Research Article

Application of the "rule of halves" for hypertension as an assessment tool in an urban and rural population at Shimoga, Karnataka - A cross-sectional study

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ABSTRACT

Background: Hypertension is a challenging disease in the developing countries like India as majority of the cases remain undiagnosed and hidden in the community. Therefore the disease hypertension adheres to "rule of halves." **Objectives:** The objectives are to assess the status of awareness, treatment, and control measures of hypertension using the "rule of halves" as a tool for the assessment of evaluation in the community. **Materials and Methods:** A cross-sectional study was conducted among 400 participants in both rural and urban field practice areas of Shivamogga Institute of Medical Sciences (SIMS). The participants were selected and interviewed about the diagnosis and management of hypertension along with their basic information using a structured questionnaire, and it was collected. Blood pressure (BP) was also recorded. **Result:** The prevalence in a rural area of Shimoga district for hypertension was 31% (62/200), whereas the prevalence was slightly higher in urban population, i.e., 34.5% (69/200). Of the 62 individuals with hypertension, 37 (59.6%) were already diagnosed as hypertensives. Of the 37 diagnosed hypertensives, 27 (72%) were under treatment of hypertension using antihypertensive drugs. Of these 27 participants, 12 (44.44%) had a control of BP. Of the 69 individuals with hypertension, 24 (34.7%) were already diagnosed as hypertensives. Of the 24 known hypertensives, 14 (58.3%) were under treatment of hypertension using antihypertensive medication. Of the 14 participants, only 5 (35.7%) had control of BP. **Conclusion:** The population in rural area had better awareness, better treatment, and inadequate control, whereas in urban area, the awareness was poor, treatment was better, and control of hypertension was not adequate.

KEY WORDS: Assessment Tool; Hypertension; Rule of Halves and Rural and Urban Area

INTRODUCTION

"High blood pressure (BP)" World Health Organization (WHO) theme 2013 is an apparent warning toward hypertension.[1] Hypertension is a challenging disease in developing countries like India causing 57% of stroke and 24% of coronary heart disease deaths, and majority of the cases remain undiagnosed and hidden in the community.[2] Studies done recently by Gupta and Gupta have revealed that hypertension was present in 10–20% of rural and 25–30% of urban population in India.[3] The silent and asymptomatic character of hypertension, an iceberg disease, therefore, follows the "rule of halves." The "rule of halves" of hypertension states that "Only about half of most developed countries were aware of the condition, only about half of those aware of the problem were being treated, and only about half of those treated were considered adequately treated."[4] This study was planned to understand the relevance of "rule of halves" in establishing the levels of awareness and control of hypertension. The objective of the study was to assess the status of awareness, treatment, and control measures of hypertension using the "rule of halves" as a tool for the

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assessment of evaluation in an urban and rural population of Shimoga, Karnataka.

MATERIALS AND METHODS

A community-based cross-sectional study was conducted in Ayanur and Mattur which are the rural field practice areas and also in Kote and Tunga Nagar which are the urban field practice areas of SIMS, Karnataka. The study with a period of 2 months from April to May 2018 was conducted after obtaining approval from the Institutional Ethical Committee.

A total of 400 participants were included in the study consisting of both men and women aged >20 years. People who not give consent to participate in the study and people who were sick with comorbid conditions were excluded from the study. Taking the total population of Municipal Corporation Shimoga as 3,22,650 as per 2011 census, hypothesized frequency of awareness levels of hypertension amongst residents of Shimoga city as 50% and confidence limits as 5% of 100 , the sample size was calculated using the formula $n = [(DEFF \times Np\ (1 - p)]/[(d2/Z21\ \alpha/2 \times (N - 1) + p \times (1 - p)]$. The design effect was taken as 1 and it came out to be 384.[5] Therefore, 400 participants were included in the study.

The research involved two steps as follows:

Screening Phase

The study population was screened for the presence or absence of BP and wasss classified as hypertensive or normotensive as per the criteria and definitions used in the study. The WHO study group recommended the sitting position than the supine position for recording of BP using mercury sphygmomanometer, and it was recorded in the left.[6] The pressure to which the sounds were first heard (Phase I) was taken to indicate the systolic pressure. Near the diastolic pressure, the sounds became muffled (Phase IV) and then disappeared (Phase V), and this Phase V was used to measure diastolic pressure. The systolic and diastolic pressures were measured at least 2 times over a period of 5 min and the mean of these was considered as BP. To reduce the source of error during recording of BP, certain standardized conditions were followed: Participants were given 10 min rest before measurement of BP, adult' s fitted cuff was used, leakage of the valve was ensured to reduce the subject and instrumental errors. To avoid the observer error, the same observer recorded the measurement of BP.

Evaluation Phase

All the study participants were assessed in accordance with the rule of halves in the population by administering a structured questionnaire once the screening phase is over. The questionnaire had questions on awareness about their BP and treatment of hypertension. The process was conducted in a manner and location that ensured participant privacy and after obtaining the participant's consent to participate.

Definitions and Criteria

The study population was considered to have hypertension if they were aware about their diagnosis (as per records, i.e., with "noncommunicable diseases" registers being maintained at Urban Health Training Centre and Rural Health Training Centre of respective areas and patients personal records) and were under treatment and/or had systolic and diastolic BP of 140 mmHg or greater and/or 90 mmHg or greater, respectively, without a comorbid condition such as diabetes or chronic kidney disease (according to the Joint National Committee 7th Report).[7] A person is said to have controlled hypertension if he/she was on treatment and had BP <140/90 mm of Hg or anyone on treatment with BP <130/80 mm of Hg if they have associated comorbidities such as diabetes mellitus or chronic kidney disease.

Data Analysis

Microsoft Excel spreadsheet was used for data entry and EPI INFO 7 for analysis of data. The data were expressed in percentages.

RESULTS

In rural area subjects, the prevalence for hypertension was 31% (62/200), whereas the prevalence was slightly higher in urban subjects, i.e., 34.5% (69/200) which is shown in Fig.1. Of the 62 individuals with hypertension in rural area, 37 (59.6%) were aware about their hypertensive status. Of the 37 aware hypertensives, 27 (72%) were under treatment. Of these 27 participants, only 12 (44.44%) had controlled BP [Figure 2]. Of the 69 individuals with hypertension in an urban area, 24 (34.7%) were aware about their hypertensive status. Of the 24 known hypertensives, 14 (58.3%) were under treatment, and among these 14 participants, only 5 (35.7%) had controlled BP [Figure 3].

1. General population
2. Normotensive population
3. Hypertensive population
4. Hypertensive - but not diagnosed subjects
5. Hypertensive - diagnosed subjects
6. Diagnosed subjects but not under treatment
7. Diagnosed subjects and under treatment
8. Not adequately treated subjects
9. Adequately treated subjects.

DISCUSSION

The study had concluded that the prevalence of hypertension among urban population (34.5%) is slightly more than the

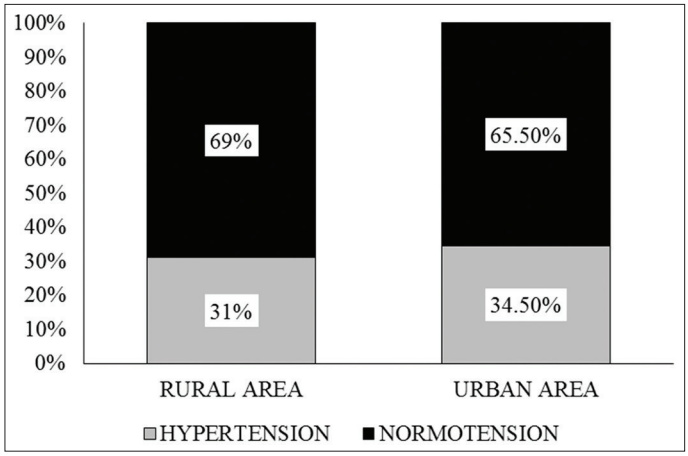

Figure 1: Prevalence of hypertension among urban and rural Shimoga

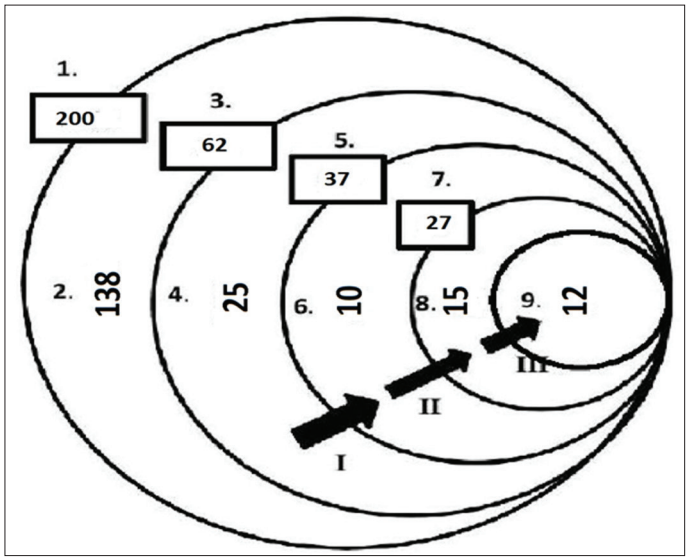

Figure 2: "Rule of halves" for hypertension among rural population

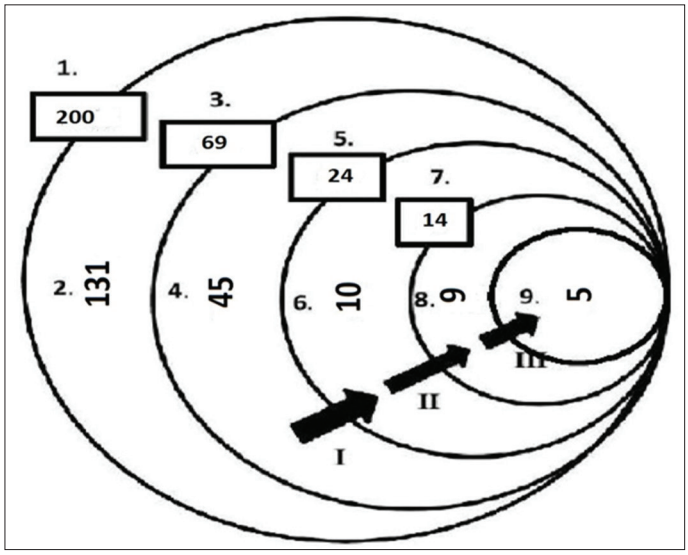

Figure 3: Depiction of "rule of halves" for hypertension among urban population

Table 1: Application of "rule of halves" for hypertension and interpretation: Rural

	I (Rule 1) undiagnosed (%)	II (Rule 2) not treated (%)	III (Rule 3) not controlled (%)
Rule of halves	50	50	50
Study population	59.6	72.9	44.4
Inference	Better awareness	Better treatment	Inadequate control

Table 2: Application of "rule of halves" for hypertension and interpretation: Urban

	I (Rule 1) undiagnosed (%)	II (Rule 2) not treated (%)	III (rule 3) Not controlled
Rule of halves	50	50	50
Study population	34.7	58.3	35.7
Inference	Poor awarness	Better treatment	Inadequate control

rural population (31%). In our study in rural area among 62 individuals diagnosed as hypertensives, 25 (40.4%) were not aware of their hypertensive status. Furthermore, in urban area, among 69 individuals, 45 (65%) were unaware about their hypertensive status. Comparing this with the rule of halves which states that 50% of cases are undiagnosed, the percentage of undiagnosed cases in the present study was lesser in a rural area but higher in an urban area. This result could be due to the poor health-seeking behavior and more sedentary lifestyle among urban people when compared with the rural population.

A study done by Bhise and Patra.[8] conducted in Maharashtra regarding hypertension found that the prevalence in an urban area (27%) is slightly more than the rural area (24%). In contrast, a study conducted in National capital region of India, Delhi by Roy *et al.*[9] had shown that prevalence in rural area is slightly more than the urban area. "Rule 1" states the awareness of disease among the people and also the prevailing condition of screening programs in the early diagnosis of disease. A study conducted by Lerner *et al.*[10] revealed that the 48.3% were aware of their disease in a population containing prevalence of 24.1%. A study done by Deepa *et al.*[11] found that only 37.3% of the hypertensives were aware of their condition, and among 50% of the hypertensives treated, only 40% of the treated cases were controlled. Hence, compared to this study, our study had shown better treatment in both rural and urban areas (72% and 58.3%, respectively) shown in Tables 1 and 2. This increase in the level of awareness and treatment could be due to the efforts of national and international health organization in the past decade to focus on the public health and prevention of cardiovascular disease like hypertension by early detection

and drug treatment of patients. In our study, among the urban population, the people had poor awareness, better treatment, and inadequate control which are in accordance with the study conducted by Rao and Daniel in 2014[12] among the urban slum which also stated that awareness among studied population was poor, treatment was better, and control of BP was not adequate.

STRENGTH AND LIMITATIONS

The rule of halves has been considered as the best assessment instrument for the awareness and treatment among the general population. Since the "rule of halves" had been used by different authors in the past and had given varied results, a constant evaluation is needed to check its validity and this is the first evaluation study using this tool in this district. Being a cross-sectional study, the study participants were not followed up and the study was just the snapshot of awareness and adequacy of treatment of hypertension in the community.

CONCLUSION

Using the "rule of halves" to assess hypertension, the study had concluded that the awareness and treatment of disease among rural population was better but control of hypertension was not adequate among them. The awareness among urban people was poor without adequate control of disease, but they had shown to have better treatment.

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