaining to blood pressure measures in various age groups by utilising a systematic review. The researchers can evaluate correlations and variances in blood pressure trends over time quantitatively thanks to the statistical technique known as meta-regression analysis. Apart from augmenting the scientific comprehension of blood pressure dynamics, the research bears practical value as it provides essential data for hypertension management and prevention strategies. In order to address the global health concern of hypertension and its related problems, it is essential to comprehend the complex patterns of blood pressure development in order to customise effective interventions and individualised prevention methods.

Dey et al. (2022) utilise a novel methodology by integrating machine learning approaches to conduct a landmark examination into the parameters influencing the utilisation of intrauterine devices (IUDs) in India. Though the main focus of the study is on contraceptive decision-making and reproductive health, the research is cleverly structured to acknowledge the possible wider implications for comprehending health determinants. By utilising machine learning, the study aims to not only decipher the complex elements determining IUD usage but also to draw conclusions about a broader range of health characteristics, such as blood pressure. Using machine learning techniques improves the study's ability to identify complex linkages and patterns in the data, providing a comprehensive picture of health dynamics that goes beyond reproductive health specifically.

Giri et al. (2022) make a significant contribution to our understanding of health dynamics in tribal groups by examining the incidence of hypertension and related variables in the Munda and Sabar tribes of Eastern India. By exploring related variables, the research, which is focused on the prevalence of hypertension, goes beyond simple epidemiological observation and offers a thorough understanding of factors influencing blood

pressure in these particular tribal groupings. By doing this, the study closes a significant research gap in healthcare and advances our understanding of possible targeted treatments. Understanding the distinct factors influencing blood pressure in tribal cultures is crucial, and the research's findings may help design customised healthcare interventions and preventive measures.

The 2022 study by Gothwal et al. provides important insights into the complex link between metabolic factors and cardiovascular health by examining the correlation between the triglyceride-glucose (TYG) index and carotid intima-media thickness (CMT) in adult patients who are not diabetic. The emphasis on those without diabetes highlights how important it is to comprehend early indicators of metabolic dysfunction and how they affect cardiovascular measures. The link between TYG index and CMT found in the study highlights the possible role of metabolic variables in vascular health. This research adds to our understanding of metabolic health and has implications for blood pressure management and cardiovascular risk assessment as CMT is a commonly recognised biomarker of subclinical atherosclerosis. It is critical to understand these relationships in order to create complete plans for preventing cardiovascular illnesses and efficiently controlling blood pressure.

3 RESEARCH METHODOLOGY

A cross-sectional community-based survey with participants of any gender who were 35 years of age or older was carried out. The study was conducted in Rajasthan, in the Northern Zone of India, in the field practice area of the Department of Community Medicine at Jawarhar Lal Nehru Medical College, Ajmer. There are 47,590 people living in the field practice area, distributed among 7,170 families in 15 villages. These villages have a homogeneous population in terms of food habits, occupations, and socioeconomic status.

Illustration

The review was supported by the institutional moral advisory group before it began. The review populace comprised of all people who were more established than thirty. Eager or nursing moms up to the review prohibited



members 15 weeks post pregnancy because of possible varieties in blood pressure during this time. 300 samples will be examined. The thorough process of choosing the subjects has already been explained. The subjects gave their written, informed consent.

3.1 Socio demographic Variables and Risk Factors

The study's objectives were explained to the eligible household members during house visits, and personal interviews using a pre-made questionnaire were used to collect data. The questionnaire asked about physical activity level, past and family history of hypertension, and sociodemographic factors. A modified scale was used to evaluate socioeconomic status. Anthropometric measurements and blood pressure readings were then taken.

Blood pressure was estimated in right arm in sitting stance, with the subject in a casual state. Normalized mercury sphygmomanometer (Precious stone Luxurious BP Device, Pune, India) with grown-up size cuff was utilized. The Primary appearance of (stage 1 of Korotk off sounds) sound was utilized to characterize systolic blood pressure (SBP). The vanishing of sound (phase5) was utilized to characterize diastolic blood pressure (DBP). Two readings were required eight minutes separated, and the normal of the two readings was taken as the last blood pressure perusing. An individual was viewed as a hypertensive if he/she was a generally analyzed instance of hypertension or potentially on treatment or had current SBP ≥ 145 mm of Hg as well as DBP ≥ 95 mm of Hg (the seventh report of the Joint Public Council on counteraction, location, assessment, and treatment of hypertension, JNCVII

models). Blood sugar assessment was finished for every one of the subjects utilizing a glucometer. An individual was viewed as a diabetic if he/she was a generally analyzed instance of diabetes or potentially on treatment or had current fasting hairlike blood glucose ≥ 115 mg/dL (fasting being characterized as no caloric admission for no less than 9 hours)

3.2 Analytical Statistics.

The Statistical Package for Social Sciences (SPSS) was used for all statistical analyses. The percentages for prevalence and risk factors for hypertension are displayed. By comparing the prevalence of hypertension in those with and without these risk factors, the relationship between hypertension and sociodemographic variables, diabetes, obesity, physical activity, and family history of hypertension was evaluated. The differences were examined using the chi square test, with a value of $p < .07$ being regarded as statistically significant. Analytical Statistics. The Statistical Package for Social Sciences (SPSS) was used for all statistical analyses. The percentages for prevalence and risk factors for hypertension are displayed. By comparing the prevalence of hypertension in those with and without these risk factors, the relationship between hypertension and sociodemographic variables, diabetes, obesity, physical activity, and family history of hypertension was evaluated. The chi square test was used to analyze the differences; a value of $p < .07$ was considered statistically significant. As independent variables, physical activity, a positive family history of hypertension, diabetes, BMI, and central obesity are all present. A significant adjusted odds ratio ($P < .07$) indicated that a variable was independently linked to hypertension.

3.3 Baseline Characteristics of the Sample

Table 1 shows the review subjects' underlying characteristics.

Table1: Features of the research participants

Variables	Males No. (%) N=100	Females No. (%) N = 200	Total No. (%) N= 300
Age group (yrs) 40-49	23 (23.0)	55 (27.5)	98 (32.6)



50-59	35 (35.0)	85 (42.5)	28 (9.33)
60-69	15(15.0)	41 (20.5)	97(32.3)
≥ 70	27 (27.0)	19 (9.5)	77(25.6)
Occupation			
Heavy	41 (41.0)	97 (48.5)	169 (56.3)
Average	40 (40.0)	47 (23.5)	55 (18.3)
Sitting	19 (19.0)	56(28.0)	76 (25.3)
BMI			
25.1	55 (55.0)	73 (36.5)	124 (41.3)
25.4 – 30.0	16 (16.0)	67(33.5)	85 (28.3)
≥ 32	29 (29.0)	60(30.0)	91 (30.3)

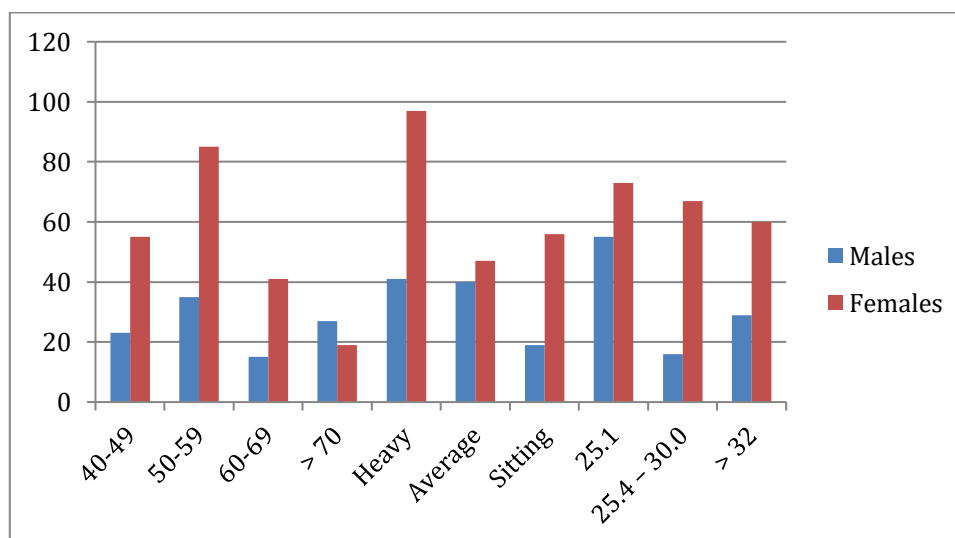


Figure1: Graphical Representation of Percentage of Features of the research participants

The concentration of people in the 50–59 age range suggests a demographic trend in which a sizeable section of the population resides in this range. This age group is important for managing health because it is a time when certain health problems could become more common. It implies that health interventions and programmes designed specifically for people in their 50s and 60s may have a greater effect.

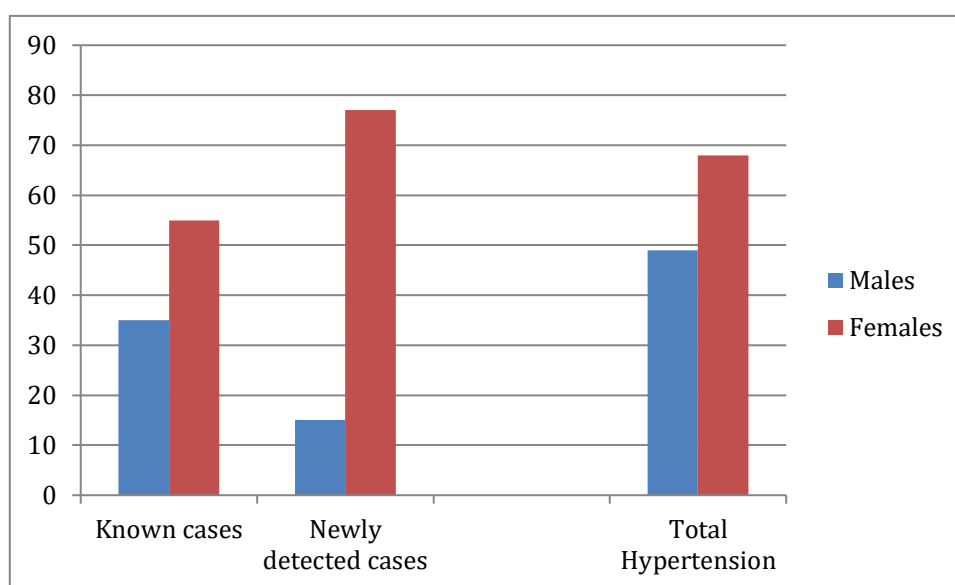
Planning for occupational health should take gender into account, as evidenced by the higher frequency of heavy occupation among females (48.5%) than among males (41.0%). The aforementioned discovery implies that workplace health initiatives ought to tackle the distinct

challenges and health hazards linked to physically demanding jobs, with a specific emphasis on women in the workforce.

The fact that women are somewhat more likely than men to have a BMI of over thirty-five (30.5%) highlights the significance of weight control and obesity prevention tactics, particularly for women. This research may lead to the creation of focused health initiatives that address lifestyle variables that contribute to females' higher BMIs. These initiatives may include overall wellness programmes, dietary education, and physical activity promotion.

**Table 2: The study population's prevalence of hypertension by gender.**

Hypertension	Males No. (%) N= 100	Females No. (%) N= 200	Total No (%) N= 300
Known cases	35 (35.0)	55 (27.5)	169 (56.3)
Newly detected cases	15(15.0)	77(38.5)	75 (25.0)
Total Hypertension	48(48.0)	68 (24.0)	56(18.6)

**Figure2:** Graphical Representation of population's prevalence of hypertension by gender

The data shows that the distribution of known cases of hypertension differs noticeably by gender. Of the overall cases, a greater proportion of females (38.5%) than males (27.5%) already have a history of hypertension. This demonstrates the knowledge or practice of seeking medical attention for hypertension that exists among women. The information emphasizes the significance of screens and diagnostic work. The considerable contribution of newly found instances is vital, even when existing cases offer valuable information. In this instance, the proportion of newly diagnosed cases of hypertension in women (25.0%) compared to men (7.5%) highlights the importance of proactive screening programmes, particularly for women. When looking at all instances of hypertension, the data shows that women (23.0%) are more likely than men (13.7%) to have the condition. The significance of focused health treatments for both genders is highlighted by this study, which raises

the possibility of under diagnosis or underreporting of instances of hypertension among men.

4 CONCLUSION

A sizable piece of the populace was viewed as in the pre hypertension classification, featuring the significance of beginning screening programs prior throughout everyday life and empowering shrewd hypertension screening during standard specialist visits to accomplish significant health benefits from essential counteraction techniques. Lately, there has been an improvement in everybody's familiarity with blood pressure and hypertensive illness, particularly among more youthful subjects and across all age gatherings. Be that as it may, to accomplish better familiarity with BP control, epidemiological reviews like our own feature the requirement for educational projects conveying data on the drawn out advantages of a healthy lifestyle, of occasional cardiovascular screening, and of worldwide cardiovascular risk evaluation. Our



outcomes, specifically, support the thought that the accompanying gatherings ought to get unique consideration: more youthful members, who may not necessarily in every case get the suitable consideration, however who stand to acquire the most from an exact and opportune mediation on cardiovascular risk decrease; more established grown-ups, who might require more exhaustive assessment by broad experts to accomplish target blood pressure levels; diabetic patients, who, due to their high cardiovascular risk, require satisfactory blood pressure control, which our review affirms; and hypertensive ladies, who ought to further develop their blood pressure control and forestall underrating their actual cardiovascular risk.

REFERENCES

1. Chakraborty, A., & Mandal, G. C. (2022). Adiposity Measures and Its Association with Blood Pressure Level Among a Group of School Going Sunni Muslims of Lucknow, Uttar Pradesh, India. *The Oriental Anthropologist*, 22(2), 262-277.
2. Chen, X., & Wang, Y. (2008). Tracking of blood pressure from childhood to adulthood: a systematic review and meta-regression analysis. *Circulation*, 117(25), 3171-3180.
3. Dey, A. K., Dehingia, N., Bhan, N., Thomas, E. E., McDougal, L., Averbach, S., ... & Raj, A. (2022). Using machine learning to understand determinants of IUD use in India: Analyses of the National Family Health Surveys (NFHS-4). *SSM-Population Health*, 19, 101234.
4. Giri, P. P., Mohapatra, B., & Kar, K. (2022). Prevalence of hypertension and the associated factors among Sabar and Munda tribes of Eastern India. *Journal of Family Medicine and Primary Care*, 11(9), 5065.
5. Gothwal, S. K., Goyal, K., Barjatya, H. C., Bhakar, B. L., Dahiya, R., Singh, Y., ... & Gupta, G. (2022). Estimating the correlation between TYG and CIMT in non-diabetic adult patients. *Obesity Medicine*, 35, 100460.
6. Gupta, R., Gaur, K., Sharma, S. C., Khedar, R. S., & Dhamija, R. K. (2023). District Level Variation in Hypertension Epidemiology in India and Influence of Social Determinants: National Family Health Survey-5. *medRxiv*, 2023-10.
7. Herath, P., Wimalasekera, S., Amarasekara, T., Fernando, M., & Turale, S. (2022). Effect of cigarette smoking on smoking biomarkers, blood pressure and blood lipid levels among Sri Lankan male smokers. *Postgraduate medical journal*, 98(1165), 848-854.
8. Kothiwalla, S. K., Khanna, N., Tandon, N., Naik, N., Sharma, V. K., Sharma, S., & Sreenivas, V. (2016). Prevalence of metabolic syndrome and cardiovascular changes in patients with chronic plaque psoriasis and their correlation with disease severity: A hospital-based cross-sectional study. *Indian Journal of Dermatology, Venereology and Leprology*, 82, 510.
9. Kumar, S. M., Anandraj, J., Sivanatham, P., Essakky, S., Nain, J., Talukdar, R., ... & Kar, S. S. (2023). Control status of hypertension in India: systematic review and meta-analysis. *Journal of Hypertension*, 41(5), 687-698.
10. Li, S., Chen, W., Srinivasan, S. R., & Berenson, G. S. (2004). Childhood blood pressure as a predictor of arterial stiffness in young adults: the Bogalusa Heart Study. *Hypertension*, 43(3), 541-546.
11. Meena, B., Kumar, A., Joshi, N. K., Jain, Y. K., Mingwal, M., & Bhardwaj, P. (2023). Hypertension and its Risk Factors among College Students of Jodhpur, Rajasthan. *CHRISMED Journal of Health and Research*, 10(1), 105-109.
12. Mohapatra, S., Satpathy, K. C., Patra, P. K., & Das, P. K. (2022). Epidemiology of blood pressure among some tribes of India: Bhumij, Bathudi and Savar. *Education*, 6(1).
13. Nath, J., Gupta, S., & Goyal, D. (2022). To evaluate the serum uric acid in hypertensive patients with reference to age and BMI. *Journal of Advanced Medical and Dental Sciences Research*, 10(2), 1-5.
14. Pandey, S., Mohapatra, G., & Arora, R. (2023). Groundwater quality, human health risks and major driving factors in arid and semi-arid regions of Rajasthan, India. *Journal of Cleaner Production*, 427, 139149.
15. Ramakrishnan, S., Zachariah, G., Gupta, K., Rao, J. S., Mohanan, P. P., Venugopal, K., ... & Banerjee, S. C. A. (2019). Prevalence of hypertension among Indian adults: results from the great India blood pressure survey. *Indian heart journal*, 71(4), 309-313.



16. Saboo, N., & Kacker, S. (2022). A study to correlate effect of dietary modification on biochemical and cardiovascular parameters among prediabetics. *Journal of Family Medicine and Primary Care*, 11(3), 1126.
17. Sarkar, A., Ghosh, R., Mondal, S., & Mallik, S. (2023). Magnitude and Correlates of Elevated Blood Pressure among Adolescent School Students Aged 15-19 Years in a Block of Murshidabad, West Bengal, India. *International Journal of School Health*, 10(1).
18. Sharma, R., Choudhary, R., & Teharia, R. K. (2022). Correlation between sensorineural hearing loss and HbA1c in diabetes mellitus patients. *European Journal of Molecular and Clinical Medicine*, 9(1), 958-964.
19. Venkatesan, V., Lopez-Alvarenga, J. C., Arya, R., Ramu, D., Koshy, T., Ravichandran, U., ... & Paul, S. F. (2022). Burden of type 2 diabetes and associated cardiometabolic traits and their heritability estimates in endogamous ethnic groups of India: findings from the INDIGENIUS Consortium. *Frontiers in endocrinology*, 13, 847692.
20. Verma, K., & Baniya, G. C. (2022). Prevalence, knowledge, and related factor of anemia among school-going adolescent girls in a remote area of western Rajasthan. *Journal of Family Medicine and Primary Care*, 11(4), 1474.