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Review Article

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Impact of climate changes on pollen and respiratory allergies

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ABSTRACT

Climate change has become a global health hazard. Increasing temperature of earth and increased extreme weather events like heat waves, floods, droughts and hurricanes are increasing incidence of respiratory diseases. Hence, this study was conducted with the objective to increase awareness of pollen allergies- adapting to a changing climate and to address treatment and quality of life issues related to the care of patients with pollen allergies.

Keywords: Climate changes, Pollen allergy, Air pollution, Respiratory allergy

INTRODUCTION

Climate change has become a global health hazard. Increasing temperature of earth and increased extreme weather events like heat waves, floods, droughts and hurricanes are increasing incidence of respiratory diseases. Climate change is having a direct impact on increase in amount of pollen produced, earlier and longer pollen seasons thereby having impact on respiratory allergies.

In this review article we have analysed air borne pollen present in India and common allergenic plants of different seasons in India. Interconnected health effects between air pollution and climate change is also analysed. To conclude, measures to reduce effects of environmental factors affecting respiratory allergies are highlighted. The objectives of the present study was to increase awareness of pollen allergies- adapting to a changing climate and to address treatment and quality of life issues related to the care of patients with pollen allergies.[1]

CLIMATE CHANGE- A GLOBAL HEALTH HAZARD

Increasing temperature of earth and increased extreme weather events like droughts, floods, heat waves, hurricanes are causing direct threat to respiratory health by promoting or aggravating respiratory diseases or indirectly by increasing exposure to risk factors for respiratory diseases.[2] There is increase in all India mean annual temperature by 0.5^0 c in period 1901-2003.[3]

CLIMATE CHANGE AND ALLERGIES

Pollen allergy

Climate changes increases plant growth and faster plant growth, increase in the amount of allergenic proteins contained in pollen, causes earlier and longer pollen seasons, increase in amount of pollen produced by each plant, increase in start time of plant growth and therefore start of pollen production.[4]

Respiratory allergies

Climate changes causes increase of heavy precipitation events (e.g. thunderstorm) thereby contributing to asthma epidemics. Climate changes causes global warming resulting in increase of length and intensity and earlier start of pollen season, increase occurrence of episodes of long distance transport of pollen and pollutants.[5]

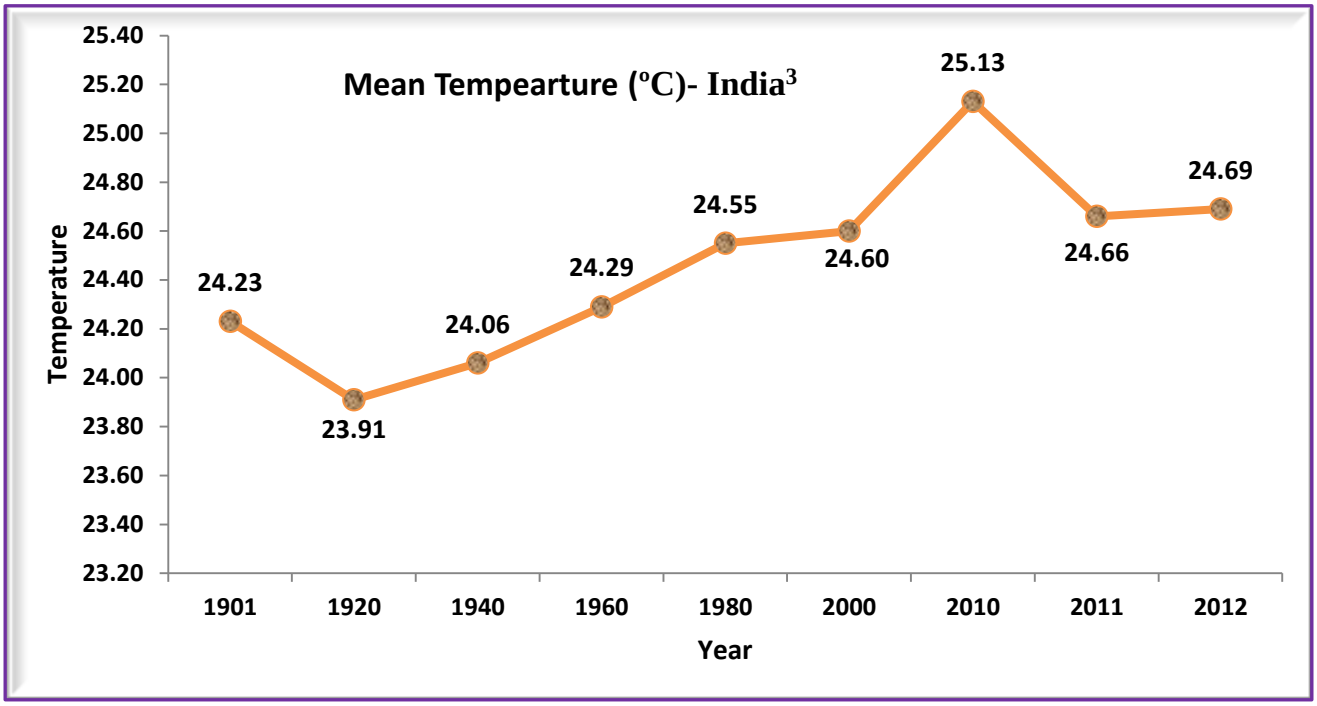

Figure 1: Mean annual temperature changes in India.

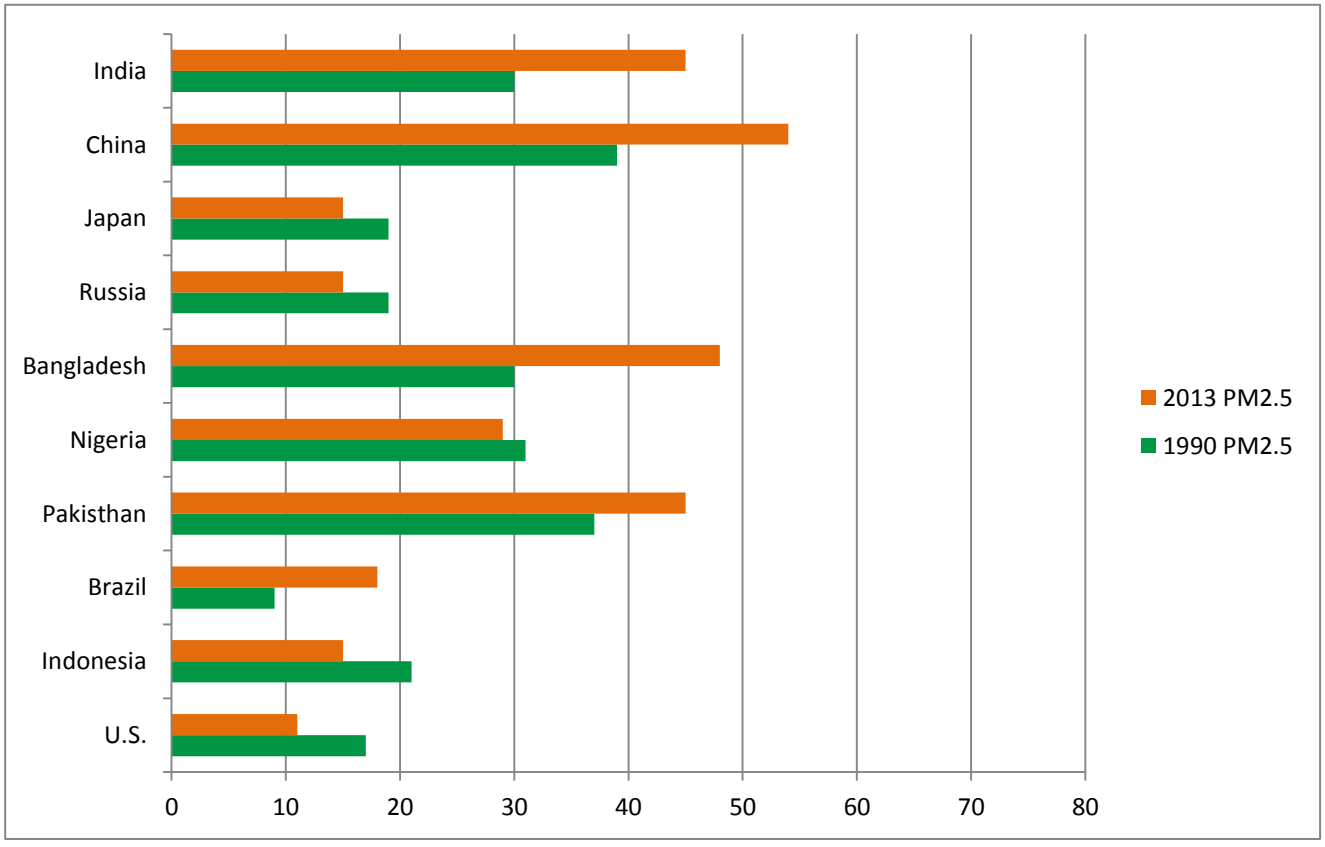

Figure 2: Climate changes and air pollution in various countries.

Table 1: Air borne pollen present in india.[6]

Name of allergen	habitat	North	South	East	West
Ailanthus	T	+	-	-	+
Alnus	T	+	-	+	-
Agemone	W	+	-	-	-
Artemisia	W	+	+	+	+
Azadirachta	T	+	-	-	-
Borrassus	T	-	-	-	+
Brassica	W	+	-	+	+
Cassia	T	+	+	-	-
Casurina	T	-	-	+	-
Cedrus	T	+	-	+	-
Cheno- Amrath	W	-	+	-	-
Coccus	T	-	+	+	+
Cyonodon	G	+	-	+	-
Donoea	W	+	-	-	+
Holoptelea	T	+	-	-	-
Malotus	T	+	-	+	+
Morus	T	+	-	-	-
Parthenium	W	-	-	+	-
Pennisetum	G	+	-	+	+
Phoenix	T	-	+	+	-
Prosiopus	T	+	-	-	-
Salvodora	T	+	-	-	-
Sorghum	G	+	-	+	-
Syzigium	T	-	+	-	-
Xanthium	W	+	-	-	+

Table 2: Common allergenic plants of different seasons in India.[7]

Season (Months)	Trees	Weeds	Grasses
Spring (February- April)	Ailanthus Excelsa	Cannabis sativa	Cyanodon dactylon
	Bauhinia varigata	Chenopodiu murale	Dicanthium annulatum
	Casuarina equisfolia	Parthenium hysteroporus	Imperata cylindrical
	Holoptela integerifolia	Plantago major	Paspalum distichum
	Mallatus phillipersis	Suaeda friuticasa	Poa annua
	Prospis julifora		Polypogon monspeliensis
	Putranjiva roxburghii		
	Quercus incana		
Autumn (September-October)	Anogeissus pendula	Amaranthus spinosis	Bothriochloa pertusa
	Carica papaya	Arthemisia scopario	Cenhrus ciliais
	Cedrus deodara	Cassia accidentalis	Hetropogon contortus
	Coccus nucifera	Ricinus communis	Pennisetum typhoides
	Eucalyptus sp	Xanthium strumarium	Sorghum vulgare
	Mallatus phillipersis		
	Phoenix sylvestris		
	Prosopis julifora		
	Quercus incana		
Winter (November-January)	Cassia simaea	Ageratum conyzoides	Cyanodon dactylon
	Cedrus deodara	Argemone Mexicana	Eragrostis tenella
	Mallatus philipersis	Asphodelous tenuifoli	Phalaris minor
	Quercus incana	Album	Poa annua
		Ricinus communis	

CLIMATE CHANGE AND AIR POLLUTION

Interconnected health effects[8]

There is consistent increase in $PM_{2.5}$ (particulate matter with aerodynamic diameter 2.5 µm or smaller. Chronic exposure contributes to risk of respiratory and CV diseases and lung cancer) in India and South Asia over past 23 years.[9]

Measures to reduce effects of environmental factors affecting respiratory allergies

- Encourage policies to promote access to non-polluting sources of energy, reducing use of fossil fuels
- Control vehicle emissions
- Reduce private traffic in towns and improving public transport
- Plant non allergenic trees and grasses in cities

Table 3: Traffic related pollution in developing allergic rhinitis symptoms.[10-12]

S.no	Traffic related pollution
1	**Trucks passing near residence**
	Odds ratio of current rhinitis- 1.60
	Odds ratio of current rhinoconjunctivitis -1.42
	Odds ratio of rhinitis ever-1.46
2.	**Living within 100 m from road with traffic intensity of more than 10 cars/min**
	Odds ratio of allergic rhinitis-1.30
	Odds ratio of allergic asthma-1.83
3.	Air pollution and allergic rhinitis
	Increased fossil fuel combustion may lead to allergic sensitization and airway responsiveness
	Air way responsiveness to environmental allergens may aggrevate allergic rhinitis symptoms

CONCLUSION

This article highlights the impact of climate changes on pollen and respiratory allergies. Global warming and extreme weather events are causing direct threat to respiratory health. Air borne pollen and allergenic plants in India are analysed. Traffic pollution is also having significant impact on respiratory health. Adopting measures like usage of non-polluting sources of energy, controlling vehicle emissions, using public transport and planting non allergenic plants should be encouraged.

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