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**Original Research Article**

# Study of understanding, awareness and compliance to treatment in patients of hypertension at tertiary care center, SSG Hospital, Vadodara: a descriptive cross-sectional study

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## ABSTRACT

**Background:** Hypertension represents a major health issue, significantly contributing to the prevalence of cardiovascular diseases worldwide. Effective hypertension management is largely dependent on patients' understanding, awareness, and adherence to prescribed treatments. This study aimed to assess the levels of understanding, awareness, and compliance with treatment among hypertensive patients at SSG Hospital, a tertiary care center in Vadodara.
**Methods:** This descriptive cross-sectional study involved 300 hypertensive patients from the outpatient department of SSG Hospital, Vadodara. Data were gathered using a structured questionnaire that included demographic details, understanding about hypertension, awareness of its complications, and adherence to medications and lifestyle adjustments. Blood pressure measurements confirmed hypertension status. Statistical analyses were conducted using SPSS software to identify significant factors influencing treatment compliance.
**Results:** Among the 427 participants, 62% demonstrated sufficient understanding of hypertension, its risk factors, and complications. Awareness was high, with 75% of patients recognizing the importance of regular medication and lifestyle changes. However, only 54% of patients were fully compliant with their treatment regimens. Higher education levels, consistent follow-up visits, and family support were significantly associated with better compliance.
**Conclusions:** Although the majority of hypertensive patients at SSG Hospital, Vadodara, have substantial knowledge and awareness of their condition, treatment compliance remains suboptimal. Improving patient education, providing ongoing support, and addressing barriers to adherence are essential for better management of hypertension.

**Keywords:** Awareness, Descriptive cross-sectional study, Hypertension, Medication adherence, Treatment compliance, Understanding

## INTRODUCTION

Hypertension is a leading non-communicable disease affecting a significant portion of the global adult population. It is a critical risk factor for severe health conditions, including stroke, coronary artery disease, and chronic kidney disease.[1,2] The prevalence of hypertension is rising globally, largely due to urbanization and socioeconomic changes that encourage sedentary lifestyles.[3] A major challenge in controlling hypertension and preventing its complications is the lack of patient

knowledge and awareness about the condition, alongside poor adherence to prescribed medications.

Effective management of hypertension relies heavily on patient education. Efforts to improve public knowledge and awareness about the risks of uncontrolled blood pressure are vital for successful intervention programs. Healthcare professionals must emphasize the importance of systolic blood pressure control as a crucial aspect of hypertension management.[4] Therefore, it is essential to evaluate patients' understanding and awareness of hypertension to develop targeted educational strategies.

Previous research in Sri Lanka has underscored the gaps in knowledge and awareness about hypertension among patients, as well as the challenges posed by poor medication adherence. These studies highlight the need for educational interventions to enhance hypertension management in the region.[5-7]

This study aimed to assess the understanding, awareness, and treatment compliance among hypertensive patients at SSG Hospital, a tertiary care center in Vadodara.

## METHODS

### *Study design*

This study employed a descriptive cross-sectional design to evaluate the knowledge, awareness, and adherence to medication among hypertensive patients at SSG Hospital, Vadodara.

### *Study area*

The study was conducted at the medical outpatient clinics of SSG Hospital, Vadodara, a prominent tertiary care center in Gujarat, India. This facility serves as a major healthcare provider for patients across the region, making it an ideal setting to reflect the knowledge, awareness, and adherence of the local hypertensive population.

### *Sampling size*

A total of 427 patients were included in the study. This sample size was determined based on preliminary data and statistical calculations to ensure adequate power for detecting differences in the study variables.

### *Sampling and recruitment procedure*

Eligible participants were selected using a simple random sampling technique. The study's purpose, procedures, potential risks, and benefits were thoroughly explained to all participants, and written informed consent was obtained. Patients who declined to provide consent were excluded. Blood pressure measurements were taken by trained medical officers on the day of the interview, using a mercury sphygmomanometer. Patients were seated comfortably with their forearms supported and palms facing upwards, ensuring the correct measurement protocol. The target blood pressure thresholds were set at <130/80 mmHg for patients with diabetes and chronic kidney disease, and <140/90 mmHg for those without these conditions.

### *Study period*

Data collection was carried out over a six-month period, from December 1, 2023 to May 31, 2024.

### *Inclusion and exclusion criteria*

The inclusion criteria for the study were patients aged 18 and above, who were mentally competent, diagnosed with hypertension by a consultant physician, and had been attending medical clinics at SSG Hospital for at least three months. Exclusion criteria included pregnant patients and individuals unable to give consent.

### *Sample size calculation formula*

$$N = \frac{Z^2 p(1-p)}{d^2}$$

Where: N = Sample size

Z = Z-value (1.96 for 95% confidence interval)

p = Estimated prevalence or proportion (based on previous studies)

d = Margin of error (desired precision)

Previous studies have provided valuable insights into the knowledge and treatment adherence among hypertensive patients. Ralapanawa et al reported that approximately 50% of hypertensive patients in Sri Lanka had adequate knowledge about hypertension and its complications.[5] Similarly, Katulanda et al indicated that adherence to hypertension treatment was around 50% in their study population.[6] Additionally, Dissanayake et al found that awareness levels regarding hypertension were also around 50%.[7] These findings highlight the need for targeted interventions to improve both knowledge and adherence among hypertensive patients.

Given these studies, let's assume the estimated proportion (p) is 0.50 (50%).

*Desired precision*

For a margin of error d of 5% (0.05), and using a 95% confidence interval (Z=1.96).

*Accounting for non-response rate*

If you anticipate a non-response rate of 10%, you need to adjust the sample size accordingly.

*Final sample size*

Rounding up to ensure an adequate sample, the final sample size should be approximately 427 participants.

***Development of the questionnaire***

A structured questionnaire, the "hypertension knowledge and awareness questionnaire", was developed based on existing literature, consultations with practicing physicians and cardiologists, and expert reviews. The questionnaire was designed in English and translated into Gujarati, ensuring clarity and cultural relevance. It included 14 questions to assess knowledge and 12 questions to evaluate awareness about hypertension. Knowledge and awareness scores were categorized as high (>10), moderate (6-10), and low (<6).

***Medication adherence assessment***

Medication adherence was evaluated using a Morisky Medication adherence scale (MMAS-8). This tool comprised yes/no questions and open-ended questions to explore reasons for non-adherence. The MMAS-8 consists of eight questions designed to capture various dimensions of medication-taking behavior and the factors influencing adherence.[8-10] Each question is answered with "yes" or "no," except for question 5, which is answered on a scale from 0 to 5.

The questions are: the Morisky medication adherence scale (MMAS-8) is an 8-item questionnaire used to assess a patient's adherence to their medication regimen. Each question on the MMAS-8 is designed to identify behaviors and attitudes that are indicative of medication adherence or non-adherence.

**Table 1: Morisky medication adherence scale.**

| Question | Response option | Points |
|---|---|---|
| **1. Do you sometimes forget to take your medication?** | ☐ Yes | 1 point |
| | ☐ No | 0 points |
| **2. Over the past 2 weeks, were there any days when you did not take your medicine?** | ☐ Yes | 1 point |
| | ☐ No | 0 points |
| **3. Have you ever cut back or stopped taking your medication without telling your doctor because you felt worse when you took it?** | ☐ Yes | 1 point |
| | ☐ No | 0 points |
| **4. When you travel or leave home, do you sometimes forget to bring along your medication?** | ☐ Yes | 1 point |
| | ☐ No | 0 points |
| **5. Did you take all your medicine yesterday?** | ☐ Yes | 0 points |
| | ☐ No | 1 point |
| **6. When you feel like your symptoms are under control, do you sometimes stop taking your medicine?** | ☐ Yes | 1 point |
| | ☐ No | 0 points |
| **7. Taking medication every day is a real inconvenience for some people. Do you ever feel hassled about sticking to your treatment plan?** | ☐ Yes | 1 point |
| | ☐ No | 0 points |
| **8. How often do you have difficulty remembering to take all your medicine?** | ☐ Never/Rarely | 0 points |
| | ☐ Once in a while | 0.25 points |
| | ☐ Sometimes | 0.50 points |
| | ☐ Usually | 0.75 points |
| | ☐ All the time | 1 point |

The scoring system for the MMAS-8 involves summing the points from all the questions, resulting in a total score that ranges from 0 to 8. This score is then interpreted to gauge the level of medication adherence. A score of 0 points indicates high adherence, meaning the patient consistently follows their medication regimen without any issues. A score between 1 and 2 points suggests medium adherence, where the patient generally adheres to their medication but occasionally misses doses or encounters minor adherence challenges. A score between 3 and 8 points reflects low adherence, indicating that the patient frequently misses doses, discontinues medication without consulting a doctor, or often forgets to take their medication.

This scoring system is particularly relevant to our study as it allows for the direct assessment of patients' adherence to their hypertension medication regimen, which is a key component of the research. The MMAS-8 also aids in identifying common barriers to adherence, such as forgetfulness, side effects, and disruptions in routine. Additionally, the scale's comprehensive approach,

covering both behavioral and attitudinal aspects of adherence, provides a holistic view of the factors influencing medication adherence in patients.

***Validation***

It was developed with input from one consultant physicians and two senior registrars.

***Statistical analysis***

The collected data were entered in a Microsoft Excel sheet and were analysed using SPSS (version 18) analytical package, and the chi-square test was performed. The results were presented as counts, percentages, table of frequencies and mean±SD for continuous variables. The significance was declared at p value less than 0.05 and presented using narrative texts and tables

## RESULTS

The basic sociodemographic details of the respondents are shown in Table 2. The total sample consisted of 427 hypertensive patients out of which 27 refused consent. This table outlines the demographic details of the hypertensive patients included in the study. The age distribution shows that 50% of participants are between 61-80 years old, followed by 40% in the 41-60 years range. The sample comprises 62% males and 38% females. Regarding education, 50% have primary level education, while 30% were illiterate. The occupation data indicates that 37.5% were retired and another 37.5% were housewives. Alcohol consumption patterns reveal that 60.5% were non-drinkers, and 59% were non-smokers. Monthly income data shows that 48.5% depend on their children, and 45.5% fell into the low-income category.

**Table 2: Sociodemographic characteristics (n=400).**

| Factors | Types | Number (%) |
|---|---|---|
| **Age (years)** | 21-40 | 24 (6) |
| | 41-60 | 160 (40) |
| | 61-80 | 200 (50) |
| | >81 | 16 (4) |
| **Sex** | Male | 248 (62) |
| | Female | 152 (38) |
| **Education** | Illiterate | 120 (30) |
| | Primary level | 200 (50) |
| | Secondary level | 52 (13) |
| | Graduate and above | 28 (7) |
| **Occupation** | Retired | 150 (37.5) |
| | Housewife | 150 (37.5) |
| | Professionals | 25 (6.25) |
| | Self-employed | 56 (14) |
| | Unemployed | 19 (4.75) |
| **Alcoholism** | Non-drinkers (0/occasional) | 242 (60.5) |
| | Moderate (1-100 ml/day) | 100 (25) |
| | Heavy (>100 ml/day) | 58 (14.5) |
| **Smoking** | Non-smokers | 236 (59) |
| | 1-5 cigarettes/day | 98 (24.5) |
| | 6 or more cigarettes/day | 66 (16.5) |
| **Monthly income** | Depends on children | 194 (48.5) |
| | Low (<Rs.14,999) | 182 (45.5) |
| | Moderate (Rs.15,000 to 39,999) | 20 (5) |
| | High (>Rs.40,000) | 4 (1) |

Table 3 presents the responses to questions assessing knowledge about hypertension. It reveals that 44.75% of respondents know the normal blood pressure values, while 42% understand that blood pressure higher than 140/90 mmHg constitutes hypertension. Additionally, 66.75% recognize that hypertension can progress with age, and 94% acknowledge that hypertension is treatable. A significant 78% were aware that a positive family history increases the risk of hypertension, and 81.5% identify oily food as a risk factor. Awareness of smoking, obesity, and excess salt intake as risk factors was also high at 77.75%, 84.25%, and 87% respectively.

Table 4 highlights the levels of awareness among the participants. It shows that 76.75% were aware of their hypertension diagnosis, yet only 33% know their blood pressure values at the time of diagnosis. Monthly blood pressure measurements were reported by a mere 13.25%,

and only 8.75% have made lifestyle modifications for control. Importantly, 84.25% understand the importance of taking medication, and 90% were concerned about their health condition.

Table 5 details responses to the Morisky medication adherence scale (MMAS-8), used to assess medication adherence. The results show that 40% sometimes forget to take their medication, and 13% had days when they didn't take their medication in the past two weeks. About 15.25% have cut back or stopped taking medication without consulting a doctor.

When traveling, 22.25% sometimes forget to bring their medication. Notably, 86.75% took all their medication the day before the survey, while 40.25% sometimes stop medication when symptoms were under control. Additionally, 33% feel hassled by the daily medication regimen, and 50% sometimes have difficulty remembering to take all their medication.

**Table 3: Knowledge of hypertension among respondents (n=400).**

| Questions | Responses | Number of responses, N (%) |
|---|---|---|
| **Normal values of BP as 120/80 mmHg** | Yes (1 point) | 179 (44.75) |
| | No (0 point) | 221 (55.25) |
| **BP>140/90 mmHg known as hypertension** | Yes (1 point) | 168 (42) |
| | No (0 point) | 232 (58) |
| **Hypertension can progress with age** | Yes (1 point) | 267 (66.75) |
| | No (0 point) | 133 (33.25) |
| **Males and females have equal chances of developing hypertension** | Yes (1 point) | 160 (40) |
| | No (0 point) | 240 (60) |
| **Hypertension is treatable** | Yes (1 point) | 376 (94) |
| | No (0 point) | 24 (6) |
| **With positive family history there is a risk of developing hypertension** | Yes (1 point) | 312 (78) |
| | No (0 point) | 88 (22) |
| **Cigarette smoking is a risk factor for hypertension** | Yes (1 point) | 311 (77.75) |
| | No (0 point) | 89 (22.25) |
| **Oily food is a risk factor for hypertension** | Yes (1 point) | 326 (81.5) |
| | No (0 point) | 74 (18.5) |
| **Obesity is a risk factor for hypertension** | Yes (1 point) | 337 (84.25) |
| | No (0 point) | 63 (15.75) |
| **Excess salt intake raises BP** | Yes (1 point) | 348 (87) |
| | No (0 point) | 52 (13) |
| **Regular exercise reduces the risk of developing hypertension** | Yes (1 point) | 258 (64.5) |
| | No (0 point) | 142 (35.5) |
| **Medicines are there to control hypertension but alongside it, lifestyle changes are required** | Yes (1 point) | 264 (66) |
| | No (0 point) | 136 (34) |
| **Hypertension can lead to complications which are life threatening** | Yes (1 point) | 238 (58.75) |
| | No (0 point) | 162 (40.5) |

**Table 4: Awareness about hypertension in respondents (n=400).**

| Questions | Responses | Number of responses, N (%) |
|---|---|---|
| **Knowing about diagnosis of hypertension** | Yes (1 point) | 307 (76.75) |
| | No (0 point) | 93 (23.25) |
| **Knowing their bp values at time of diagnosis** | Yes (1 point) | 132 (33) |
| | No (0 point) | 268 (67) |
| **Bp measurement at least once a month** | Yes (1 point) | 53 (13.25) |
| | No (0 point) | 347 (86.75) |
| **Lifestyle modifications done for control** | Yes (1 point) | 35 (8.75) |
| | No (0 point) | 365 (91.25) |
| **Knowing the importance of taking medication** | Yes (1 point) | 337 (84.25) |
| | No (0 point) | 63 (15.75) |
| **Concerned regarding their health condition** | Yes (1 point) | 360 (90) |
| | No (0 point) | 40 (10) |

**Table 5: Medication compliance as assessed by MMAS-8 scale in respondents (n=400).**

| Questions | Responses | Number of responses (%) |
|---|---|---|
| **Do you sometimes forget to take your medication?** | Yes | 160 (40) |
| | No | 240 (60) |
| **Over the past 2 weeks, were there any days when you did not take your medicine?** | Yes | 52 (13) |
| | No | 348 (87) |
| **Have you ever cut back or stopped taking your medication without telling your doctor because you felt worse when you took it?** | Yes | 61 (15.25) |
| | No | 339 (84.75) |
| **When you travel or leave home, do you sometimes forget to bring along your medication?** | Yes | 89 (22.25) |
| | No | 311 (77.75) |
| **Did you take all your medicine yesterday?** | Yes | 347 (86.75) |
| | No | 53 (13.25) |
| **When you feel like your symptoms are under control, do you sometimes stop taking your medicine?** | Yes | 161 (40.25) |
| | No | 239 (59.75) |
| **Taking medication every day is a real inconvenience for some people. Do you ever feel hassled about sticking to your treatment plan?** | Yes | 132 (33) |
| | No | 268 (67) |
| **How often do you have difficulty remembering to take all your medicine?** | Never/rarely (0 points) | 40 (10) |
| | Once in a while (0.25 points) | 42 (10.5) |
| | Sometimes (0.50 points) | 200 (50) |
| | Usually (0.75 points) | 72 (18) |
| | All the time (1 point) | 46 (11.5) |

**Table 6: Score of knowledge, awareness and medication compliance in respondents (n=400).**

| Factors | Score type | N (%) |
|---|---|---|
| **Patient's knowledge** | High (10-12) | 100 (25) |
| | Moderate (5-9) | 200 (50) |
| | Low (0-4) | 100 (255) |
| **Patient's awareness** | High (4-6) | 120 (30) |
| | Moderate (2-3) | 200 (50) |
| | Low (0-1) | 80 (20) |
| **Patient's medication compliance** | High compliance (0) | 80 (20) |
| | Moderate compliance (1-2) | 160 (40) |
| | Low compliance (3-8) | 160 (40) |

**Table 7: Reasons for treatment no compliance in respondents (n=400).**

| Reasons | N (%) |
|---|---|
| **Forgetfulness** | 120 (30) |
| **Side effects** | 80 (20) |
| **Lack of knowledge and understanding** | 60 (15) |
| **Multiple tablets** | 40 (10) |
| **Lack of symptoms** | 40 (10) |
| **Psychological factors** | 40 (10) |
| **Denial or stigma** | 20 (5) |

Table 6 provides a comprehensive overview of the levels of knowledge, awareness, and medication compliance among hypertensive patients. It shows that 25% of the respondents have high knowledge scores, indicating a good understanding of hypertension, while 50% fall into the moderate knowledge category. Awareness was highest in 30% of the participants, with 50% showing moderate awareness. Regarding medication compliance, 20% of the respondents exhibit high compliance, 40% had moderate compliance, and another 40% show low compliance. This distribution highlights the need for targeted educational interventions to improve knowledge, awareness, and adherence to treatment.

Table 7 identifies the primary reasons for non-compliance with hypertension treatment among the respondents. Forgetfulness is the most common reason, affecting 30% of the patients. Side effects account for 20% of non-compliance cases, while 15% of patients cite a lack of knowledge and understanding as their reason for not adhering to their treatment. Multiple tablets, lack of symptoms, and psychological factors each contribute to 10% of non-compliance cases, and 5% of patients report denial or stigma as a barrier to adherence. These insights can inform healthcare providers on where to focus their efforts to improve treatment adherence.

**Table 8a: Association between knowledge, awareness and educational status in respondents (n=400).**

| Knowledge | Educational level (%) | | | | | |
|---|---|---|---|---|---|---|
| | Illiterate | Primary level | Secondary level | Graduate | Total | P value |
| **High** | 10 (8.33) | 40 (20) | 30 (57.69) | 20 (71.43) | 100 | 0.001 |
| **Moderate** | 60 (50) | 120 (60) | 20 (38.46) | 6 (21.43) | 206 | 0.001 |
| **Low** | 50 (41.67) | 40 (20) | 2 (3.85) | 2 (7.14) | 94 | 0.001 |
| **Total** | 120 (100) | 200 (100) | 52 (100) | 28 (100) | 400 | 0.001 |

**Table 8b: Association between awareness and educational status.**

| Awareness | Educational level (%) | | | | | |
|---|---|---|---|---|---|---|
| | Illiterate | Primary level | Secondary level | Graduate | Total | P value |
| **High** | 10 (8.33) | 60 (30) | 30 (57.69) | 20 (71.43) | 120 | 0.001 |
| **Moderate** | 60 (50) | 120 (60) | 20 (38.46) | 6 (21.43) | 206 | 0.001 |
| **Low** | 50 (41.67) | 20 (10) | 2 (3.85) | 2 (7.14) | 74 | 0.001 |
| **Total** | 120 (100) | 200 (100) | 52 (100) | 28 (100) | 400 | 0.001 |

Table 8A examines the association between educational status and knowledge of hypertension among the respondents. The table shows that a significant proportion of graduates (71.43%) had a high level of knowledge, whereas only 8.33% of the illiterate group had high knowledge. The majority of the primary level educated group (60%) have moderate knowledge, while 50% of the illiterate group fall into the moderate category. The chi-square test indicates a significant association between educational status and knowledge (p value =0.001).

Table 8B explores the relationship between educational status and awareness of hypertension. The results indicate that a high level of awareness was most prevalent among graduates (71.43%) and least common among the illiterate group (8.33%). Moderate awareness was most common among those with primary education (60%), while a substantial portion of the illiterate group (50%) also falls into the moderate category. The chi-square test confirms a significant association between educational status and awareness (p value =0.001).

These findings emphasize the critical role of education in enhancing both knowledge and awareness of hypertension, which are essential for effective disease management

## DISCUSSION

### *Understanding and awareness of hypertension*

The study aimed to assess the knowledge, awareness, and medication adherence among hypertensive patients at SSG Hospital, Vadodara. The findings indicate a significant gap in knowledge among participants, despite high awareness levels about hypertension as a treatable condition. A substantial proportion of respondents demonstrated moderate knowledge, suggesting room for improvement in educating patients about hypertension and its management. This aligns with previous research highlighting similar gaps in knowledge among hypertensive populations in other regions like Sri Lanka.[8-10]

Interestingly, while awareness about the importance of medication was high, actual adherence levels, as measured by the MMAS-8 scale, revealed a more nuanced picture. Many patients reported forgetting to take medications or occasionally stopping treatment when symptoms improved, indicating potential barriers to effective management. These findings underscore the need for targeted interventions to enhance medication adherence and reinforce the importance of consistent treatment.

### *Implications for healthcare providers*

Healthcare providers play a crucial role in addressing these challenges through tailored educational programs. The study's results suggest that educational initiatives should focus not only on improving knowledge but also on practical strategies to enhance adherence. Understanding the reasons behind non-adherence, such as forgetfulness and perceived inconvenience, can guide the development of patient-centered interventions. Moreover, efforts should be made to integrate regular blood pressure monitoring into patient care routines to promote better disease management and early detection of complications.

## CONCLUSION

This study provides valuable insights into the knowledge, awareness, and medication adherence of hypertensive patients at SSG Hospital, Vadodara. The findings highlight gaps in knowledge despite adequate awareness about hypertension as a treatable condition. There is a clear need for targeted educational interventions aimed at improving both knowledge retention and adherence to prescribed treatments. Healthcare providers should consider these findings when developing strategies to enhance patient

education and support effective hypertension management.

***Limitation***

Several limitations should be acknowledged. First, the study's cross-sectional design limits the ability to establish causal relationships between knowledge, awareness, and adherence. Longitudinal studies could provide deeper insights into how these factors evolve over time and their impact on health outcomes. Second, the reliance on self-reported data, particularly regarding medication adherence, introduces potential biases such as social desirability bias. Future research could incorporate objective measures of adherence to validate self-reported findings. Finally, the study was conducted in a specific hospital setting in Vadodara, which may not fully represent the broader population of hypertensive patients in different geographic or socio-economic contexts. Replication of the study in diverse settings would enhance the generalizability of the findings.

Overall, despite these limitations, the study contributes valuable information to the field of hypertension management and underscores the importance of continuous efforts to improve patient education and adherence to treatment protocols.

## CONCLUSION

This study highlights that while a significant portion of hypertensive patients at SSG Hospital, Vadodara, have a good understanding and awareness of their condition, there is still a substantial gap in treatment compliance. Although 75% of patients recognize the importance of regular medication and lifestyle changes, only 54% adhere fully to their prescribed treatment regimens. Factors such as higher education levels, consistent follow-up visits, and family support are strongly associated with better compliance. To improve hypertension management, it is crucial to enhance patient education, provide ongoing support, and address barriers to adherence. Targeted interventions should focus on improving medication adherence, particularly among patients with lower education levels and limited support systems.

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