# Health Literacy and Medication Adherence among Hypertensive Patients: A Cross-Sectional Study

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## ABSTRACT

**Background: Evaluating drug adherence is necessary for improving individuals' compliance with their medications to help them prevent long-term negative outcomes and attain better quality of life. This study aims to determine health literacy levels and their impact on health-related behaviors and medication adherence among hypertensive patients in the Hail Region of Saudi Arabia.**

**Methods: A cross-sectional study design was employed and involved 693 participants with hypertension. Data collection occurred between September and November 2022.**

**Results: The hypertensive patients adequately adhered to their prescribed medications (35.13±4.535) and had marginal health literacy (13.70). There were significant differences between gender and Medication Adherence Report Scale (MARS-5) (t=-16.321; p<0.000) and BRIEF (t=-6.611; p<0.000), nationality and MARS-5 (t=-3.252; p=0.001) and BRIEF (t=5.527; p<0.000), age and MARS-5 (F=249.266; p=0.000) and BRIEF (F=44.592; p=0.000), civil status and MARS-5 (F=16.675; p<0.000) and BRIEF (F=38.344; p<0.000), and educational attainment and MARS-5 (F=37.902; p<0.000) and BRIEF (F=49.074; p<0.000). Conversely, BRIEF and MARS-5 were not significantly correlated (r= -0.029; p>0.445).**

**Conclusion: The main findings of this study evolved with adequacy of adherence and marginal health literacy of hypertensive patients. Moreover, there were significant differences between gender, nationality, age, civil status, and educational attainment with and Medication Adherence Report and BRIEF. The BRIEF and MARS-5 were not significantly correlated. This study results can be used to create and implement programs that increase hypertensive patients' knowledge about their medications.**

**Keywords: Adherence, Health literacy, Hypertensive patients, Medication**

## INTRODUCTION

As a leading health issue in Saudi Arabia, hypertension affects more than a quarter of the Saudi adult population[1]. There has been a great deal of research on hypertension globally; however, despite the fact that hypertension is a leading health burden, research on the issue of medication knowledge and adherence in Saudi Arabia remains sparse[2]. Globally, hypertension affects almost 1 billion people, with 40% of those affected aged 25 years and above[3]. Some of the factors linked to the disease include urbanization, ageing, obesity, excessive salt intake, and sedentary lifestyles. In addition to this, the World Health Organization (WHO) reported that blood pressure–related health issues accounts for 9.4 billion deaths each year due to stroke (51%) and heart disease (45%) worldwide[4]. Therefore, it is vital to increase awareness and knowledge about hypertension detection, control, and treatment among people with hypertension, especially regarding the dangers of uncontrolled blood pressure. It has indicated that patients with knowledge about hypertension have better adherence to medication[5]. However, there is no consistency in the correlation between the number of people with vital knowledge about hypertension and their control of their blood pressure. A study carried out in Saudi Arabia in 2016 did not indicate any significant relationship between patients' knowledge of their target blood pressure and their control of their blood pressure[6].

While lifestyle modification and pharmacotherapy are the main methods for the management of hypertension, medication adherence also plays a crucial role in obtaining the desired health outcomes.

Medication adherence can be defined as the extent to which an individual follows the drugs, diet, and necessary lifestyle changes in conformity with the instructions given by a medical practitioner. A study conducted in Saudi Arabia demonstrated that only 34.7% of male hypertensive patients were found to be adherent to their medications[7]. Adherence issues are a severe problem that have an impact on both the patient and the healthcare system. Patients who will not take their medications as prescribed experience significant illness progression, higher mortality rates, and higher medical expenses. Adherence is most likely to be impacted by a multitude of circumstances. As patient, provider, and health system factors with interactions among them emerge, barriers to adherence could be addressed[8]. Chronic diseases or long-term ailments are responsible for a significant part of morbidity and death in the Kingdom of Saudi Arabia[9]. Reports on high blood pressure and other related morbidities for the Saudi population have led to the development and implementation of treatment guidelines[10]. To this end, however, no studies have evaluated subsets from the Saudi population to focus on health literacy and its impact on health-related behaviors and medication adherence among diagnosed hypertensive patients.

The identification of adherence predictors is important in reducing the risks of future no adherence. Misinformation among patients about the proper use of drugs, recommended diets, and disease monitoring can lead to no adherence. Therefore, this study is of significance as it ensures that the necessary measures of control are put into practice

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to improve patients' medication adherence. It will also prevent the long-term negative repercussions of no adherence and reduce strain in healthcare settings. This can be achieved by providing patients with the necessary information and knowledge on the issue of drug adherence. This knowledge can be spread by educating people about the need to ensure that they adhere to the medications given to them. It is necessary to evaluate the level of adherence to the drugs. This can help improve individuals' compliance with their medications, prevent long-term negative outcomes, and attain a better quality of life. Therefore, this study aims to determine self-perceived health literacy levels and their impact on health-related behaviors and medication adherence among hypertensive patients in the Hail Region of Saudi Arabia.

## MATERIALS AND METHODS

**Design:** A cross-sectional study design was employed to determine the health literacy and medication adherence of patients with hypertension.

**Participants:** The 693 participants in this study were individuals in the Hail Region who had been diagnosed with hypertension for more than a year, had been prescribed maintenance medication, and were required to undergo monthly follow-ups. Additionally, patients who were able to read and comprehend instructions were considered eligible. Excluded were the other illnesses or inability to participate. The Raosoft sample size calculator with 95% confidence level (http://www.raosoft.com/samplesize.html) was used to determine the needed sample. The researcher collaborated with the eight primary healthcare centers and hospital outpatient departments in Hail City, Saudi Arabia, to identify hypertensive patients and select participants via convenience sampling.

**Data Collection:** Data were collected from September to November 2022 during visits scheduled by the researcher. Prior to data collection, the researcher explained the purpose of the study to all potential respondents. These respondents were already at the medical centers for other appointments. Once they agreed to participate in the study, the respondents signed consent forms. The respondents were allowed sufficient time to complete the questionnaires, and the researcher was available throughout the data collection process for clarification purposes. All of the questionnaires completed in person.

**Questionnaires:** The researcher used two questionnaires to evaluate the participants: The first instrument, MARS-5, was devised by Chan[11] to evaluate patients' self-reported medication compliance. The 10-item questionnaire asks respondents to rate their responses on a 5-point Likert scale: 1: Always, 2: Often, 3: Sometimes, 4: Rarely, and 5: Never. The values for each item on the MARS-5 questionnaire are summed up, and higher total scores denote higher levels of medication adherence.

The second instrument, the Brief Health Literacy Screening Tool (BRIEF), was developed by Haun[12]. It has four items and asks respondents to answer the questions using a 5-point Likert scale: 1: Always, 2: Frequently, 3: Occasionally, 4: Infrequently, and 5: Never. The values for the four responses are summed up to generate a total score. A score of 4-12 indicates limited literacy (incapable of reading health materials), a score of 13-16 indicates marginal literacy (needs assistance or struggles to grasp health education materials), and a score of 17-20 indicates adequate literacy (capable of reading and comprehending health educational materials).

The original authors of the questionnaires gave permission to use their tool with the consideration that it will be used for the research purposes only. Validity was conducted with three experts in the field, who unanimously agreed on the contents of the questionnaires. The

researcher conducted reliability testing with 15 patients, resulting in an internal consistency of 0.85 for MARS-5 and 0.78 for BRIEF.

**Ethical Considerations:** This study has clearance and approval from the Institutional Review Board of the University of Hail (H-2022-0101), dated 5 October 2022.

The researcher began collecting data after obtaining the ethical committee's approval for the study and ensuring that all ethical requirements were met. Participants in the survey were free to take part at their discretion. In addition, respondents were free to discontinue the questionnaires if they felt uncomfortable during the study. The respondents' identities and individual responses to the questionnaires were kept private. This information was secured in a cabinet to which only the researcher had access.

**Data Analysis:** Data analysis was performed using the Statistical Package for Social Sciences Version 26. The participant characteristics were determined using descriptive statistics, such as frequency, percentage, and weighted mean. The relationship between BRIEF and MARS-5 was identified using Pearson's r correlation.

## RESULTS

Table 1 presents the demographic profiles of the respondents. Of the 693 participants, most were 29–39 years of age (48.1%), female (54%), and married (34.3%). At least 37.5% had a college level of education (37.5%), and most of the participants were not Saudi (53%).

**Table 1:** Demographic profiles of the 693 participants

| Age | Frequency | Percent (%) |
|---|---|---|
| 18–28 years old | 131 | 18.9 |
| 29–39 years old | 333 | 48.1 |
| 40 years old and above | 229 | 33.0 |
| Gender | | |
| Male | 319 | 46 |
| Female | 374 | 54 |
| Marital Status | | |
| Single | 235 | 34 |
| Married | 238 | 34.3 |
| Separated/Divorced | 220 | 31.7 |
| Level of Education | | |
| High school and below | 190 | 27.4 |
| College | 260 | 37.5 |
| Professional | 243 | 35 |
| Nationality | | |
| Saudi | 323 | 47 |
| Non-Saudi | 370 | 53 |

Table 2 presents the levels of medication adherence and health literacy. As shown, the participants adequately adhered to their prescribed medication (35.13±4.53) and had marginal health literacy (13.70).

**Table 2:** Levels of medication adherence and health literacy

| Variable | Min | Max | Mean | Std |
|---|---|---|---|---|
| MARS-5 | 27.00 | 42.00 | 35.13 | 4.53 |
| BRIEF | 10.00 | 19.00 | 13.70 | 2.13 |

Table 3 presents the differences between the demographic profiles, MARS-5, and BRIEF. There was a significant difference found between gender and MARS-5 (t=-16.321; p<0.000) with higher perception for females (39.20±3.823) than male patients. The gender and BRIEF were

found significant (t=-6.611; p<0.000) showing female patients scored higher than male patients (14.57±1.781).

There was a significant difference between nationality and MARS-5 (t=-3.252; p=.001), with non-Saudi patients highly perceived (35.39±4.284) than their counterpart. Also, the nationality and BRIEF were found significant (t=5.527; p<0.000), with Saudi patients scoring higher than the non-Saudi. On age, there was a significant difference between age and MARS-5 (F=249.266; p=0.000), with ages 39 years old and above scoring higher (39.28±3.444) than the other age bracket. Further, a significant difference was found between age and BRIEF (F=44.592; p=0.000), with 18–28 years old scoring highest (14.96±1.163).

There was a significant difference between civil status and MARS-5 (F=16.675; p<0.000) showed that single patients perceived higher than other groups (36.55±1.502). A significant difference was found between civil status and BRIEF (F=38.344; p<0.000) showing that married patients scored higher than other groups (14.16±2.089).

Finally, there was a significant difference between educational attainment and MARS-5 (F=37.902; p<0.000), with high school level patients scoring higher than other groups (37.27±2.504). Moreover, the significant difference found between educational attainment and BRIEF (F=49.074; p< 0.000) was noted showing high school level patients perceived higher than the other groups.

**Table 3:** Differences between demographic profiles, MARS-5, and BRIEF

| Variables | | Mean | Std. | t | df | Sig. (2-tailed) |
|---|---|---|---|---|---|---|
| **Gender** | | | | | | |
| MARS-5 | Male | 33.69 | 3.867 | -16.321 | (2,691) | .000 |
| | Female | 39.10 | 3.823 | | | |
| BRIEF | Male | 13.39 | 2.168 | -6.611 | (2,691) | .000 |
| | Female | 14.57 | 1.781 | | | |
| **Nationality** | | | | | | |
| MARS-5 | Saudi | 33.93 | 5.412 | -3.252 | (2,691) | .001 |
| | Non-Saudi | 35.39 | 4.284 | | | |
| BRIEF | Saudi | 14.65 | 1.116 | 5.527 | (2,691) | .000 |
| | Non-Saudi | 13.50 | 2.246 | | | . |
| | | Mean | Std. | F | df | Sig. |
| **Age** | | | | | | |
| MARS-5 | 18–28 years old | 32.43 | 3.748 | 249.266 | (3,690) | .000 |
| | 29–38 years old | 33.33 | 3.353 | | | |
| | 39 years old and above | 39.28 | 3.444 | | | |
| BRIEF | 18–28 years old | 14.96 | 1.163 | 44.592 | (3,690) | .000 |
| | 29–38 years old | 13.05 | 2.206 | | | |
| | 39 years old and above | 13.92 | 2.098 | | | |
| **Civil Status** | | | | | | |
| MARS-5 | Single | 36.55 | 1.502 | 16.675 | (3,690) | .000 |
| | Married | 34.79 | 5.366 | | | |
| | Divorced | 33.00 | .000 | | | |
| BRIEF | Single | 13.00 | 2.135 | 38.344 | (3,690) | .000 |
| | Married | 14.16 | 2.089 | | | |
| | Divorced | 12.10 | .364 | | | |
| **Educational Attainment** | | | | | | |
| MARS-5 | High school level | 37.27 | 2.504 | 37.902 | (3,690) | .000 |
| | College level | 37.11 | 1.371 | | | |
| | Professional level | 34.14 | 5.077 | | | |
| BRIEF | High school level | 14.65 | 1.018 | 49.074 | (3,690) | .000 |
| | College level | 12.25 | 1.916 | | | |
| | Professional level | 13.94 | 2.160 | | | |

Table 4 presents the correlation between BRIEF and MARS-5. It can be noted that there was no significant correlation between MARS-5 and BRIEF (r= -0.029; p > 0.445).

**Table 4:** Correlations between BRIEF and MARS-5

| | | BRIEF | MARS-5 |
|---|---|---|---|
| BRIEF | Pearson Correlation | 1 | -.029 |
| | Sig. (2-tailed) | | .445 |
| MARS-5 | Pearson Correlation | -.029 | 1 |
| | Sig. (2-tailed) | .445 | |

## DISCUSSION

This study aims to determine health literacy levels and their impact on health-related behaviors and medication adherence among hypertensive patients in the Hail Region of Saudi Arabia. The participants adequately adhered to their prescribed medications, which means that they followed their doctors' recommendations on treatment, including dosage, diet, and other behavioral modifications. These findings substantiated those of a Korean study that revealed that 81.7% of hypertension patients had good medication adherence[13]. In comparison to the findings of this study, medication adherence was lower in the United States[14], the United Kingdom[15], and Germany[16]. Cultural and economic considerations, the research population, patient awareness, health literacy, and the complexity of patients' regimens and health conditions may all contribute to the discrepancies between the adherence rates reported in the literature and those observed by Pan et al.[17].

In this study, hypertensive patients were found to have marginal health literacy, meaning that the majority of respondents possessed intermediate to basic levels of health literacy. This result demonstrated that the Saudi population has a health literacy trend similar to those reported internationally, including in industrialized countries. For example, only 12% of American participants met the criteria for proficient health literacy, 53% met the intermediate threshold, 21% met the threshold for basic literacy, and 14% met the threshold for below-basic literacy[18]. Contrary evidence suggested that in terms of health literacy, survey respondents in China[19] demonstrated a low level of health literacy. This suggests that educating hypertensive patients about their conditions is still needed. Clearly, a lack of health literacy poses a concern for any healthcare system, and additional research is warranted to examine the problem of health literacy among Saudis and the necessary strategies to address it. Patients must be able to read and comprehend health information, written medical instructions, and pharmaceutical prescriptions for health systems to manage their illnesses and overall health. Healthcare systems can adopt health literacy standards to simplify the process of obtaining and understanding health information for patients. The results of this study should be considered by Saudi healthcare systems and used to educate

the public on the importance of health literacy in enhancing medical treatment outcomes and quality of life for patients.

Accordingly, there was a significant difference between gender and MARS-5, with female patients demonstrated higher medication adherence than male patients. One possible explanation for the greater adherence shown by female patients is that they tend to be more conscientious about their hypertension management. In addition, male patients are more likely to experience poor drug adherence certain industries in Saudi Arabia employed more men than women and men are assumed to have busy schedules and might increase levels of work-related stress. A stronger correlation between female patients and better medication adherence compared to male patients and medication adherence[17,20], but in others, the opposite result was observed[21]. In addition, Yang[22] found no gender differences in the frequency of low medication adherence scores. Moreover, there was a significant difference between gender and BRIEF, as female patients had perceivably higher scores than male patients. It is unclear why such differences exist, but this contradicts the findings of Al-Arifi et al.[23], who found that male participants were more likely to have a high level of health literacy. Its societal significance lies in the fact that the variations observed between male and female patients are likely attributable to their diverse physiological characteristics in terms of medication compliance and health literacy[24]. For valid results, future research should separate male and female participants. For instance, interrogation in terms of deeper knowledge of medication adherence and how men and women will behave differently.

There was a significant difference between MARS-5 and nationality, with non-Saudi patients scoring higher than Saudi patients, which may point to differences in perceptions relating to linguistic and ethnic backgrounds. Contrary to this study's findings, one study showed that Saudi patients are less medically compliant than patients of other nationalities[25]. Accordingly, there could be a correlation between being a member of a racial or ethnic minority group and medication adherence[26]. Low medication adherence among Saudi patients may have something to do with the country's cultural and societal constraints, such as the religious views of Saudi patients, or fatalism in particular[27]. This refers to the conviction that people have little say over their own destinies and that everything, even their physical well-being, is ultimately under God's benevolent favor. Zainudin et al.[28] also identified that the month of Ramadan was a barrier to adherence among Saudi patients. During this month, Muslims around the world fast from dawn until sunset and some medications must be taken with food or at specific times of day, so fasting would affect medication adherence. Additionally, religious celebrations such as Eid caused over a third of patients (42%) to neglect to take their medications[29]. Due to these religious constraints, long-term medication patients should consult with their doctors about how to adjust their treatment plan in light of fasting[28].

There was a significant difference between nationality and BRIEF, with Saudi patients scoring higher than their non-Saudi counterparts, which suggests that ethnicity and language have something to do with this gap. It has been found that non-native English-speaking groups are more prone to low health literacy[30]. Also, the private sector is by far the largest employer for non-Saudis; as a result, the majority of non-Saudi workers are required to have health insurance, and only a small proportion are hired by the government and are therefore typically given access to free public healthcare. This difference in health literacy could be attributed to the fact that non-Saudi individuals are required to have health insurance, whereas Saudi individuals are typically given access to free public healthcare[31]. Individuals living in the Kingdom of Saudi Arabia must be able to locate relevant healthcare services and information, comprehend it, and put it to good use if the country's

rapidly developing healthcare system is to achieve its full potential in terms of improving public health. Physicians should routinely reassess their patients to ensure that they are fully aware of the natures of their diseases as well as the proper timing and quantity of medications.

There was a significant difference between age and MARS-5, with those aged 39 years old and above perceived to have higher medication adherence score than the other age groups. This means that the presence of caregivers who assist older patients in taking their medications may explain their greater medication adherence. In addition, older adult patients typically have work-related obligations and other life concerns, so they may not be able to attend their clinic sessions and take their medications as prescribed. This may also be a result of the numerous comorbidities associated with elderly individuals. Therefore, they may perceive themselves as more ill and have better adherence to the antihypertensive regimens advised by their physicians[29]. Familiarity with drug therapy may also lead to greater medication adherence. Similar conclusions were made from other investigations in Saudi Arabia and other countries[26,29,32,33]. Notably, age and BRIEF were significantly different, with younger participants demonstrating higher health literacy than their counterparts. This may be because younger generations have a higher rate of high school graduation than older generations. This result is consistent with previous research[23,34]. Researchers in Saudi Arabia found that those between the ages of 18 and 40 had considerably higher health literacy levels than those aged 40 years and above[35]. It has been found out that younger respondents were more inclined to alter their dietary practices, while middle-aged respondents were more likely to increase their physical activity[36]. It would be more accurate to describe that these individuals are more inclined to apply lifestyle changes for their health. Therefore, it is possible to draw the conclusion that senior citizens ought to be among the high-priority target groups in future efforts to enhance health literacy. The findings of this study, along with those of other studies, highlight the importance of boosting health literacy across all age groups. It is crucial for healthcare professionals to consider conveying health-related information to patients in a way that is clear, concise, and easy to grasp, as these factors impact not only young people but also public welfare as a whole. Because of the wide range of health literacy and medication compliance across the population, healthcare providers in Saudi Arabia must tailor their communication to each individual's level of knowledge and understanding.

There was a significant difference between civil status and MARS-5, with single participants having a higher self-perception of medication adherence than the other groups. These results match the findings of past surveys, which indicated that single patients had higher levels of medication adherence than other groups[37,38]. However, these contradicted the findings of previous research[32,39]. This disparity may be related to the fact that spouses help with medication adherence by providing practical support or supervising medication consumption. Due to the absence of a spouse, divorced individuals may not have sufficient life security for a change in lifestyle. In addition, civil status and BRIEF were shown to have a significant difference, with married patients perceived to have higher health literacy than the other groups. This implies that married patients may be less likely to engage in risky behaviors, eat better, and maintain healthier lifestyles. They are also more likely to attend regular doctor's appointments and adhere to advice from their physicians than their counterparts. This finding is in line with those of previous studies[36,40]. Similar outcomes have been obtained in other research with various target populations[41]. Due to psychological and spiritual issues, divorced or separated patients may find it difficult to participate in health education sessions. Given their specific conditions, these patients require special consideration in health literacy and medication compliance programs.

There was a significant difference between educational attainment and MARS-5, with patients who had a high school level of education being more adherent to their medications than their counterparts. This may indicate that as formal education levels increase, patients may become more aware of the significance of implementing recommended lifestyle changes to prevent hypertension and its consequences. In addition, it is possible that illiterate respondents are unable to read written information regarding the disease and the prescribed lifestyle changes. This outcome is in line with previous research[39,42]. Contrary to this study's findings, a Saudi Arabian study[29] found that the likelihood of medication adherence was the same for both educated and illiterate patients. Factors such as social, cultural, and personal characteristics may impact a patient's medication-taking behavior and account for this disparity[27]. This would also support the policy of increasing drug adherence and including education about specific diseases in the education curriculum. This health-related information should be provided consistently, beginning in childhood education, to prevent lifestyle-related diseases. Hence, health providers should prioritize medication adherence while implementing instructional strategies to enhance lifestyle. Moreover, educational attainment and BRIEF were significantly different, with patients with a high school level of education possessing more health literacy than their counterparts. Relatively comparable outcomes were anticipated from more investigations in Saudi Arabia and elsewhere[23,34,40,42,43]. Education is one of the most important predictors of patients' health literacy[44], as individuals with low levels of education struggle to interpret and evaluate health information[45]. As a result, these patients are unable to communicate effectively with healthcare systems and providers. Therefore, planning and executing educational interventions to increase the health literacy of uneducated or illiterate patients should be a top priority for the healthcare providers. Non-print media is one of the most effective methods for communicating health messages to individuals with limited practical literacy. Messages can be transmitted through images, videos, and interactive computer applications. In addition, education based on the distribution of flyers, booklets, and brochures should be replaced with face-to-face education in group meetings to increase health literacy among those with lower education levels.

In this study, there was no significant correlation between BRIEF and MARS-5, which indicates that patients' health literacy levels remain constant despite their levels of medication compliance. This could also suggest that those with lower health literacy may have had insufficient disease control due to unintended errors in following recommended routines (e.g. omitting medications prescribed by healthcare professionals or not taking medications at the prescribed frequency). Correspondingly, health literacy may be negatively related to the probability of delivering socially beneficial survey responses regarding medicine use[46]. Prior research has distinguished between purposeful and inadvertent no adherence. Fan et al.[47] observed that low health literacy was linked to inadvertent no adherence but not substantially connected to purposeful no adherence among people with chronic illnesses. However, the study's limitation like difference between patients self-evaluating their abilities versus external evaluations limits this association. This result contradicts previous research[19,48,49], in which the authors concluded that patients who have a better grasp of their medications are more likely to make educated choices about treatment. Poor adherence to antihypertensive drug treatments may stem from a lack of medication literacy, which may result in misinterpretation of medication-related data or negative attitudes towards taking these prescriptions[49]. However, the observed disparities in the analyzed areas of pharmaceutical self-management show that the determinants of hypertension control may vary throughout the range of health literacy. This indicates that there is a need for health systems to identify better strategies to assist patients in ensuring that they comprehend the rationale behind the use of their medications. This study has implications for effective nursing, which is necessary for creating and implementing programs that increase patients' knowledge about medications. Additionally, hypertension patients with poor medication literacy should initially be assessed using evaluation instruments (e.g. MARS-5 and BRIEF). In addition, health education information should be as clear and straightforward as feasible that is to start education from childhood and implementing programs that support those with low literacy.

## CONCLUSION

**In this study, patients with hypertension adequately adhered to their prescribed medications and had marginal health literacy. There were significant differences between gender, nationality, age, civil status, and educational attainment with BRIEF and MARS-5. However, BRIEF and MARS-5 were not significantly correlated. These study results can be used to create and implement programs that increase hypertensive patients' knowledge about their medications.**

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