Prevalence, Awareness and Control of Hypertension among Sanitary Workers Employed in a Tertiary Care Centre in Puducherry, South India

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ABSTRACT

Background and Aims: Sanitary workers have higher tendency to develop hypertension as they spend most of their time in polluted or stressful environments. Hence, the current study was done to determine the prevalence, awareness and control of hypertension among sanitary workers in tertiary care centre in Puducherry. Methods: A cross sectional study was conducted among the sanitary workers in tertiary care centre from May to December 2019. Socio-demographic, work related and behavioural characteristics was obtained using a pretested semi-structured questionnaire. Individuals was diagnosed as hypertensive if systolic BP ≥140 mmHg and/or diastolic BP ≥90 mmHg. Results: Prevalence of hypertension among the sanitary workers was 36.6% (95% CI: 31.3-41.3%). Amongst them, only 34 (29.8%) participants were aware of their hypertension status. Prehypertension was present in 114 out of 277 participants (41.1%; 95% CI: 35.3-47.2%) without any history of hypertension. Among the 34 patients with known hypertension, only 12 (35.3%) had controlled BP. In age group of 40 years (aPR = 1.22), unmarried workers (aPR -1.65), obese workers (aPR -1.25), current tobacco users (aPR -1.61) and alcohol users (aPR -1.25) had significantly higher association with hypertension. Conclusion: Current study found that more than one-third of the sanitary workers had hypertension. However, almost three fourth of the hypertensives were not aware about their status and only one-third of the known hypertension cases had controlled BP. Hence, it is important to conduct periodic screening and awareness sessions about the possible risk factors for better prevention and control of hypertension.

Keywords: Epidemiology, hypertension, occupational health, sanitation

INTRODUCTION

Hypertension is an important public health problem and it has no obvious signs or symptoms making the persons unaware of condition. World Health Organization (WHO) has stated that around 1.3 billion people around the world suffers from hypertension and less than one in five have their blood pressure under control. It is also one of the leading causes of premature mortality. Hence an earlier diagnosis by regular screening and adequate management with lifestyle modification and drugs is required for effective reduction in high blood pressure. Occupational health deals with various health-related aspects and workplace safety. It focusses on the primary prevention of hazards. The health of occupational workers has various determinants at workplace leading to accidents, communicable diseases like Tuberculosis, anthrax, brucellosis and non-communicable diseases like diabetes, hypertension and stress-related states. Workers employed in certain occupations like sanitary workers have tendency to develop the above-mentioned conditions because of the nature of their work and level of stress faced during day-to-day activities. They are also more prone to lead unhealthy lifestyle like irregularities of meals and sleep.
pattern, low intensity physical activity, alcohol and tobacco consumption.[3]

Though there is increased focus on the morbidity status of healthcare workers, sanitary workers employed within a healthcare institution/hospital is often neglected and their burden goes unnoticed. Several studies has assessed the burden of hypertension among several cadres working in hospitals like doctors, nurses, laboratory technicians and administrative staffs.[4-7] There is still a narrow focus on the burden of hypertension among sanitary workers. Even, the studies that are done till now have targeted only sanitary workers working outside healthcare sector.[10] There is a need to generate evidence related to sanitary workers working inside the healthcare institutions or hospitals as it will help in taking measures or develop appropriate strategies for prevention and control of hypertension amongst this vulnerable population. Hence, the current study was done to determine the prevalence, awareness, control and determinants of hypertension among sanitary workers employed in a tertiary healthcare institution in Puducherry.

**METHODS**

**Study design, setting and population**

A cross sectional analytical study was conducted within the premises of Jawaharlal Institute of Postgraduate Medical Education and Research (JIPMER) for a period of eight months (May 2019 to December 2019). This was conducted as a part of larger project to determine the burden of cardiovascular diseases among sanitary workers. JIPMER is a tertiary care hospital situated in Dhavantari Nagar, Puducherry. JIPMER has a separate sanitary unit to maintain the general sanitation of the hospital. There are 4 sanitary units within the campus with sanitary superintendent, sanitary inspectors and around 1500 sanitation workers employed to provide sanitary services. All the sanitary workers employed for at least 6 months were eligible to participate in this study.

**Sample size calculation and sampling technique**

Sample size was calculated using OpenEpi (v 3.01 updated on 2013, USA). Since we could not find any previous studies on hypertension among sanitary workers, we assumed prevalence as 25%, 20% relative precision and 5% alpha error, the minimum sample size was calculated to be 289. After accounting for 10% non-response rate, final sample size was estimated to be 318. There were about 920 sanitary workers eligible to participate in our study. Non-probability convenient sampling method was followed to obtain the sample among these eligible participants.

**Study procedure**

First, approval for the study was obtained from the institutional ethics committee. After which, data has been collected after obtaining informed written consent from the eligible participants selected for the study. Data collection was performed within the premises of JIPMER. Weekly 3-4 visits have been made and 5-6 individuals were interviewed using a pre-tested semi-structured interview questionnaire. The questionnaire contained 3 sections. The first section contained information on socio-demographic details; the second section contains work-related characteristics such as number of hours of work per day and number of working hours per week which was assessed using the recommended guidelines from Factories Act; and the third section contained behavioural characteristics like current tobacco use (past one month), current alcohol use (past one year), dietary habits (vegetable and fruit intake – at least five servings per day)[9] and physical inactivity (moderate physical activity of at least 150 minutes/week or vigorous physical activity of at least 80 minutes/week).[10] Anthropometric measurements like height, weight and waist circumference was measured using standard WHO guidelines.[11] Obesity was classified based on Asia Pacific guidelines for Body mass Index (BMI).[12] Waist circumference was classified based on International Diabetes Federation criteria for South Asian individuals.[13]

For measurement of blood pressure, 2 readings were taken at an interval of 5 minutes and mean of 2 measurements

| Table 1: Socio-demographic and work-related characteristics of the study participants (n=311) |
|---------------------------------------------------------------|
| **Characteristics**                                           | **Frequency (%)** |
| Age category (in years)                                       |                    |
| 18-30                                                         | 40 (12.9)          |
| 31-40                                                         | 136 (43.7)         |
| 41-50                                                         | 109 (35)           |
| 51-60                                                         | 20 (6.4)           |
| 61 and above                                                 | 6 (1.9)            |
| Gender                                                        |                    |
| Female                                                        | 132(42.4)          |
| Male                                                          | 179 (57.6)         |
| Educational status                                           |                    |
| No formal education                                          | 65 (20.9)          |
| Primary school                                               | 55 (17.7)          |
| High school                                                  | 124(39.9)          |
| Secondary school                                             | 33 (10.6)          |
| Graduate                                                     | 33 (10.6)          |
| Marital status                                               |                    |
| Currently married                                            | 260 (83.6)         |
| Never married                                                | 43 (13.8)          |
| Widowed/Divorced/Separated                                    | 8 (2.6)            |
| Religion                                                      |                    |
| Hindu                                                        | 302 (97.1)         |
| Christian                                                     | 9 (2.9)            |
| Duration of work experience (in years)                        |                    |
| 0-5                                                          | 136 (43.7)         |
| 6-10                                                         | 111 (35.7)         |
| >10                                                          | 64 (20.6)          |
| Duration of work hours per week                               |                    |
| ≤48                                                          | 285 (92.2)         |
| >48                                                          | 24 (7.7)           |

*Recommended duration of working hours per week by Factories Act (48 hours)*
was taken as final blood pressure value. Care was taken that the subject avoided caffeine, smoking or exercise at least 30 minutes prior to measurement. Hypertension was diagnosed according to Joint National Committee-7 guidelines,[14] individuals was diagnosed as hypertensive if systolic BP ≥140 mmHg and/or diastolic BP ≥90 mmHg. Hypertension was further classified into: Grade I (Systolic BP between 140-159 mmHg and/or diastolic BP between 90-99 mmHg), Grade II (Systolic BP between 160-179 mmHg or greater and/or diastolic BP between 100-109 mmHg.) or Grade III hypertension (Systolic BP 180 mm Hg and higher and/or diastolic BP 110 mmHg or higher). Individuals were diagnosed as Prehypertension, if systolic BP is between 130-139 mmHg and/or diastolic BP is between 80-89 mmHg. Individuals who were on anti-hypertensive treatment were also included. Among the known case of hypertension, uncontrolled status was determined by the BP value of systolic BP ≥140 mmHg and/or diastolic BP ≥90 mmHg.[14]

**Statistical analysis**

Data was collected using EpiCollect 5 (Imperial College, London) which is a mobile based application and analysis was done using STATA version 12.0. Prevalence of hypertension was expressed as proportion with 95% confidence interval (CI). Bivariate analysis using Chi-squared test was done with hypertension as dependent variable and age, gender, education, marital status, duration of working experience, tobacco use, alcohol use, obesity and abdominal obesity as explanatory variables. Factors significant at $P$ value less than 0.2 were included in the multivariable analysis. Log binomial regression was done to quantify the association and adjusted prevalence ratio (aPR) with 95% CI was reported. Final model in multivariable regression analysis was chosen based on adjusted R-square value.

**RESULTS**

In total, 318 sanitary workers were approached for inclusion in our study. However, 311 participants completed the full interview schedule and examination (response rate 97.8%). Socio-demographic and work-related details of the study participants are provided in Table 1. About one-third of these participants were never screened for any NCDs in their lifetime and 47 (15.1%) participants had family history of HTN. Table 2 shows the behavioural and anthropometric characteristics of the study participants. Only 10.7% of the workers were current tobacco users, while almost 15% were current alcohol users. More than three fourth of the study participants were physically active. More than 50% of the participants were obese (≥ 25.00 kg/m²). Abdominal obesity was present in about 35% of the participants.

Table 3 provides the details on the burden of hypertension among the study participants. Prevalence of hypertension among the sanitary workers was 36.6% (95% CI: 31.3-41.3%). Only 34 (10.9%) participants were aware of their hypertension status and 80 (25.7%) of the participants were newly diagnosed to have hypertension. Prehypertension was present in 114 out of 277 participants (41.1%; 95% CI: 35.3-47.2%) without any known history of hypertension. Among the 34 patients with known history of hypertension, only 12 (35.3%) belonged to controlled status category.

Table 4 shows the determinants of hypertension among the sanitary workers. Participants belonging to age group of 40 years or more had 1.22 times higher prevalence of hypertension when compared to participants less than 40 years

### Table 2: Behavioral and anthropometric characteristics of the study participants ($n=311$)

| Characteristics                        | Number of participants $n$ (%) |
|----------------------------------------|-------------------------------|
| **Current tobacco use**                |                               |
| Yes                                    | 32 (10.3)                     |
| No                                     | 279 (89.7)                    |
| **Current alcohol use**                |                               |
| Yes                                    | 45 (14.5)                     |
| No                                     | 266 (85.5)                    |
| **Physical activity**                  |                               |
| Adequate                               | 241 (77.5)                    |
| Inadequate                             | 70 (22.5)                     |
| **BMI Category**                       |                               |
| Underweight (<18.50)                   | 15 (4.8)                      |
| Normal (18.50 - 22.99)                 | 69 (22.2)                     |
| Overweight (23.00 - 24.99)             | 67 (21.5)                     |
| Obesity (≥ 25.00)                      | 160 (51.5)                    |
| **Abdominal obesity**                  |                               |
| Present                                | 109 (35.0)                    |
| Absent                                 | 202 (65.0)                    |

*Self-reported by the participants.**Asia Pacific guidelines for obesity.
*International Diabetes Federation criteria for country specific waist circumference values for South Asian population (WC >90 cm for males; >80 cm for females)

### Table 3: Prevalence, awareness and control of hypertension among the study participants

| Characteristics                              | Frequency | Proportion with 95% CI |
|----------------------------------------------|-----------|------------------------|
| Overall prevalence of hypertension ($n=311$) | 114       | 36.7 (31.3-41.3)       |
| Awareness of hypertension ($n=311$)          |           |                        |
| Newly diagnosed hypertension (unaware)       | 80        | 25.8 (20.9-30.9)       |
| Known case (aware of hypertension status)    | 34        | 10.9 (7.7-14.9)        |
| Control status of known hypertension cases ($n=34$) | |                        |
| Controlled                                   | 12        | 35.3 (19.7-53.5)       |
| Uncontrolled                                 | 22        | 64.7 (47.7-79.2)       |
| Grading of hypertension ($n=277$)            |           |                        |
| Prehypertension                              | 114       | 41.1 (35.3-47.2)       |
| Grade I hypertension                         | 59        | 21.3 (16.8-24.2)       |
| Grade II hypertension                        | 18        | 6.5 (4.0-9.9)          |
| Grade III hypertension                       | 3         | 1.1 (0.3-2.9)          |
Table 4: Association of sociodemographic, behavioural and anthropometric characteristics with hypertension among sanitary workers in a tertiary care centre, Puducherry (n=311)

| Characteristics                          | Total    | Hypertension (n=114) | Unadjusted Prevalence Ratio (95% CI) | Adjusted Prevalence Ratio (95% CI) | Adjusted P  |
|------------------------------------------|----------|----------------------|-------------------------------------|------------------------------------|-------------|
| Age categorization (in years)            |          |                      |                                     |                                    |             |
| <40                                      | 176      | 59 (33.5)            | 1                                   | 1                                  |             |
| ≥40                                      | 135      | 55 (40.7)            | 1.21 (0.91-1.62)                    | 1.22 (1.01-1.47)                   | 0.04*       |
| Gender                                   |          |                      |                                     |                                    |             |
| Female                                   | 132      | 55 (41.7)            | 1.26 (0.94-1.69)                    | 1.14 (0.79-1.65)                   | 0.48        |
| Male                                     | 179      | 59 (33.0)            | 1                                   | 1                                  |             |
| Educational status                       |          |                      |                                     |                                    |             |
| No formal education                      | 66       | 24 (36.4)            |                                     |                                    |             |
| Primary                                  | 55       | 16 (29.1)            | 0.80 (0.47-1.35)                    |                                    |             |
| Secondary                                | 124      | 50 (40.3)            | 1.11 (0.75-1.63)                    |                                    |             |
| Higher                                   | 66       | 24 (36.4)            | 1.00 (0.64-1.57)                    |                                    |             |
| Marital status                           |          |                      |                                     |                                    |             |
| Currently married                        | 260      | 91 (35.0)            |                                     |                                    |             |
| Never married                            | 43       | 20 (46.5)            | 1.33 (0.93-1.90)                    | 1.65 (1.32-2.07)                   | <0.001      |
| Widowed/Separated/Divorced               | 8        | 3 (37.5)             | 1.07 (0.43-2.66)                    | 1.20 (0.46-3.14)                   | 0.72        |
| Duration of working experience (in years)|          |                      |                                     |                                    |             |
| 0-5                                      | 136      | 50 (36.8)            |                                     |                                    |             |
| 6-10                                     | 111      | 42 (37.8)            | 1.03 (0.74-1.42)                    |                                    |             |
| >10                                      | 64       | 22 (34.4)            | 0.93 (0.62-1.40)                    |                                    |             |
| Current tobacco use                      |          |                      |                                     |                                    |             |
| Yes                                      | 32       | 18 (56.2)            | 1.63 (1.16-2.31)                    | 1.61 (1.18-2.21)                   | 0.003*      |
| No                                       | 279      | 96 (34.4)            |                                     |                                    |             |
| Current alcohol use                      |          |                      |                                     |                                    |             |
| Yes                                      | 45       | 23 (51.1)            | 1.49 (1.07-2.08)                    | 1.25 (1.03-1.51)                   | 0.02*       |
| No                                       | 266      | 91 (34.2)            |                                     |                                    |             |
| Obesitya                                 |          |                      |                                     |                                    |             |
| Present                                  | 160      | 68 (42.5)            | 1.39 (1.03-1.88)                    | 1.25 (1.03-1.51)                   | 0.02*       |
| Absent                                   | 151      | 46 (30.5)            |                                     |                                    |             |
| Abdominal Obesitya                       |          |                      |                                     |                                    |             |
| Present                                  | 109      | 45 (41.3)            | 1.21 (0.90-1.62)                    |                                    |             |
| Absent                                   | 202      | 69 (34.2)            |                                     |                                    |             |

*P value statistically significant (<0.05). Educational status, Duration of working experience, Abdominal Obesity were not included in the model as the P value was more than 0.20. aAsia Pacific guidelines for obesity (BMI > 25.0 kg/m2). bInternational Diabetes Federation criteria for country specific waist circumference values for South Asian population (WC >90 cm for males; >80 cm for females)

and it was statistically significant (P = 0.04). Unmarried sanitary workers had higher prevalence (aPR-1.65, P < 0.001) when compared to married workers. Participants with obesity had higher prevalence of hypertension (aPR-1.25, p-0.02) when compared to participants with normal or low BMI. Current tobacco users had 1.61 times higher prevalence of hypertension when compared to those who are not current users and this was statistically significant (P = 0.003). Current alcohol users had significant association with hypertension (aPR-1.25; P = 0.02).

**DISCUSSION**

This cross-sectional study conducted among sanitary workers employed in tertiary care centre in Puducherry reported prevalence of hypertension as 36.7%. A systematic review on hypertension among general population in India reported a prevalence of 29.8%, which shows that the burden is higher among sanitary workers compared to the general population.[15] Though not much studies are done to find the burden of hypertension among sanitary workers, one study reported prevalence among sanitation workers in Shimla where it was 18.5%,[8] This difference in findings can be attributed to difference in the study settings and difference in nature of work between sanitation workers in community and sanitary workers employed in healthcare institutes. Hence, occupations with significantly higher prevalence of hypertension, when compared to general population, need to be studied in detail to explore the possible risk factors involved.

Our study also found that only 30% were aware of their condition which is almost similar to the general population.[15] The awareness level still needs to be improved by periodic or annual screening of workers for high blood pressure. This baseline information is useful for the relevant policymakers as it shows the target population with such lesser awareness level regarding their own hypertension status and the need to develop specific strategies targeting them.
The control status among the sanitary workers (35.3%) was much better than the control status found in the general population (<20%).[13] This shows that though the burden of hypertension is more among the sanitary workers, once diagnosed and aware, the control status among the sanitary workers is better than the general population. This might be due to the factor that these workers are employed in a healthcare institution. Hence, accessibility to services will not be an issue for them, making them regular in follow-up and adherence to medications. However, further exploration of these factors is required.

Older age group, marital status, obesity, tobacco and alcohol were significant determinants of hypertension among sanitary workers. However, most of these factors are established risk factors for hypertension. This shows that the risk factors for hypertension were similar between general population and sanitary workers. Therefore, strategies used for control of hypertension in general population can be applied for the sanitary workers through special health education sessions.

Limitations of the study were smaller sample size which limits the generalizability of study results. Since, this was a cross-sectional study, it is difficult to assume causal relationship between exposure and outcome. In addition to awareness status, treatment seeking behaviour for hypertension could have been assessed in the study which was not included in the questionnaire. In spite of these limitations, the current study provided important baseline information on the burden and lack of awareness about hypertension among sanitary workers employed in healthcare institution. This study also identified more than 70% workers unaware of their hypertension status and provided appropriate referral services for further management at the end of the project.

One important measure that needs strict implementation is pre-placement screening of blood pressure for hypertension. Persons identified with raised blood pressure can be suggested to take up any other less stressful job as suggested by the concept of “ergonomics” (Fitting the job to the worker).[16] After recruitment, further periodic screening need to be done at least every year. This calls for integrated approach between health and labour sector.

Further workplace interventions like regular health education sessions on how to prevent the hypertension, addressing the importance of proper adherence to medications and annual visit by mental health counsellors for counselling of persons with high degree of stress are required. Development and implementation of protocols and guidelines for the screening and management of hypertension for vulnerable occupational groups can be done at national level. Incorporation of multiple components in multiple levels can be done in existing interventions to achieve better control of hypertension.

**Conclusion**

The current study found that more than one-third of the sanitary workers had hypertension. However, almost three-fourth of the hypertensives were not aware about their status and only one-third of those who were aware had their BP under control.

**Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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**Conflicts of interest**

There are no conflicts of interest.

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