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Original Research Article

Prevention of heatstroke: knowledge, attitude and practices among community population – a cross-sectional study in Jharkhand, India

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ABSTRACT

Background: Heatstroke is a critical and often fatal condition that results from prolonged exposure to high temperatures, exacerbated by climate change. As global temperatures rise, the frequency and intensity of heatwaves have increased, placing populations in heat-vulnerable areas, such as Jharkhand, at significant risk. Despite this, public awareness and preventive practices remain limited. The study aimed to assess the knowledge, attitude and practices regarding prevention of heatstroke and assess the association between knowledge, attitude and practices regarding the prevention of heatstroke with the selected demographic variables of community population.
Methods: This cross-sectional study surveyed 405 adults (aged 18-45) attending Out patient department of a tertiary care institute in Jharkhand, India, who were selected by convenient sampling technique. Data was collected through face to face interviews. The survey covered socio-demographic details and knowledge, attitude and practice regarding prevention of heat stroke. Data analysis was performed using statistical package for the social sciences (SPSS) version 26.0, with descriptive and inferential statistics. A significance level ($p<0.05$) was used for statistical associations.
Results: In the current study the majority of participants (26.1%) have good knowledge about the prevention of heatstroke, and they show favorable attitude (61.08 %) towards the preventive measures, and but 9.38% only had good practice during peak heatstroke hours. Knowledge was significantly associated with occupation, educational status, and previous heatstroke experience ($p=0.000$ for all). Attitude was significantly associated with educational status ($p=0.000$) and occupation ($p=0.029$). Practice was significantly associated with occupation ($p=0.006$).
Conclusions: These results underscore the need for targeted public health interventions focusing on occupational and educational profiles to effectively improve heatstroke prevention behaviors in the community.

Keywords: Prevention of heat stroke, Knowledge, Attitude, Practice

INTRODUCTION

Heat is an important environmental and occupational health hazard. Heat stress is the leading cause of weather-related deaths and can exacerbate underlying illnesses including cardiovascular disease, diabetes, mental health, asthma, and can increase the risk of accidents and transmission of some infectious diseases.

Heatstroke (HS) is a life-threatening disorder originating from thermal injury within the body, and it is associated with a relatively high death rate. When the body's temperature regulation mechanism fails, the body's core temperature dangerously rises above 40.6 °C. This can lead to central nervous system dysfunction, which can cause delirium, convulsions, and coma.[1,2]

The number of people exposed to extreme heat is growing exponentially due to climate change in all world regions.

Estimates show that between 2000 and 2019, approximately 489,000 heat-related deaths occurred each year, with 45 per cent of these in Asia and 36 per cent in Europe. Worldwide, the official diagnosis and reporting of heat-related illness, injuries and deaths are recognized to be under-reported. Heat-related mortality for people over 65 years of age increased by approximately 85% between 2000–2004 and 2017–2021. Between 2000–2019 studies show approximately 489 000 heat-related deaths occur each year, with 45% of these in Asia and 36% in Europe. In Europe alone in the summer of 2022, an estimated 61 672 heat-related excess deaths occurred.[2-6]

Heatwave deaths in India are also common. According to Integrated Disease Surveillance Programme (IDSP) at National Centre for Disease Control (NCDC) a total of 3,775 deaths were reported during 2015-2019 (2,040 deaths in 2015, 1,111 deaths in year 2016, 384 deaths in year 2017, 25 deaths in the year 2018, and 215 deaths in 2019). These deaths mainly occurred during the heatwave period in India, i.e., from March to July. The country had reported nearly 48,000 cases of heatstroke and 159 deaths due to extreme heat in 2024 as NCDC.[7-9]

Studying heatstroke in Deoghar, Jharkhand, India is crucial due to several factors, as the geographical location of Jharkhand, located along the Tropic of Cancer, results sun rays directly fall on the surface leading to high solar insolation and elevated temperature. The perpendicular angle of the sun's rays significantly contributes to the state's high temperature. Jharkhand recorded a 300% rise in the number of annual heatwave days in the past 35 years, revealed a report by the Center for Environment and Energy Development. The state recorded 21 heat wave days in 2024 against seven in 1990.[7,8,10-13]

The three key aspects of knowledge, attitudes, and practices (KAP) toward heatstroke reduce the adverse health impacts of heat waves. To the best of our knowledge, limited studies have explored KAP related prevention of heatstroke in Jharkhand. This study addresses this gap by providing valuable insights into local public health needs and identifying areas for targeted interventions to mitigate the health impacts of heatstroke in this unique setting. This study was conducted with the intention of assessing KAP of prevention of heatstroke among community population of Deoghar Jharkhand.

METHODS

Study design and setting

The study adopted a cross-sectional design, via personal interview using standardised tool. Data collection occurred over 4 months spanning June 2025 to September 2025.The present study was conducted among the community population visiting the outpatient registration area of All India Institute of Medical Sciences, Deoghar, Jharkhand, India.

Study population and inclusion criteria

The study population comprised of people aged 18 years and above visiting the outpatient registration counter of tertiary care institute, either as patient or bystander. To be eligible participants were required to understand Hindi or English. Patients who are severely ill and cognitively impaired were excluded from the study.

Instrument for data collection

The current study used an interview schedule consisting of four sections, starting with sociodemographic variables, structured knowledge questionnaire, Likert scale for attitude and practice checklist. The entire tool was designed by reviewing available surveys in the literature. The second section consisted of 20 knowledge questions in multiple choice format. A score ranging from 15 to 20 signifies good knowledge, indicating strong understanding and competence in the subject matter. Scores between 9 and 14 are considered average knowledge, reflecting a satisfactory but possibly limited grasp of the content. Meanwhile, any score of 9 or below is categorized as poor knowledge. The third section consisted 10 questions of attitude Likert scale. The scoring guide was based on a five-point Likert scale where "strongly agree" was assigned a score of 5, "agree" as 4, "neutral" as 3, "disagree" as 2, and "strongly disagree" as 1. The last section of practice checklist also had 10 questions. The scoring scale is based on a total of 10 points, with 6 and above considered as good practice. The tool was validated by experts in the field and reliability was ensured by test retest method.

Sampling technique and sample size determination

For the present study, participants were selected using non probability convenience sampling technique. The estimated sample size was calculated using 5% margin error and 95% confidence interval and we considered 50% prevalence as we could not retrieve such studies therefore with the use of these parameters, the estimated sample size comes to 370. In view of non-response of 10%, the sample size came to 405.

$$N = 4pq/d^2$$

Ethical considerations

The study strictly followed the ethical guidelines set forth in the revised Declaration of Helsinki. Approval to conduct the research was granted by the Institutional Research Ethics Committee (IEC Code 2023-232-IND-03 dated 9/4/2024 in letter no.: AIIMS-DEO/RC-IEC-Full Committee/2024-April/103) Before enrolling in this study, all study participants provided informed consent. Investigators were briefed about the study's purpose, methodology, and their rights, including the assurance of anonymity and the confidentiality of their data. Additionally, participants were made fully aware that

participation in the study was entirely voluntary and that they might leave at any time without incurring any penalties.

Statistical analysis

The statistical package for the social sciences (SPSS) software, version 26 (IBM Corp., Armonk, New York, USA), was used to analyse the data. The analysis involved both descriptive and inferential statistical techniques. The participants' sociodemographic characteristics, were compiled using descriptive statistics such as frequency, percentage, mean, median, Inter quartile range, and standard deviation (SD). Inferential statistical methods, such as chi-square tests, were employed to explore associations between variables. A p value of less than 0.05 was considered statistically significant.

RESULTS

The study population consisted of 428 participants, all aged 18 years or older, with a mean age of 28.6 (SD=16.57) years. Of them, 55.8% were male. Near about half of participants were residing in rural area (52.4%). Almost 83.7% were married. In terms of occupation 40.24 % were out door workers employed in construction, agriculture, traffic police, sanitation work and 32.34% were indoor workers. 52.34% reported an experience of heat stroke, with 73.58% among them had a personal experience of heat stroke. The details are shown in Table 1.

The KAP scores of participants regarding prevention of heatstroke are shown in Table 2. The study highlighted a gap in knowledge level with 36.79% having poor knowledge with a mean 11.24±3.970. Overall, the data indicate that most of participants showed a favourable attitude (90.61%) and but majority following poor preventive practices (90.61%), though knowledge levels is a need to enhance among the respondents.

Table 3 shows a significant association ($p<0.05$) between occupation, education, area of residence and level of knowledge on prevention of heatstroke among the participants. In the study population, majority (52.34%) had an experience of heats stroke, and the incidence of heat stroke was found to have a significant association with knowledge on prevention of heat stroke among participants ($p<0.001$). The occupational status and education had shown a significant association with attitude of prevention of heat stroke among participants, shown in Table 4 ($p<0.05$). About practice (Table 5), occupation have shown a significant association with prevention practices of heat stroke among participants ($p<0.001$).

Table 1: Socio-demographic characteristics of study participants (n=405).

Socio-demographic characteristics	Category	Frequency	Percentage
Age in years (mean±SD)	28.6±16.57 years		
Gender	Male	226	55.80
	Female	179	44.19
Family type	Nuclear	157	36.7
	Joint	232	54.2
	Extended	39	9.1
Residence	Urban	194	47.90
	Rural	211	52.09
Education	Primary	94	23.2
	secondary	174	42.96
	Higher	98	24.19
	Illiterate	39	9.62
Occupation	Unemployed	66	16.29
	Outdoor worker	163	40.24
	Indoor worker	131	32.34
	Occupation involving both indoor and outdoor activities	45	11.11
Habits	Smoking only	25	6.17
	Drinking only	33	8.14
	Both	29	7.16
	Nil	318	78.51
Any incidence of heatstroke	Yes	212	52.34
	If yes		
	Personal experience	156	73.58
	Family members or friends experience	55	25.94
	No, recent reports in surrounding area	193	47.65

n=Number of participants, SD=standard deviation

Table 2: Knowledge, attitude, and practice score regarding prevention of heatstroke (n=405).

Variables	Knowledge score			Attitude score		Practice score	
	Good	Average	Poor	Favourable	Unfavourable	Good	Poor
Frequency	106	150	149	292	113	38	367
Percentage	26.17	37.03	36.79	72.09	27.90	9.38	90.61
Mean±SD	11.24±3.970			37.26±12.045		4.80±1.681	
Median	12.00			43.00		3.00	
Range score	2-18			15-50		2-8	

n=Number of participants, SD=standard deviation

Table 3: Association of level of knowledge with selected demographic variables (n=405).

S. no.	Demographic variables	Knowledge scale			Chi square	P value
		Poor	Average	Good		
1	Age in years					
	18-31	68	64	60	5.135	0.077
	32-45	81	86	46		
2	Occupation					
	Unemployed	20	40	6	53.056	<0.001*
	Outdoor worker	55	79	29		
	Indoor worker	53	29	49		
	Occupation involving both indoor and outdoor activities	19	7	19		
3	Gender					
	Male	88	84	54	1.658	0.436
	Female	61	66	52		
4	Educational status					
	Primary	45	36	13	37.481*	<0.001*
	Secondary	61	46	67		
	Higher	29	46	23		
	Illiterate	14	22	3		
5	Residence					
	Urban	65	52	77	37.618	<0.001*
	Rural	84	98	29		
6	Habits of					
	Smoking only	9	9	7	7.032	0.318
	Drinking only	12	11	10		
	Both	17	8	4		
	Nil	111	122	85		
7	Any incidence of heatstroke					
	Yes	68	115	29	64.788	<0.001*
	No, recent reports in surrounding area	81	35	77		

*Statistically significant (<0.05), # Fischer exact

Table 4: Association of level of attitude with selected demographic variables (n=405).

S. no	Demographic variables	Level of attitude		Chi square	P value
		Favourable	Unfavourable		
1	Age group (in years)				
	18-31	144	48	1.528	0.216
	32-45	148	65		
2	Occupation				
	Unemployed	52	14	8.986	0.029*
	Outdoor worker	123	40		
	Indoor worker	82	49		
	Occupation involving both indoor and outdoor activities	35	10		

Continued.

S. no	Demographic variables	Level of attitude		Chi square	P value
		Favourable	Unfavourable		
3	Gender				
	Male	166	60	0.465	0.495
	Female	126	53		
4	Educational status				
	Primary	60	34		
	Secondary	134	40	22.761	<0.001 *
	Higher	80	18		
	Illiterate	18	21		
5	Residence				
	Urban	147	47	2.499	0.114
	Rural	145	66		
6	Habits of				
	Smoking only	16	9		
	Drinking only	22	11	5.768#	0.123
	Both	26	3		
	Nil	228	90		
7	Any incidence of heatstroke				
	Yes	151	61	0.168	0.682
	No, recent reports in surrounding area	141	52		

*Statistically significant (<0.05), # Fischer exact

Table 5: Association of level of practice with selected demographic variables (n=405).

S. no.	Demographic variables	Level of practice		Chi square	P value
		Good	Poor		
1	Age in years				
	18-31	28	293	0.793	0.373
	32-45	10	74		
2	Occupation				
	Unemployed	7	59		
	Outdoor worker	9	154	12.497#	<0.001 *
	Indoor worker	21	110		
	Occupation involving both indoor and outdoor activities	1	44		
3	Gender				
	Male	24	202	0.920	0.338
	Female	14	165		
4	Educational status				
	Primary	13	81		
	Secondary	14	160	3.165#	0.367
	Higher	7	91		
	Illiterate	4	35		
5	Residence				
	Urban	13	181	3.150	0.076
	Rural	25	186		
6	Habits of				
	Smoking only	1	24		
	Drinking only	6	27	4.094#	0.252
	Both	2	27		
	Nil	29	289		
7	Any incidence of heatstroke				
	Yes	17	195	0.973	0.324
	No, recent reports in surrounding area	21	172		

*Statistically significant (<0.05), # Fischer exact

DISCUSSION

The current study revealed a significant association between knowledge and occupation, educational status, residence, working outdoors for long hours, and incidence of heatstroke ($p<0.001$). These findings are supported by several previous investigations.[14-16] However, unlike other studies that have reported significant associations between age and marital status with knowledge levels, such associations were not observed in the present study.[17] This discrepancy may be attributable to contextual, demographic, or cultural variations within the study population.

The present study identified a significant association between attitude and occupation as well as educational status ($p<0.001$), whereas occupation alone was found to be a contributing factor for the practice of heatstroke prevention among the community population. These findings align with several prior studies.[14,15,18] Nevertheless, other investigations have highlighted years of service, educational status, and marital status as contributing factors influencing preventive practices.[19-21] Such differences may reflect variability in occupational exposure patterns, access to health information, and socioeconomic determinants across study settings.

The observed gap between knowledge and actual preventive practices underscores a critical public health concern. While awareness and favourable attitudes are essential precursors to behavioural change, they do not automatically translate into consistent protective actions. Structural barriers such as demanding work conditions, economic necessity, limited access to cooling facilities, and inadequate enforcement of occupational safety guidelines may hinder individuals from adopting recommended preventive measures during peak heat hours. Therefore, interventions must extend beyond awareness campaigns and address environmental and policy-level determinants to promote sustainable behavioural change.

Furthermore, the significant role of occupation and educational status suggests that targeted interventions are warranted. Outdoor workers and individuals with lower educational attainment may require tailored educational strategies, workplace-based interventions, and employer-supported protective measures such as scheduled rest breaks, shaded rest areas, and hydration programs. Community-level health promotion initiatives, including collaboration with local authorities and media platforms, could strengthen dissemination of heat-health advisories and early warning systems, particularly during extreme heat events.

There are certain limitations to the current investigation. First, only one district in Jharkhand, India, was included in this study, which may limit the generalizability of the findings. Additionally, social desirability bias may have influenced participants' responses, as some individuals might have provided answers they perceived as socially acceptable. Despite these limitations, the findings offer valuable insights for strengthening heatstroke prevention strategies. Future research should consider multi-district or multi-state studies with longitudinal designs to better understand behavioural changes over time and to evaluate the effectiveness of targeted intervention programs. Emphasis on mass media dissemination, as preferred by participants for learning about heat-related topics, could play a pivotal role in preventing heat-related illnesses and protecting vulnerable populations.

CONCLUSION

In order to promote adaptable coping strategies and increase public knowledge of the detrimental effects of heat, the government should also establish comprehensive risk-awareness initiatives, such as community-based interventions and educational initiatives. Finally, more extensive studies are needed to evaluate the effectiveness of implemented therapies and provide more in-depth understanding of heatstroke-related behaviors, particularly those that use qualitative approaches and watch actual actions.

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