



Relationship of Hypertension with Stress Level among Hypertensive Police Personnel of Tier Two and Tier Three Cities

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Abstract

Background:

Hypertension is a major public health problem associated with stress and lifestyle-related risk factors. Police personnel, due to their demanding duties, are at higher risk of developing hypertension and stress-related disorders. This study explores the relationship between hypertension and stress levels among hypertensive police personnel in tier two and tier three cities.

Objectives:

To assess stress levels using the Perceived Stress Scale (PSS) and evaluate the association of hypertension with stress levels among police personnel of tier two and tier three cities.

Methods:

An observational cross-sectional study was conducted among 69 hypertensive police personnel aged 30–58 years. A total of 39 participants were from tier two cities and 30 from tier three cities. Anthropometric measurements and blood pressure were recorded using a digital sphygmomanometer. Stress levels were assessed using the PSS. Statistical analysis was performed using SPSS version 24.

Results:

In tier two cities, 84.63% of participants had moderate stress, 10.26% low stress, and 5.13% high stress. In tier three cities, 73.33% had moderate stress, 16.67% low stress, and 10% high stress. A significant association between stress and blood pressure was observed in tier three city participants ($p=0.013$), whereas no significant association was found in tier two cities ($p=0.17$). The comparison of stress levels between the two groups showed no significant difference ($p=0.38$).

Conclusion:

Moderate stress was predominant in both city groups. Stress was significantly associated with hypertension in tier three city police personnel but not in tier two. Regular screening and stress management interventions are essential for this high-risk occupational group.

Keywords: Blood pressure, Hypertension, Police personnel, Stress, Two and Three Tier cities

Introduction

Hypertension is a chronic condition of concern due to its role in the causation of coronary heart disease, stroke and other vascular complication, High blood pressure represents a quantitative deviation rather than qualitative deviation from norm and definition of hypertension is therefore arbitrary.

The British Hypertension Society defines hypertension as BP>140/90 mm of Hg. When systolic and diastolic blood pressure falls into different categories, the higher category will be selected to classify the individual's blood pressure.

Category	Systolic blood pressure (mm of Hg)	Diastolic blood pressure (mm of Hg)
Normal	<130	<85
High normal	130-139	85-90
Hypertension Stage 1 (Mild)	140-159	90-99
Stage 2 (Moderate)	160-179	100-109
Stage 3 (Severe)	>180	>110

In 95% cases of hypertension there is no specific cause can be found and such patients are said to have essential hypertension. This may include predeposing risk factors like, ethnicity, genetic factors, high salt intake, alcohol excess, obesity, lack of exercise, stress, etc.

In ~ 5% of cases hypertension results from specific underlying disorder termed as secondary hypertension causes include renal diseases: (renal vascular disease, glomerulonephritis, polycystic kidney disease) Endocrine disorders (phaeochromocytoma, Cushing's syndrome, Cohn's syndrome, acromegaly, thyrotoxicosis, congenital adrenal hyperplasia) Pregnancy, Drugs (corticosteroids, oestrogen-containing contraceptive pill, anabolic steroids) Coarctation of aorta.

Raised blood pressure is a leading risk factor for causing death globally, accounting for 10.8 million deaths in 2019. Hypertension is more prevalent in Asian than in Western countries due to higher rates of abnormal patterns of blood pressure variability. It is estimated that ~50% of hypertensive patients in the Asian region do not adhere to medication. This is likely due to the gap between physician capacity and patient need for hypertension care. Thus, identifying and treating masked hypertension phenotypes seem particularly important for cardiovascular risk reduction in Asian population.^[1]

The status of police force in India paints a challenging scenario due to lack of staff and an increasing number of crimes. The national data reveals that the Indian police and civil ratio is 138:100,000. This ratio puts India to the fifth-lowest police-civilian ratio in the whole world. In addition to these contemporary police work involves pressure both in terms of professional and family, dual responsibilities for women police, use of technology, body image related issues, media and political pressure.^[2]

They averagely work for 12 hours or more, often goes to couple of days nonstop at police station with a catnap in between. The truth is that many policemen live lives of fatigue and despair, knowing that they nothing but the concerned voice by superiors usually to media and not the superiors.^[3]

When individuals are overwhelmed by occupational stress, they suffer from increased chronic stress, hypertension, depression, heart disease, gastrointestinal disorder, tobacco, alcohol, and drug use. Knowledge of these risk factors for hypertension may give tracks for prevention in hypertension among police.^[4]

Operational police personnel have to urgently and dynamically mobilise in response to unpredictable frontline incident. These personnel have an increased risk of cardiovascular events than general population. Low level of physical activity, poor diet, shift work may also contribute to increased risk of cardiovascular diseases. Whereas, non-operational police personnel work involves being sedentary while completing administrative and desk-based duties in an office environment. High volumes of sedentary behavior are associated with hypertension and metabolic syndrome.^[5]

Furthermore, the etiology of hypertension is multifactorial,

and a large number of the separate causative factors (hyperactivity of sympathetic nervous and renin-angiotensin-aldosterone systems, endothelial dysfunction, and arterial stiffness) were also seen. Causative factors pertaining to arterial hypertension also seem to hold true for obesity and Metabolic syndrome, whose common feature consists in an increased oxidative stress caused by excessive Reactive oxygen substance (ROS) production.^[6]

Public order maintenance, prevention and control of crime, timely investigation, while following the human rights regime with civil order have made policing arduous and stressful. This continuous work hampers the already susceptible internal body homeostasis, and they become more prone to disease, disability, and infirmity in the form of hypertension and its complications. We need to focus on the health profile and timely intervention on the health status of the law enforcement officers so that they can effectively continue with their duties.

Proper health education regarding risk factors for hypertension, regular physical and mental health measures to counter the stressful conditions can have a positive effect on the prevalence of hypertension and subsequent morbidity profiles among them.^[7]

Police personnel have copious pre-deposited risk factors for being hypertensive. Being a non-communicable disease; hypertension is communicating with the risk factor beholders and the cardiovascular diseases plays salutation to hypertension. Most of the police personnel evade themselves from stress free lifestyle promoting to be unhealthy as they mostly perform organizational and operational dual task handling due to less man power; so regular physical assessment and ruling out the stress levels becomes mandatory for such a high-risk job profile.

Also, a study suggests that^[7] hypertension is more common in rural area than urban area; due to the significant difference in their lifestyles. Also, there is remarkable difference in job setting provided to them according to the area to be supervised. This is observed in case of work load and shift duties. Crime rates tend to decline as we go for three tier cities from two tier city; due to this there is decline in number of police personnel posted in 3 tier cities compare to 2 tier cities. We found lack of data regarding the differences of stress and blood pressure in police personnel of tier 2 and tier 3 city, across various geographical area. Thus, need of our study arises to evaluate the same & find its relationship with stress in rural & urban area set up in our vicinity.

Material and Method:

1. **Study Type:** Observational study.
2. **Study Design:** Cross- sectional
3. **Study duration:** 6 months.
4. **Study population:** Hypertensive police personnel between 30 to 58 age group
5. **Study setting:** Residential area, police station, checkpoints, headquarters
6. **Sampling technique:** Simple random sampling
7. **Sample Size:** n= To estimate the population proportion:

$$n = \frac{Z^2 pq}{d^2}$$

"Where, p =guess of population= 0.58 $Q=1-p=0.42$ $\alpha=5\%$ level of significance

$$Z=1.96 \text{ at } d=\text{absolute precision}=0.1$$

$$n = \frac{[1.96]^2 [0.58] [0.42]}{[0.1]^2}$$

$$n=65$$

8. Inclusion criteria:

- Police personnel diagnosed with Hypertension.
- Police personnel posted at tier 2 city and tier 3 city.
- Age group:30-58.
- Gender : Male, Female, Other.

9. Exclusion criteria:

- Those who are not willing to participate.
- Individuals having Less than 1 year of work experience.

Materials

1. Inch tape
2. Weighing machine
3. Pen
4. Paper
5. Chair
6. Pillow
7. Consent form
8. Case record form
9. Perceived Stress Scale (PSS)
10. Digital Sphygmomanometer: Omron, HME7141T1 automatic blood pressure monitor

Perceived Stress Scale:

- The Perceived Stress Scale (PSS) is the most widely used psychological instrument for measuring the perception of stress. It is a measure of the degree to which situations in one's life are appraised as stressful. Items were designed to tap how unpredictable, uncontrollable, and overloaded respondents find their lives.
- The questions in the PSS ask about feelings and thoughts during the last month. In each case, respondents are asked how often they felt a certain way.
- The scale also includes a number of direct queries about current levels of experienced stress.
- Perceived Stress Scale (PSS) has 10 questions.
- Each question is responded as,
- 0 = Never, 1 = Almost, never 2 = Sometimes, 3 = Fairly Often, 4 = Very Often
- PSS scores are obtained by reversing responses (e.g., 0 = 4, 1 = 3, 2 = 2, 3 = 1 & 4 = 0) to the four positively stated items (items 4, 5, 7, & 8) and then summing across all scale items. A short 4 item scale can be made from questions 2, 4, 5 and 10 of the PSS 10 item scale.
- Individual scores on the PSS can range from 0 to 40 with higher scores indicating higher perceived stress.
 - Scores ranging from 0-13 would be considered low stress.

- Scores ranging from 14-26 would be considered moderate stress.
- Scores ranging from 27-40 would be considered high perceived stress

Digital Sphygmomanometer:

Omron HEM 7141T1 device is used; it has validated to be within +/-3mmHg or 2% for blood pressure.

Instruction for blood pressure measurements were as followed:

- Measurements were taken in a quiet place.
- Participants were asked to remove any tight-fitting clothing from arm.
- Then they were sitting on a chair with feet flat on the floor & their arm on a table so that the cuff is at the same level as heart.
- They were instructed to remain still and not to talk during the measurement.
- Then blood pressure readings were noted.

Procedure:

- Ethical clearance was taken from the ethical committee of Dr. Ulhas Patil College of Physiotherapy, Jalgaon prior to the commencement of the study.
- A cross – sectional study was administered and subjects was screened on the basis of inclusion – exclusion criteria.
- A brief demographic data was obtained and a written consent was from all participants, and the nature and purpose of the study was explained to them.
- The anthropometric measurement was taken by inch tape and weighing machine.
- First, medical history was noted regarding presence of hypertension.
- Then, level of stress was assessed by Perceived Stress Scale.
- After data collection, data entry was done.
- Statistical analysis was done.

Statistical Analysis:

- Data was collected and validated using MS-Excel Software.
- Simple graphs & basic descriptive statistics was analysed using MS-Excel 2016.
- Data was analysed using SPSS software version 24.
- Descriptive statistics was applied to categorical variables where mean, SD and frequency was expressed in %. Mean and SD was computed.
- The chi-square test was conducted to test the association of stress level with blood pressure level of significance was set at $p > 0.05$
- The comparison of stress level among tier 2 and tier 3 were done by unpaired t test & level of significance was set at $p > 0.05$.

Results

A total of 69 hypertensive police personnel were studied, with 39 participants from tier two cities and 30 from tier three cities.

Table 1: Shows that the mean age was 48.74 ± 4.66 years in tier two cities and 46.87 ± 5.19 years in tier three cities. The mean stress scores were comparable between groups (18.49 ± 4.36 vs. 19.57 ± 5.58).

Variables	Mean Tier 2	SD* Tier 2	Mean Tier 3	SD Tier 3
Age (years)	48.74	4.66	46.87	5.19
Stress score	18.49	4.36	19.57	5.58

Table 2: Presents the age distribution, with the majority of participants in both groups aged 46–50 years.

Variable	Groups	Tier 2		Tier 3	
		Frequency	Percentage	Frequency	Percentage
Age	Below 40	2	5.13	5	16.67
	41-45	8	20.51	4	13.33
	46-50	14	35.90	15	50.00
	Above 50	15	38.46	6	20.00



Fig 1: Illustrates gender distribution, showing male predominance in both groups.

Table 3: summarizes BMI distribution, indicating that overweight individuals formed the largest subgroup in both cities.

Variable	Groups	Tier 2		Tier 3	
		Frequency	Percentage	Frequency	Percentage
BMI	NORMAL	10	25.64	12	40.00
	OVERWEIGHT	19	48.72	14	46.67
	OBESE CLASS 1	9	23.08	3	10.00
	OBESE CLASS 2	1	2.56	1	3.33

Lifestyle factors such as additional salt intake (Figure 2) and alcohol consumption (Figure 3) were common in both

groups, with slightly higher prevalence in tier two cities.

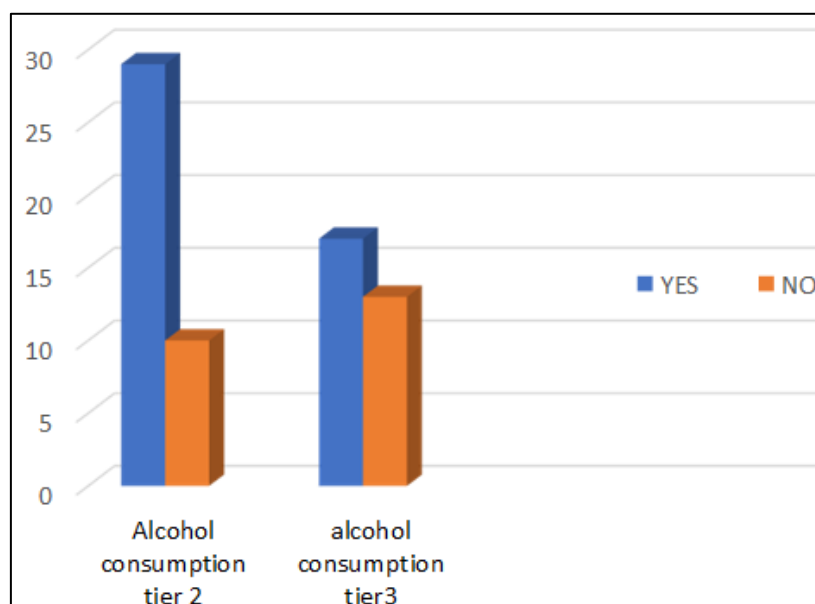


Fig 2: Shows number of sample consuming alcohol

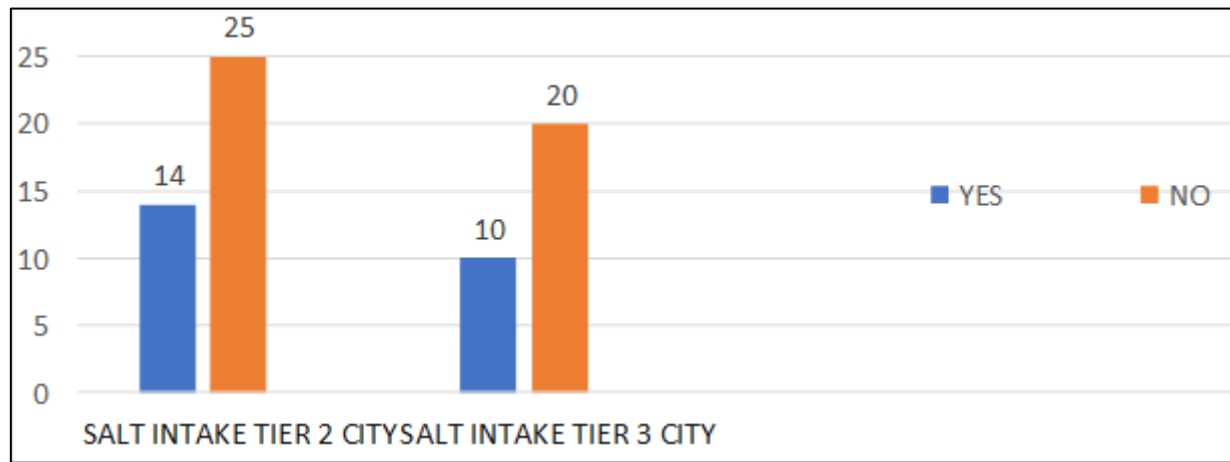


Fig 3: Salt intake tier 2 city salt intake tier 3 city

Table 4: shows blood pressure classifications, with hypertension stage 1 being the most common category in both groups.

Variable	Readings	Frequency Tier 2	Percentage Tier 2	Frequency Tier 3	Percentage Tier 3
Blood Pressure	Normal	2	5.13	4	13.33
	High Normal	13	33.33	10	33.33
	HTN Stage 1 Mild	19	48.72	13	43.33
	HTN Stage 2 Moderate	5	12.82	3	10.00

As an outcome measure (PSS) perceived Stress Scale was used according to that in tier 2 city (n=39) there were 4 police personnel with LOW stress level which is 10% & 33 police personnel had moderate level of stress which is 84% & 2 police personnel had high stress level which is 5%

In 3 tier city (n =30) there were 5 police personnel with low level stress which is 17% & 22 police personnel had moderate level stress which is 73% & 3 police personnel had higher level stress which is 10%

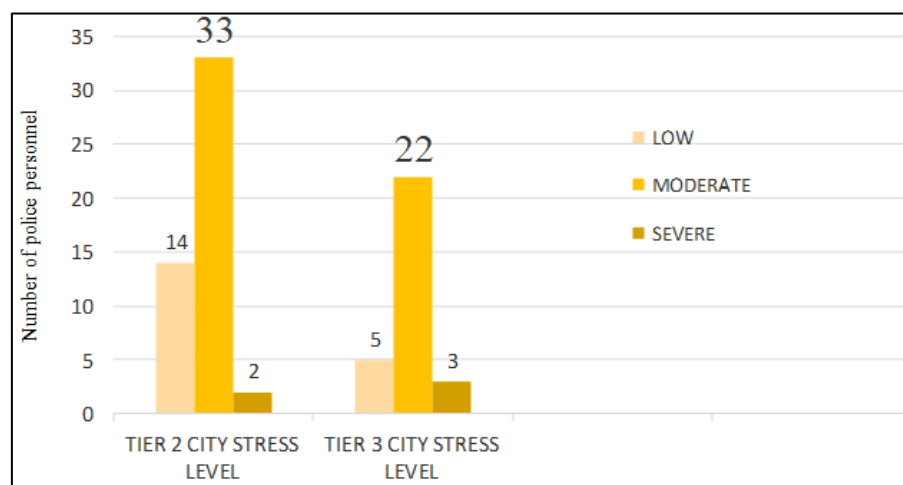


Fig 4: demonstrates perceived stress levels. Moderate stress was predominant in both groups, while low and high stress levels were less frequent.

The chi-square test (Table 5) showed a significant association between stress and blood pressure in tier three cities

($p=0.013$), whereas no significant association was found in tier two cities ($p=0.17$).

Table 5:

Variable	P values Tier 2 city	Significance	P value Tier 3 city	Significance
Stress	0.17	Not significant	0.013	Significant

Discussion:

The present study aimed to find relationship of hypertension with stress level among hypertensive police personnel of tier 2 and tier 3 city. Hypertension is the most common lifestyle disorder among high-risk work group like police officers and nowadays stress have become major part of lifestyle it

becomes mandatory to assess stress of hypertensive persons. To find the relationship of stress & hypertension we had to determine the level of stress by perceived stress scale and current blood pressure by Digital sphygmomanometer. The sample collected for study consist of (n=69) hypertensive police personnel from 2 tier & 3 tier city where 39 samples

were from 2 tier city & 30 samples were from 3 tier city in which most of them were male & all of them were married and were having 14-25 years of work experience and working hours were varying from 8-12 hours with dual task handling of organizational and operational work depending upon the duty schedule.

In our study most of the participants were male & only 15 participants were female; in a study conducted by common wealth human rights initiative ^[15] they found that women make up only 6.11% of India's 2.3 million police force and this is one of the main reasons for women facing a deep-seated gender bias across the police force which started at recruitment and carried on throughout their career. Hence, overall proportion of male policemen is more than female policemen, which is also reflected in the present study. Similar to our study, Arunesh kumar *et al* ^[14] revealed in their study that study population was male dominated.

Stress level of police personnel:

The stress level of hypertensive police personnel was assessed by perceived stress scale and by that we found that the moderate perceived stress is more common in both of the cities as perseverance of stress is self-administered in the perceived stress scale and it includes question asks about the feeling and thought experienced in last month & the recent stressful event might affect the perseverance of stress. Police personnel with age group of 41-45 and 45-50 were mostly experiencing moderate level stress and this age group contributes to be the 56% of samples for tier 2 city & 63% samples of tier 2 city so the moderate stress level was 85% for tier 2 city & 73% for tier 3 city. As shown in our study tier 2 city there were 4 police personnel with LOW stress level & 33 police personnel had moderate level of stress & 2 police personnel had high stress level which is & In 3 tier city there were 5 police personnel with low level stress & 22 police personnel had moderate level stress & 3 police personnel had higher level stress. Similarly, a study by Chauhan.V *et al.* ^[7] on police personnel of district gwalior showed that majority of the participants (89%) were in the category of moderate level stress score.

Association of Stress level with blood pressure

Results of current study shows that the tier 3 city had significant association of stress level and hypertension & tier 2 city did not had significant association. This is due to the employ –employer relationship of both the cities were different and samples collected from tier 2 city was having 18.49 mean perceived stress & tier 3 police personnel were having 19.57 mean perceived stress. Most of the samples collected from tier 2 city were collected at the RPI (Revenue Police Inspector) office which is also the headquarters for all the police officers and this becomes the stressful environment for the them. On the other hand, tier 3 police personnel were experiencing transfer issues at the time of sample collection this tension in the air will be most important factor which have affected our studies finding. As per the study by Ganesh *et al.* ^[16] among male police personnel of urban Puducherry, a high level of perceived stress was present among 51% of the police personnel the p value was 0.017 which showed that higher perceived stress was significantly associated with hypertension.

Comparison of stress level of tier 2 city and tier 3 city

Our study showed that there no significant difference in average stress level of tier 2 and 3 cities as the average stress among tier 2 city was 18.49 the average stress among tier 3

city was 19.57. As per the study by Chauhan.V *et al.* ^[7] participants with normal blood pressure are less in rural areas as compared to their urban counterparts. The reason might be the vast area to be covered by police personnel and uncomfortable living conditions in rural areas. This might be because of same environmental factors as both the cities comes under same territorial region. The community of both the cities shares similar kind of cultural upbringing which they almost have same dietary habits as 35.90% police personnel had additional salt intake & in tier 3 city 33.33% police personnel had additional salt intake which also didn't had any significant differences. Also, there were similar posting schedule all of them had to do shift duties which generally proceed to have more than 10 hours and was changing on daily basis. Most of police personnel from both the cities were addicted to alcohol consumption which for tier 2 was 74% and 57% for tier 3 city. These factors contribute to the lifestyle and stress is the part of lifestyle so that is why both the cities had similar results and did not had any significant differences in the stress level.

The present study had inherent constraints that warrant consideration. Blood pressure estimation was based on a single measurement, which, although standardized, may not fully capture individual variability; repeated measurements across different occasions would have enhanced precision and facilitated more robust risk stratification. The overall sample size was relatively modest, potentially constraining the statistical power and external validity of the findings. Furthermore, female police personnel were underrepresented, reflecting their limited presence in the force, which restricts gender-specific interpretation. Similarly, the participation of senior-ranking officers was low, despite their unique occupational stressors and leadership responsibilities that warrant deeper exploration. Future investigations should therefore aim to recruit larger and more diverse cohorts, ensuring adequate representation of both genders and hierarchical levels within the police force. Additionally, distinguishing between organizational and operational roles in future analyses would provide more nuanced insights, as the dual-task responsibilities observed in the present study likely influence stress and hypertension in distinct ways.

Conclusion

Hypertension is influenced by a multitude of risk factors, with elevated stress levels being closely linked to increased blood pressure. Nevertheless, our analysis demonstrated an absence of statistically significant differences in stress levels between tier-2 and tier-3 cities, suggesting that police personnel in both regions are subjected to comparable stress burdens.

Our findings indicate a significant association between hypertension and factors such as BMI and stress levels among police personnel in tier-3 cities. Conversely, in tier-2 cities, elevated blood pressure was predominantly associated with addiction. Although other factors were not significantly associated with hypertension their presence is always high risk factor for hypertensive persons; so regular health check-up and health promotion plays important role for such metabolic disorders as prevention is always better than cure. The study concluded that moderate stress levels were the most common among police personnel in both tier-2 and tier-3 cities. These stress levels could be reduced through the implementation of effective stress-coping strategies,

including physiotherapy interventions such as relaxation techniques, breathing exercises, posture correction, and physical activity programs, alongside mindfulness training and time management techniques.

The study's clinical implications suggest the need for targeted stress management interventions, such as mindfulness and physiotherapy, to reduce stress-induced hypertension among police personnel in both tier-2 and tier-3 cities. Additionally, routine screening for stress and hypertension could help prevent long-term cardiovascular risks, while informing occupational health policies to support mental and physical well-being in law enforcement

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