

Research Article

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Awareness Regarding Global Warming and knowledge towards climate change among medical students of Shyam Shah Medical College RewaDr. Ratan Priya Gupta¹, Dr. Anshuman Sharma^{2*}, Dr. Neera Marathe³, Dr. Amiy Krishna Gupta⁴, Dr. Satendra Gupta⁵, Dr. Bhavna Tomar⁶¹Junior Resident, Dept. of Community Medicine, Shyam Shah Medical College Rewa (M.P.), India²Associate Professor, Dept. of Community Medicine, Shyam Shah Medical College Rewa (M.P.), India³Professor and HOD, Dept. of Community Medicine, Shyam Shah medical college, Rewa (M.P.), India⁴Intern student, Sri Guru Ram Rai institute of Medical Sciences Dehradun (U.K.), India⁵Assistant Professor, Dept. of Paediatrics, GMC Haldwani (U.K.), India⁶Junior Resident, Dept. of Community Medicine, Shyam Shah Medical College Rewa (M.P.), India

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Abstract: Background- Global warming is the gradual increase in the average temperature of the Earth's atmosphere and oceans. Climate change and environmental degradation have far-reaching consequences for present and future generations. They pose serious threats to human well-being, economic stability, and ecosystem health. Because of the seriousness of these concerns, global programs are being started to mitigate climate change, prepare for its consequences, and promote sustainable development alternatives. **Aim & Objective-**1) To assess the awareness regarding global warming and its health hazards among the medical students 2) To assess the knowledge and attitude towards climate change among medical students of Shyam shah medical college, Rewa, Madhya Pradesh. **Material and method-** A Cross-sectional study was conducted. A self-administered, online questionnaire was used to collect data from 300 UG medical students of Shyam shah medical College Rewa. The collected data was analysed using SPSS 20 and MS Excel to draw results. **Result-** It was found that 96% of students were aware of climate change. While 95% students believe that human behaviours are responsible for climate change. 75.8% of the students were aware about greenhouse gases. 78% of students emphasize health-related aspects of climate change preventive measures. According to 62.5% students, direct physical hazards of extreme climatic events are most important health-related impact of climate change. Majority have commented that urbanization contribute most to climate change. **Conclusion-** Although most students are aware of global warming, there is still scope for advancement of mitigation efforts. A nationwide poll is advised to raise awareness about the health risks of global warming. A cross-sectional investigation on climate change and related health risks is recommended to assess medical students' preparation and suggest curricular adjustments.

Keywords: Climate, Environment, Global warming, Awareness, Medical students.

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INTRODUCTION

Climate change and Global warming is the most important emerging public health issue of the 21st century. Global warming means long-term increase in the Earth's average surface temperature, mainly due to the accumulation of greenhouse gases in the atmosphere resulting from human activities such as industrialization, deforestation, urbanization, and the burning of fossil fuels [1].

Rising temperatures, extreme weather, changing precipitation, melting glaciers, and sea level rise are the direct consequences of climate change worldwide, and

the health impacts of climate change are far-reaching, including heat-related illnesses, respiratory illnesses, cardiovascular diseases and illnesses caused by vectors and water-borne illnesses, malnutrition and mental-health issues.

The World Health Organization (WHO) estimates that climate change will result in ~250,000 extra deaths annually in developing countries like India, where population size, rapid urbanization and reliance on climate-sensitive industries make them highly vulnerable to the impacts of climate change.

Medical students, as future health care workers, should be well equipped with knowledge and awareness about climate change and related health risks, thus it is important for them to be educated about it. Knowing their awareness and attitudes can help to determine gaps in education and inform curriculum planning.

Though a lot of emphasis has been laid on discussions of climate change at the global level, little information is available about the awareness and perception of climate change among medical students belonging to central India. Hence, the present study was conducted amongst the undergraduate students of medical college, Shyam Shah Medical College Rewa Madhya Pradesh regarding awareness, knowledge and attitude towards Global Warming, Climate change and associated health hazards.

AIM AND OBJECTIVES

Aim

To assess the awareness regarding global warming and its health hazards among undergraduate medical students of Shyam Shah Medical College, Rewa, Madhya Pradesh.

Objectives

1. To assess the awareness regarding global warming and its health hazards among medical students.
2. To assess the knowledge and attitude towards climate change among medical students of Shyam Shah Medical College, Rewa, Madhya Pradesh.

MATERIALS AND METHODS

A cross-sectional descriptive study was carried out in undergraduate medical students of Shyam Shah medical college, Rewa, Madhya Pradesh. This study was conducted at Shyam Shah Medical College Rewa, a tertiary care teaching hospital at Rewa, Madhya Pradesh, India. The study population comprised undergraduate medical students (MBBS) of first, second, third and fourth year courses. The study was a three-month period (January 2025 to March 2025). The total number of undergraduate medical students who participated in the study was 300. Convenience sampling method was used. Students who consented to participate and gave informed consent were included in the study.

The inclusion criteria included i) Undergraduate MBBS students studying at Shyam Shah Medical College Rewa, ii) Students who voluntarily agreed to participate in the study and, iii) Students who filled online questionnaire.

The following were considered exclusion Criteria: i) Students who refused to participate, and ii) the completion of incomplete and duplicate questionnaires.

Pre-designed, pre-tested, self-administered online questionnaire developed based on the relevant literature was used for data collection. The questionnaire had been divided into sections which included Socio-demographic information, Awareness about global warming and climate change, Knowledge about causes and impacts of climate change, Awareness of health hazards due to climate change, Attitude towards climate change mitigation and adaptation measures. The questionnaire was designed using an online survey tool and sent electronically to the undergraduate medical students using the institutional communication system. Data collection was consensual and informed consent was obtained electronically prior to data collection. Confidentiality and anonymity of responses were ensured throughout the study. The variables measured were: Climate Change and Global Warming Awareness, Knowledge about Green House Gases and Climate Change, Awareness of health impacts of climate change, Attitudes towards preventive measures and mitigation measures.

The data collected were entered and analyzed in Microsoft Excel and by using the Statistical Package for Social Sciences (SPSS) version 20. Descriptive statistics were determined including frequencies, percentages, means and standard deviations. The data were displayed in tabular and graphical format. Unless otherwise specified, a p -value < 0.05 was deemed statistically significant. Approval was given by Institutional Ethical Committee before the study commenced. All participants were informed about the study and given the opportunity to participate, and confidentiality of information obtained was strictly maintained.

RESULTS

The number of undergraduate medical students involved in the study was 300. Among them, 168 (56.0%) were males and 132 (44.0%) were females. The majority of participants belonged to the age group of 21–23 years (48.0%), followed by 18–20 years (42.0%) and more than 23 years (10.0%). The total sample size of students included was 100 students (24.0% from first MBBS, 26.0% from second MBBS, 25.0% from third MBBS Part-I, and 25.0% from final MBBS Part-II) (Table 1).

The respondents had a high level of awareness about climate change and global warming. In general, 96% of all students knew about climate change and global warming, and 95% of them felt that the main cause of climate change was human activities. Additionally, 92% recognized climate change to have a negative impact on human health (Table 2).

Students' knowledge about the causes of climate change showed that 73% identified urbanization as the main cause of climate change, 69% cited deforestation, 67% cited industrial pollution, 64% cited emissions from



vehicles, 61% cited burning of fossil fuels and 37% indicated agriculture as a cause (Table 3).

The awareness about GHGs was seen among 75.8% of the participants, while 24.2% were not aware of GHGs. The correct identification of carbon dioxide, methane and nitrous oxide as greenhouse gases was 72%, 57% and 48% respectively (Table 4).

When it comes to health effects of climate change: 62.5% indicated that the biggest health impact of extreme climatic events is direct physical hazards. Other widely recognized effects were mental health issues (29%), malnutrition caused by food insecurity (27%), respiratory diseases (48%), vector borne diseases (52%) and heat related illnesses (57%) (Table 5).

The majority of participants had a positive attitude towards climate change mitigation. Over 90% agreed on the importance of introducing climate change and environmental health issues into the undergraduate medical curriculum and wanted to see more government

action on climate change. Furthermore, 88% felt climate change was a significant public health risk and 80% felt that personal efforts can help mitigate the effects of climate change (Table 6).

As for preventive measures, 78% of the students highlighted the preventive measures related to health for mitigating the effects of climate change. In addition, afforestation (74%), reducing the use of fossil fuels (67%), renewable energy sources (61%), waste management and recycling (59%) and public awareness (56%) are seen as important mitigation measures for climate change (Table 7).

In general, the results reveal that medical students are very aware and have good attitudes towards climate change and health effects. Some knowledge gaps and knowledge gaps about certain climate change-health interactions were identified, requiring an enhanced climate change education in the medical education (Tables 2-7).

Table 1: Socio-demographic Characteristics of Study Participants (n=300)

Variable	Number	Percentage (%)
Gender (Male)	168	56.0
Gender (Female)	132	44.0
Age 18–20 years	126	42.0
Age 21–23 years	144	48.0
Age >23 years	30	10.0
First MBBS	72	24.0
Second MBBS	78	26.0
Third MBBS Part-I	75	25.0
Final MBBS Part-II	75	25.0

Table 2: Awareness Regarding Climate Change and Global Warming

Variable	Yes n (%)	No n (%)
Heard about climate change/global warming	288 (96.0)	12 (4.0)
Climate change is a serious global issue	282 (94.0)	18 (6.0)
Human activities contribute to climate change	285 (95.0)	15 (5.0)
Climate change affects human health	276 (92.0)	24 (8.0)
Climate change can be prevented/controlled	261 (87.0)	39 (13.0)

Table 3: Knowledge Regarding Causes of Climate Change

Cause Identified	Number	Percentage (%)
Urbanization	219	73.0
Deforestation	207	69.0
Industrial pollution	201	67.0
Vehicle emissions	192	64.0
Burning of fossil fuels	183	61.0
Agricultural activities	111	37.0

Urbanization was identified as the most important contributor to climate change by 73% of students.

Table 4: Knowledge Regarding Greenhouse Gases

Response	Number	Percentage (%)
Aware of greenhouse gases	227	75.8
Not aware	73	24.2
Correctly identified CO ₂ as greenhouse gas	216	72.0
Correctly identified methane as greenhouse gas	171	57.0
Correctly identified nitrous oxide as greenhouse gas	144	48.0

Table 5: Awareness of Health Hazards of Climate Change

Health Hazard	Number	Percentage (%)
Direct physical hazards due to extreme weather events	188	62.5
Heat-related illnesses	171	57.0
Vector-borne diseases	156	52.0
Respiratory diseases	144	48.0
Mental health problems	87	29.0
Malnutrition due to food insecurity	81	27.0

The majority (**62.5%**) considered direct physical hazards resulting from extreme climatic events as the most important health impact of climate change.

Table 6: Attitude Towards Climate Change

Statement	Agree n (%)	Neutral n (%)	Disagree n (%)
Climate change is a major threat to public health	264 (88.0)	24 (8.0)	12 (4.0)
Medical students should be educated about climate change	276 (92.0)	18 (6.0)	6 (2.0)
Climate change should be included in medical curriculum	249 (83.0)	39 (13.0)	12 (4.0)
Individual actions can reduce climate change	240 (80.0)	42 (14.0)	18 (6.0)
Government should take stronger action	270 (90.0)	18 (6.0)	12 (4.0)

Table 7: Preventive Measures Suggested by Students

Preventive Measure	Number	Percentage (%)
Health-related preventive measures	234	78.0
Afforestation	222	74.0
Reduced use of fossil fuels	201	67.0
Renewable energy adoption	183	61.0
Waste management and recycling	177	59.0
Public awareness campaigns	168	56.0

DISCUSSION

The present study assessed awareness, knowledge, and attitudes regarding climate change and its health hazards among undergraduate medical students of Shyam Shah Medical College, Rewa. Climate change has emerged as a major public health challenge worldwide, and healthcare professionals are expected to play a crucial role in addressing its health consequences through prevention, education, and advocacy [1,4].

In the present study, 96% of participants were aware of climate change and global warming. Similar findings have been reported in studies conducted among medical students and healthcare trainees, which demonstrated high levels of awareness regarding climate change and environmental issues [6,7]. The high level of awareness observed in the present study may be attributed to increased media exposure, educational initiatives, and growing public discourse on environmental issues.

The study found that 95% of students believed that human activities are primarily responsible for climate change. This finding is consistent with previous studies that reported widespread recognition of anthropogenic factors such as industrialization, urbanization, deforestation, and fossil fuel combustion as major contributors to global warming [1,8].

Knowledge regarding greenhouse gases was observed among 75.8% of participants. Although this proportion is encouraging, nearly one-fourth of the students lacked adequate knowledge regarding greenhouse gases and their role in climate change. Similar gaps in detailed environmental knowledge have been reported among medical students in previous studies [6,7]. This finding highlights the need for strengthening climate science education within undergraduate medical curricula.

Regarding the health impacts of climate change, 92% of participants acknowledged that climate change adversely

affects human health. Furthermore, 62.5% identified direct physical hazards resulting from extreme climatic events as the most significant health consequence. These findings are supported by reports from the World Health Organization and the Lancet Countdown, which have highlighted the increasing burden of injuries, heat-related illnesses, infectious diseases, and mortality associated with climate-related disasters [3,4].

In the present study, urbanization was identified as the leading contributor to climate change by 73% of students. Rapid urban expansion, increased energy consumption, transportation-related emissions, and industrial activities have been recognized as important drivers of greenhouse gas emissions globally [1,2]. This reflects a satisfactory understanding among students regarding environmental determinants of climate change.

A positive attitude towards climate change mitigation was observed among the majority of participants. More than 90% supported the inclusion of climate change education in the medical curriculum and favored stronger governmental action. Similar observations have been reported by Wellbery *et al.* and Maxwell *et al.*, who emphasized the importance of incorporating climate-health competencies into medical education to prepare future physicians for emerging environmental health challenges [6,7].

The majority of students (78%) emphasized health-related preventive measures for climate change mitigation. This finding suggests that medical students recognize the important role of healthcare professionals in promoting sustainable practices, community awareness, and preventive interventions aimed at reducing climate-related health risks [4,9].

Overall, the findings of the present study demonstrate good awareness and positive attitudes regarding climate change among medical students. However, deficiencies in specific areas of knowledge indicate the need for enhanced educational interventions, regular awareness programs, and integration of climate change and planetary health concepts into undergraduate medical training [6,7].

CONCLUSION

The current study found that the awareness of the medical students about climate change and global warming was high in the undergraduate medical students. The majority of participants identified human

activities as significant drivers of climate change and felt that climate change had a negative impact on the health sector. The personal physical risks of climate change events were the most salient health impact of climate change.

Awareness levels were good, but some aspects were identified as having gaps, including with regard to greenhouse gases and detailed climate-health interactions. Most students had positive attitudes towards climate change mitigation and advocating for the integration of climate change topics in the medical curriculum.

Thus, it is recommended to reinforce environmental and climate-health education in undergraduate medical education. Raising awareness, embedding education in the curricula, and frequent learning activities may be helpful to better prepare future health care workers in facing the increased health problems stemming from climate change.

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