

An intervention Study on Knowledge of Global Warming among School Students of Kolkata, West Bengal, India

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Abstract: Global warming is the increase in the average temperature of the Earth's near-surface air and oceans since the mid-20th century and its projected continuation. According to best estimates the earth could warm up by a minimum of 3°C by 2100. There will also be profound Health effects. Various studies conducted worldwide concluded that majority of the population across the globe, specifically in the developing countries, were unaware of climate change and its impacts on environment and human health. Our study aims to assess the existing knowledge of global warming among school students in West Bengal, India as well as to determine the effectiveness of knowledge intervention in them. The study was an Institution –based, Intervention study, where two sections of two classes (Class 9 & Class 11) were randomly selected for the study purpose. Total 135 students were enrolled for the study and subsequently divided to intervention and control group in an unbiased manner. Total duration of study was 3 months from Mid-May to Mid-August, 2014. No significant variation in mean score was found in relation to age and sex. Following intervention, significant improvement was observed in mean score of students of intervention group. Among them, increase of mean score was more in case of female students and students of lower age group. Control group did not show any significant improvement. This type of intervention programme proves to be effective in order to enhance general awareness of global warming which may help in mitigation of this alarming global crisis.

Keywords– Global Warming, Intervention, School Students

I. Introduction

Global warming is the increase in the average temperature of the Earth's near-surface air and oceans since the mid-20th century and its projected continuation. Global warming ¹ present changes in the surface air temperature, emerging as the greenhouse effect caused by emissions of greenhouse gases in the air. The Intergovernmental Panel on Climate Change (IPCC) concludes that such things result from human activity (fossil fuel burning, deforestation). In this connection, an international agreement linked to the United Nations Framework Convention on Climate Change (UNFCCC) ² was adopted on 11 December 1997 to set binding targets for 37 industrialized countries and the European community to reduce their greenhouse gas emission levels 5% below the 1990 levels within the period 2008-2012, better known as Kyoto Protocol. According to best estimates the earth could warm up by a minimum of 3°C by 2100 ³ (IPCC). Other Effects include rise of sea level, increase in the frequency of intense precipitation, increasing frequency and intensity of extreme events, increasing water stress, decrease in crop yield, changes in rainfall pattern etc.^{4,5,6} There will also be profound Health effects namely increase in the vector borne diseases, migration of mosquitoes leading to increased occurrence of Dengue, Malaria, increases in endemic morbidity and mortality due to diarrheal disease, increase in the abundance and/or toxicity of cholera, reduction in immunity, resurgence of tuberculosis etc. Since the inception of the UN Framework Convention on Climate Change, numerous studies conducted, revealed that the vast majority of people across the world, especially in developing countries were unaware of climate change despite their high vulnerability to the impacts of climate change. ^{7,8,9} Similar is the case with developed countries. A MIT survey in 2005 revealed that climate change and the threat of global warming were poorly understood by the US public and taking action to reduce their impact was not a high priority to them. ¹⁰ Our study aimed to assess the existing knowledge and awareness of global warming among school students, in West Bengal, India, to find out the variation in knowledge of global warming among school students in relation to their age and sex and to determine the effect of knowledge intervention among them. Such awareness is an important measure to persuade people at all levels in the community to play an active role in mitigating the emerging problem of global warming.

II. Material And Methods (11 Bold)

The study was an institution –based, intervention study, where two sections of two classes (Class 9 & Class 11) of an urban, higher secondary co education school in Kolkata, West Bengal , India ;were randomly selected for the study purpose. There were two rounds of assessments. All those students present in both the rounds, were included. Those who were not present in any one of them were excluded. Thus, the final study size of 135 students was reached. A pre-tested, close ended, questionnaire consisting of 20 questions each of 1 mark i.e. total of 20 marks, was used as the study instrument. The questions were equally divided (5 each) on the basic concept, cause, impact including on health and mitigation measures of global warming. A simple, knowledge based intervention module was prepared and was used to provide knowledge intervention to one group of students. All the students were initially assessed by the questionnaire following which they were divided into intervention & control group in an unbiased manner (one section of each class in each group). Knowledge was given to the intervention group in the form of class lectures. Control group did not receive any intervention. A repeat assessment was done for both the groups using the same questionnaire, following one month from the time of intervention and the total duration of study was 3 months from Mid-May to Mid-August, 2014. SPSS version 16, was used to compute the frequency distribution, measures of central tendency, measures of dispersion and the test of significance-student’s t test, both paired & unpaired. $P < 0.05$ was considered as significant.

III. Result

On pre intervention assessment, most (66%)of the students obtained a score between 25 - 50% i.e. between 5 to 10. None of the student obtained a score $\geq 75\%$ (≥ 15) [Table 1]. Mean (SD) and median score of all students were respectively 5.72 (2.05) and 6 which implied that scores followed normal distribution [Table 2]. No significant difference in mean score was found between age groups of ≤ 15 years and > 15 years ($p = 0.11$) and also between boys and girls ($p = 0.10$) [Table 3]. There was no significant ($p = 0.22$) difference observed between the mean scores of initial assessment of the two groups (intervention and control group). Following knowledge intervention, mean (SD) scores of the intervention group increased from 5.94 (2.34) to 13.27 (3.56) and this increase was found to be significant ($t = -14.2$, $df = 67$, $p = 0.00$).Control group did not show any significant improvement ($p = 0.30$) [Table 4]. Among the intervention group, increase of mean score was more in case of students of lower age (≤ 15 years) group (10.03) compared to higher (> 15 years) age group (4.64) [Table 5]. Similarly more improvement in mean scores following intervention was observed in girls (8.31) than boys (6.47) [Table 6]. (10). Regarding source of information, internet (37%) remained the major source followed by the teachers (25%). Parents including Guardians (4%) and friends (5%) were the main source of information for only a few students [Fig 1]

IV. Figures And Tables

Table 1: Table showing Frequency distribution of pre-intervention (initial) Scores (%) of all students (n = 135)

Score (%)	Boys No (%)			Girls No (%)			Total No (%)
	std 9	Std 11	Total	Std 9	Std 11	Total	
< 25	12(30)	6(25)	18(28)	7(27)	15(33)	22(31)	40(30)
25 - <50	27(68)	16(67)	43(67)	19(73)	27(60)	46(65)	89(66)
50- <75	1(2)	2(8)	3(5)	0(0)	3(7)	3(4)	6(4)
≥ 75	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)
Total	40(100)	24(100)	64(100)	26(100)	45(100)	71(100)	135(100)

Table 2: Table showing the Summary statistics of pre-intervention (initial) Scores of all students (n =135)

Parameters	All students (n = 135)
Mean	5.72
Median	6
Mode	5
Max	13
Min	1
Range	12
SD	2.05
Skew	0.56

Table 3: Table showing Age and sex wise comparison of pre-intervention (initial) Scores of all students (n =135)

Parameter	<= 15 years (n = 66)	> 15 years (n =69)	Unaired t test result : t = 1.59, df = 133, p =0.11 (two tailed)	Boys (n = 64)	Girls (n = 71)	Unpaired t test result : t = 1.65, df = 133, p =0.10 (two tailed)
Mean	5.44	6		6.03	5.45	
SD	1.75	2.28		2.19	1.89	
Median	5	6		6	5	
Max	10	13		13	11	
Min	2	1		2	1	

Table 4: Table showing the Comparison between two scores of intervention and control groups.

Parameter	Intervention Group (n= 68)		Paired t test result : t = -14.2, df = 67, p = 0.00 (one tailed)	Control Group (n = 67)		Paired t test result : t = 0.51, df = 66, p = 0.30 (one tailed)
	Pre	Post		Initial	Repeat	
Mean	5.94	13.27	5.51	5.42		
SD	2.34	3.56	1.69	1.81		
Median	6	13	6	5		
Max	13	20	10	11		
Min	2	4	1	1		

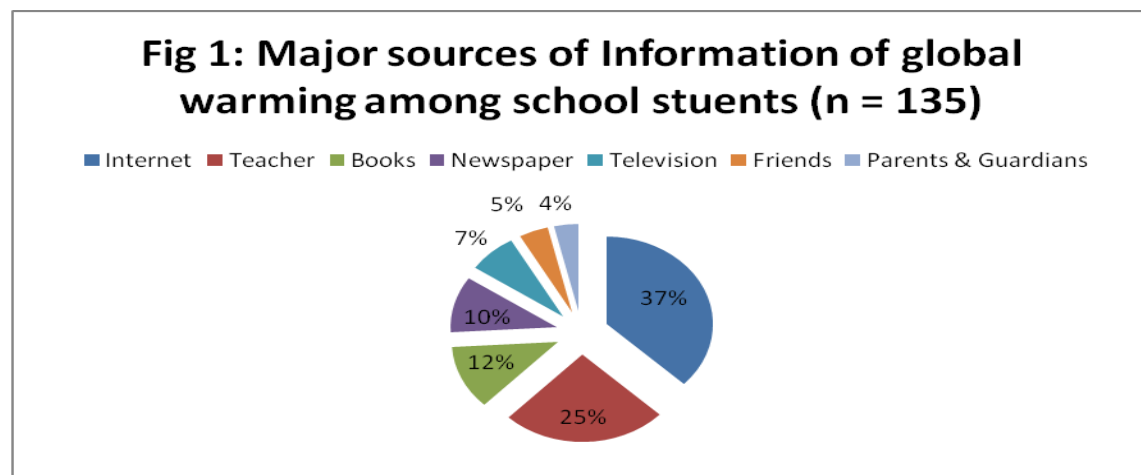
Unpaired t test between 1st score of two groups: t = 1.22, df = 133, p = 0.22 (two tailed)

Table 5: Table showing the Age wise comparison of pre & post intervention scores of intervention group (n=68).

Parameter	Age <= 15 years (n= 34)		Increase in mean -10.03, increase in median - 10	Age > 15 years (n = 34)		Increase in mean -4.64, increase in median - 4
	Pre	Post		Pre	Post	
Mean	4.94	14.97	6.94	11.58		
SD	1.63	3.28	2.54	2.99		
Median	5	15	7	11		
Max	8	20	13	17		
Min	2	7	2	4		

Table 6: Table showing the Sex wise comparison of pre & post intervention scores of intervention group (n=68).

Parameter	Boys (n= 36)		Increase in mean -6.47, increase in median - 7	Girls (n = 32)		Increase in mean - 8.31, increase in median - 8.5
	Pre	Post		Pre	Post	
Mean	6.11	12.58	5.75	14.06		
SD	2.43	3.74	2.27	3.21		
Median	6	13	5.5	14		
Max	13	20	11	20		
Min	2	4	2	7		



V. Discussion And Conclusion

In our study around 47.5% of students were male and rest 52.5% were female. Around 48% belonged to class IX (age ≤ 15 years) and rest were in class XI (> 15 years). On Initial assessment, 96% of students obtained a score below 50% which implied a serious gap in knowledge level. Knowledge level was found to be much lower regarding the impacts and mitigation measures compared to basic concepts and causes like greenhouse gas emissions. It was identified from Table 4, that, there was no difference between the Intervention and the Control group in the Pre-Intervention assessment, i.e. both groups initially had similar kind of knowledge. Significant increase in knowledge level, as reflected by mean score, was observed for the intervention group following knowledge Intervention. Among them, increase in score was relatively more in case of age ≤ 15 years and girls compared to age above 15 years and boys. This may be possibly due to relatively higher receptivity to class lectures for younger and female students. In a study in Belagavi, Karnataka, knowledge was found significantly more in case of female students and lower age group¹¹ contrary to our study where we did not observe any significant difference in knowledge level in reference to age and sex on initial evaluation. In a study in Iran, male students' mean score was significantly higher than females¹². As knowledge level was comparatively more regarding the basic concepts including greenhouse gases, the improvement was found relatively less on these questions. Post intervention evaluation showed much increase of score in questions on health impacts and mitigation measures such as emerging infection, Kyoto Protocol, carbon credit etc. on which initial knowledge was particularly lower. A study in rural Delhi reported that only some of the students were aware about all the health effects of global warming¹³.

We found internet (37%) and teachers (25%) were two major sources of information for the students whereas friends and guardians were the least. These findings more or less corroborated with earlier studies^{11, 12}. The knowledge level of school teacher's on every detail aspect of global warming may also be not beyond question which might have been a factor contributing to low baseline knowledge of the students and this may require further evaluation. Also effectiveness of conceptualization of such a critical issue from internet information for a school student need to be studied further.

Various studies have been carried out focussing on the awareness on Global Warming and Climate change among the school students in different parts of the world. Mostly studies identified unacceptably low knowledge along with various misconception prevailing in them^{11,12,13}. Mostly these studies concentrated on one time baseline evaluation of knowledge level. However, to the best of our knowledge, no studies have been attempted in the eastern part of India with such an Intervention Model where school students were assessed before and after knowledge intervention and significant improvement was elicited. There lies the uniqueness of this study. The study showed that there remains enough scope of knowledge incorporation amongst school students regarding global warming. This type of intervention programme proves to be effective in order to enhance general awareness of global warming which may help in mitigation of this alarming global crisis.

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