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RESEARCH ARTICLE

BLOOD PRESSURE MEASURING TECHNIQUES AMONG HEALTHCARE PROFESSIONALS IN KSA: A SYSTEMATIC REVIEW

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Abstract

Background: Accurate blood pressure (BP) measurement is critical for the diagnosis and management of hypertension, a leading cause of global morbidity and mortality. However, challenges in measurement techniques and knowledge gaps among healthcare professionals can lead to inaccurate readings, compromising patient care. This systematic review aimed to evaluate the difficulties healthcare professionals face in BP measurement and explore the variability in measurement practices.

Methods: A comprehensive search of PubMed, Embase, Cochrane Library, and CINAHL databases was conducted to identify relevant studies. A total of 627 articles were initially identified. After removing 524 irrelevant articles, 103 studies were screened for eligibility. Of these, 60 full-text articles were reviewed, and two studies met the inclusion criteria. Data were synthesized to highlight common challenges and discrepancies in BP measurement practices among healthcare professionals.

Results: The two included studies revealed significant challenges in BP measurement. One study identified that 60% of hospital staff in a teaching hospital lacked sufficient knowledge of fundamental BP measurement techniques. Key issues included improper understanding of cuff size, arm positioning, and deflation rates, which led to

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inconsistent and inaccurate readings. The other one examined BP measurement devices and methods in primary healthcare settings across Saudi Arabia. The study found that mercury sphygmomanometers were most commonly used (69.8%), followed by electronic devices (16.5%) and aneroid manometers (11.8%). However, electronic and aneroid devices were prone to measurement variations, especially in rural areas, emphasizing the need for standardized devices to reduce bias.

Conclusion: This review highlights critical gaps in knowledge and variability in BP measurement methods among healthcare professionals, which can adversely impact hypertension management. Addressing these challenges requires targeted educational programs and the adoption of reliable and standardized devices to improve measurement accuracy. Enhancing BP measurement practices is essential for achieving better patient outcomes and reducing the burden of hypertension-related complications.

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Introduction:-

The high rates of death and morbidity caused by hypertension continue to be a global health crisis. Cerebrovascular accidents (CVAs) and coronary artery disease (CAD) are both made more likely by it. Mortality statistics show that more than 50 American workers die from cardiovascular disease for every worker killed in an industrial accident. It has been suggested that hypertension is the primary culprit [1]. The prevalence of hypertension in Saudi Arabia ranged from 4% to 10%. The variation in diagnostic procedures and criteria is largely responsible for the discrepancy in these results [2-5].

Because hypertension is best managed when caught early, primary care doctors and nurses are well positioned to do just that [6-10]. Primary health care facilities make screenings easy. The primary care physician must have current information on the illness, its consequences, and how to treat it correctly. Scientific contact with specialist centers in the Ministry of Health (MOH), University Hospitals, and other healthcare facilities should maximize the attitude and practice of doctors and other medical professionals towards hypertension and patients with hypertension. The treatment of hypertension patients and the reduction of associated problems would unquestionably benefit from such an increase in understanding, perspective, and action. Primary prevention and early detection strategies may be effectively put into place, nevertheless, if the general population is better informed about these health issues [11].

Studying "Blood Pressure Measuring Techniques and Difficulties among Healthcare Professionals" is important since it will help make a basic clinical practice more accurate and reliable. Inaccuracies in measuring blood pressure may lead to incorrect diagnoses or therapy, despite its central role in the diagnosis and management of cardiovascular illnesses. The study's overarching goal is to fill knowledge and practice gaps by highlighting the obstacles encountered by healthcare practitioners, such as incorrect equipment usage, inadequate training, and environmental issues. Improving patient care and lowering the burden of hypertension-related consequences may be achieved by addressing these challenges, which in turn can lead to the creation of more focused training programs, better procedures, and better equipment.

Methods:-

Review Question

The systematic review aimed to address the following question: What were the challenges and techniques associated with blood pressure measurement among healthcare professionals, and how did they impact the accuracy and reliability of the readings?

Search Strategy

A comprehensive search was conducted across multiple electronic databases, including PubMed, Scopus, Web of Science, and CINAHL, to identify relevant studies. The search encompassed peer-reviewed journal articles, conference proceedings, and dissertations. Reference lists of included studies were screened to identify additional sources. Articles published in English and spanning the last 15 years were included to ensure up-to-date evidence.

Types of Studies Included

The review included quantitative, qualitative, and mixed-method studies that examined blood pressure measuring techniques, the associated challenges, or both. Randomized controlled trials, observational studies, cross-sectional surveys, and qualitative interviews were considered. Editorials, commentaries, and studies without sufficient methodological detail were excluded.

Participants

The review focused on studies involving healthcare professionals, including physicians, nurses, and allied health practitioners, who performed blood pressure measurements as part of their clinical practice. Studies targeting medical students or trainees were also included if they explored the techniques or challenges related to blood pressure measurement.

Search Keywords

Search terms included variations of the following keywords: blood pressure measurement, healthcare professionals, challenges, techniques, hypertension monitoring, training, clinical practice. Boolean operators, truncation, and proximity searches were employed to optimize the search strategy.

Study Selection Process

All identified studies were imported into a reference management software for deduplication. Titles and abstracts were screened independently by two reviewers against predefined inclusion criteria. Full-text articles of potentially eligible studies were then assessed. Disagreements were resolved through discussion or consultation with a third reviewer. A Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram documented the selection process.

Outcomes

Primary outcomes included the prevalence of difficulties experienced by healthcare professionals during blood pressure measurement and the types of challenges reported. Secondary outcomes focused on the techniques employed to overcome these difficulties, their impact on measurement accuracy, and proposed solutions.

Data Extraction and Coding

Data were extracted using a standardized extraction form, including information on study design, population characteristics, techniques, challenges, outcomes, and recommendations. Two reviewers independently extracted data, and discrepancies were resolved through consensus. The extracted data were coded into predefined categories relevant to the review objectives.

Data Management

Extracted data were managed using software such as Excel, depending on the nature of the data. Quantitative data were analyzed descriptively, and thematic analysis was performed for qualitative data. Tera tools were used for forward and backward citation analysis. A narrative synthesis integrated findings, highlighting patterns, gaps, and implications for practice.

Results:-

The initial search identified a total of 627 studies from PubMed, Embase, Cochrane Library, and CINAHL. There were 524 articles excluded due to their irrelevance. At the end of identification process, 103 articles were screened. Of these, 60 full-text articles were reviewed, and only two studies were eligible for inclusion in this systematic review (Figure 1).

Figure 1: Flow chart of selection process

The systematic review identified significant challenges and inconsistencies in blood pressure (BP) measurement practices among healthcare professionals, as highlighted by the two included studies.

El Bagir (1997) assessed the knowledge of BP measurement among hospital staff in a teaching hospital in southern Saudi Arabia. The study revealed that 60% of respondents, including consultants, junior doctors, and nurses, demonstrated insufficient knowledge of basic BP measurement techniques. Key difficulties included improper understanding of cuff size, recording diastolic BP, arm positioning, and the rate of cuff deflation. These deficiencies pointed to a lack of standardized practices, which could lead to inaccurate BP readings, ultimately affecting the

diagnosis and management of hypertension. The findings emphasized the urgent need for targeted educational programs to enhance knowledge and skills related to BP measurement [12].

Hassan et al. (2020) investigated the devices and methods used for BP measurement in primary healthcare settings across Saudi Arabia. The study observed that while mercury sphygmomanometers were the most commonly used devices (69.8%), a significant proportion of BP measurements were performed using electronic devices (16.5%) and aneroid manometers (11.8%). Rural healthcare settings frequently relied on electronic and aneroid devices, which were prone to variations in BP readings. The differences in measurement techniques highlighted the potential for bias and inconsistency in BP assessment. The authors advocated for the use of electronic devices to standardize measurements and reduce errors [13].

Both studies underscored the challenges healthcare professionals face in ensuring accurate BP measurement, including inadequate knowledge of proper techniques and variability in measurement methods. Addressing these challenges through standardized protocols, continuous education, and adoption of reliable devices could significantly improve the accuracy of BP assessments.

Quality assessment

The quality assessment of the included studies using the Newcastle-Ottawa Scale (NOS) revealed several limitations. El Bagir (1997) scored 3 out of 9 points, reflecting low quality. Although the study included a reasonably representative sample of consultants, junior doctors, and nurses, it relied on self-reported data through a questionnaire, which is subjective and susceptible to bias. Additionally, the study lacked a comparison group and did not account for potential confounding variables, limiting its ability to draw robust conclusions about the knowledge gaps in BP measurement practices [12].

Similarly, Hassan et al. (2020) scored 3 out of 9 points, indicating low methodological rigor despite its large and representative sample of BP measurements conducted by primary care physicians. The observational nature of the study ensured reliable data on devices used; however, it failed to adjust for confounding factors such as device reliability or patient characteristics. The lack of stratification or comparative analysis further limited the study's ability to explore the variability in BP measurement methods comprehensively. Both studies provide valuable insights but highlight the need for future research to adopt more robust methodologies and address these gaps [13].

Discussion:-

The findings from this systematic review underline the significant challenges healthcare professionals face in achieving accurate blood pressure (BP) measurements, which is crucial for hypertension management. Both studies highlighted in this review identified knowledge gaps and inconsistencies in BP measurement practices among healthcare staff. El Bagir [12] revealed that a substantial proportion of hospital staff lacked sufficient understanding of fundamental BP measurement techniques, such as cuff size and arm positioning. This lack of knowledge is concerning as inaccurate BP readings can directly affect clinical decision-making, leading to either overdiagnosis or underdiagnosis of hypertension. The study suggests that improving the education and training of healthcare staff in BP measurement is vital to enhance diagnostic accuracy and patient outcomes.

Hassan et al. [13] further demonstrated the variability in BP measurement devices and methods used across different healthcare settings, with discrepancies in readings between mercury sphygmomanometers, electronic devices, and aneroid manometers. These differences highlight the challenges of achieving consistent measurements, especially in rural areas where certain devices may be more commonly used. The study recommends the use of electronic devices to standardize BP measurements and reduce biases, as they may offer greater reliability in diverse settings. However, both studies emphasize that technological solutions alone are not sufficient. The improvement of healthcare professionals' knowledge and the implementation of standardized protocols are essential to address the root causes of measurement inaccuracies. These findings underscore the need for continued education and the adoption of evidence-based practices to ensure accurate BP measurement and effective hypertension management.

The results of a research conducted in Pakistan [14] highlight how important it is to have reliable blood pressure measurements, especially when dealing with hypertension. A tertiary care cardiology clinic in Karachi has nurses who are woefully unprepared when it comes to taking blood pressure readings. Such gaps in healthcare delivery have far-reaching consequences, as hypertension is a major cause of death and disability across the world [14]. It seems that there may be a lack of knowledge or focus on best practices in this vital part of patient care, as only one-

third of the nurses said they had read the American Heart Association recommendations for blood pressure monitoring [14]. Furthermore, the average number of years since the previous blood pressure measurement training was 9.8 ± 5.8 years, and more than 93.3 percent of the nurses had their last training more than 4 years ago. Based on these results, it seems like healthcare providers should pay more attention to training and educational programs that teach them how to use standardized procedures and standards to measure blood pressure [14].

Targeted interventions are needed to increase competency in blood pressure measuring procedures, as shown by the low compliance rates and mediocre skill levels of most nurses [14]. Patient outcomes may be negatively impacted by inaccurate or inconsistent measuring procedures, which can lead to incorrect diagnoses and treatment [15]. Healthcare providers' adherence to standards and recommendations for taking blood pressure readings has been the subject of mixed results in a number of studies. Nurses barely followed 65% of the procedures to test blood pressure, according to Machado et al. [16]. However, despite the fact that adherence assessment was self-reported, a research including doctors found that BP measurement criteria were well-followed [17].

Similarly worrisome is the fact that most nurses show a lack of awareness of important principles when it comes to blood pressure monitoring [14]. A widespread lack of understanding of blood pressure measurement among healthcare personnel has been brought to light by several research, such as Machado et al. [18] and Machado et al. [16]. In one research, Machado et al. [18] discovered that cardiac nurses had intermediate understanding of blood pressure measurement across several domains, whereas in another, Machado et al. [16] revealed that cardiac nurses had inadequate theoretical knowledge when it came to indirect blood pressure measurement. Also, most healthcare staff in Nigeria didn't know how to monitor blood pressure or were unfamiliar with the recommendations, according to a research [19]. This highlights the need of well-rounded instructional programs that include both the technical components of measurement and the fundamental concepts and causes that might impact blood pressure measurements.

Elzeky ME et al. [20] evaluated the efficacy of WhatsApp as a method for distant education in enhancing nurses' knowledge and accuracy of blood pressure measurement. Compared to the control group, those in the WhatsApp group exhibited much better knowledge scores and fewer BP measurement mistakes following the intervention. A multimodal strategy may be necessary to improve practical skills with knowledge, as there was no significant difference in performance ratings between the two groups. According to Block et al. [21], an online course raised students' level of information but had no effect on their level of competence or outlook. For the purpose of improving attitude and skill, Block et al. proposed that a combination of live and web-based training could be necessary. On the other side, after a 1-day in-person training session, Rabbia et al. [22] and Machado et al. [18] both showed substantial improvements in blood pressure measuring method. The instruction was 2-hours long. In addition, by removing obstacles and raising awareness inside the company, a research that used a bundle intervention program discovered that blood pressure measurement performance ratings improved significantly [23].

Conclusion:-

This systematic review highlights significant challenges in the measurement of blood pressure (BP) among healthcare professionals, emphasizing the impact of inadequate knowledge and inconsistent practices on the accuracy of BP readings. Findings from El Bagir (1997) revealed that a substantial proportion of hospital staff lacked fundamental knowledge of proper BP measurement techniques, such as appropriate cuff size, correct arm positioning, and accurate deflation rates. Similarly, the study by Hassan et al. (2020) identified variability in BP measurement methods and devices, with differences in readings between mercury sphygmomanometers, electronic devices, and aneroid manometers. These inconsistencies underline the critical need for standardized training and protocols to enhance healthcare professionals' proficiency in BP measurement.

Improving BP measurement practices requires a multifaceted approach. Educational interventions and ongoing professional development programs must be implemented to address knowledge gaps and promote adherence to evidence-based guidelines. Additionally, greater emphasis should be placed on adopting reliable and standardized devices, particularly electronic sphygmomanometers, which have the potential to minimize biases and improve consistency. Addressing these issues is essential for ensuring accurate BP assessment, which is foundational for the effective diagnosis and management of hypertension. By enhancing measurement practices, healthcare systems can significantly contribute to better patient outcomes and reduce the burden of hypertension-related complications.

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