“Saharan Dust”

Origin and effects on health

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Purpose

• The purpose of this investigation is to inform the audience about the phenomena, its origin and how does it affect the health of individuals.
El polvo del Sahara y tu salud

El efecto de este fenómeno en el aire se agrava en la época de lluvias.

Desde el momento que ha estado presente en el ambiente, afectando la vida de cientos de personas que padecen de alergias. Y no es para menos.

La temporada alta de polvo, proveniente del desierto del Sahara, que nos ha acarreado esta ola de aire, nos llega con un particular cargo de virus, bacterias y contaminationes más o menos violentas en su intensidad, así como componentes volátiles orgánicos, derivados de la petróleo.

Asi lo describe el doctor alergista e immunólogo Rafael H. Zaragoza Urdaz, presidente de la Asociación Puertorriqueña de Médicos Alergistas (APRA). quien destaca que ese panorama no se complica aún más en los meses de septiembre y octubre con la llegada de la época de lluvia y el aumento de los niveles de esporas de hongos en el aire.

Por eso no es extraño que las alergias se hayan convertido en uno de los principales padecimientos a tratar a lo largo de todo el año en Puerto Rico, según publica la APRA en su sitio web en Internet (www.apra.org).

De hecho, se estima que cerca de 80% de los niños en la Isla sufre de ciática alérgica, una de las combinaciones más intensas.

Y es que, cuando una alergia, el sistema inmunológico percibe que algo es nuevo para el cuerpo y, en un intento por protegerlo, produce anticuerpos entre estos alérgenos. Es cuando liberan sustancias que son las que, en el caso de urticaria, gárgaras, polmones, piel y el sistema gastrointestinales, provocan una reacción inesperada de respuesta que puede ser considerablemente intenso Zaragoza.

“Tenemos una combinación de factores alérgicos y un sin número de personas están al día de cómo vivirán sus días de polvo. El problema que ha habido con el calentamiento global es que estamos teniendo anomalías de polvo más frecuentes y los niños más pequeños, que están inmunizados a la alérgica, simplemente no pueden tolerar las condiciones ambientales.”

El polvo que nos llega de África es un particular muy pequeño que se deposita en los pulmones y mucosas del tracto respiratorio. En la foto, tema de debate de una rubio de polvo en las libras de cabo verde en la costa este de africana. (NASA/Goddard Space Flight Center, and ORBIMAGE/Thinkstock)
Yet another Saharan dust cloud has made the journey 5,000 miles from Africa to Houston.

These clouds are concentrated about 10,000 feet off the ground. They do thin out as they cross the Atlantic Ocean, the Caribbean Sea and the Gulf of Mexico, but there are still enough fine dust particles left to make for a hazy gray sky over Texas.

These fine dust particles are also hazardous for our health. Measuring only 2.5 microns in diameter, or roughly 1/30 the width of a human hair, they can penetrate deep into the lungs when breathed in.

Today's air quality index is moderate verging on "unhealthy for sensitive groups," or those with lungs conditions like asthma and emphysema. If you are concerned about the air quality, limit your exposure outdoors, especially while engaging in physical activity.

One plus to the African dust blowing across the Atlantic is that it normally signals quiet tropical weather due to the dry nature of the air and the high wind shear needed to blow it all the way over here.

Our latest round of African dust is expected to move out by Friday. While it's here, you might notice some unusually colored sunrises and sunsets. If you capture any on camera, post them to social media with #abc13eyewitness or email them to us at news@abc13.com.
Saharan dust and pollution: confusion over health risk from smog cloud

School pupils kept indoors amid fears over air pollution as Government advisers insist no health risk to vast majority of people

By Goodan Rayner, and Keith Perry
16:06PM BST 30 Apr 2016

Healthy schoolchildren were being kept indoors on Wednesday as government experts contradicted messages about the dangers of smog leading to widespread confusion.

The Department for Environment, Food and Rural Affairs warned of “very high” levels of pollution due to a mixture of dust from the Sahara and industrial emissions from Europe arriving on a south-easterly breeze.

But its own advisers at Public Health England admitted that the “vast majority of people” would feel no effects and independent experts said there was “no need” to stay indoors.

Photographs of the Prime Minister’s official car coated in a thin film of dirt captured the public imagination following an air pollution alert issued by Defra earlier in the week.
Sahara dust causes sore throats and dirty cars

2 April 2014 Last updated at 12:49 BST

Government health advice has been issued amid warnings that pollution spreading across England will again hit high levels later.

The pollution - a mix of local and European emissions, and dust from the Sahara - has caused a thick layer of grime to form on cars and buildings around the country.

Pallab Ghosh reports.

Read more
Air pollution: High levels to spread across England
Origin

• 3.5 million square miles

• Factor favoring the desert climate:
  • Quote: Jim Andrews: AccuWeather Expert Senior Meteorologist
    • High atmospheric pressure…

• Factors favoring the phenomenon:
  • Consistent winds…
What does the dust contain?

- Virus
- Pollen
- Bacteria
- Spores
- Non-specific heavy metals and irritants.
- Volatile organic compounds, derived from petroleum.
Classification of particles

- PM$_{10}$: particles with diameter of de 10 micrometers or less.

- PM$_{2.5}$: particles with diameter of de 2.5 micrometers or less. They are known as the fine particles.

- The particles in this range (0-10µm)- stay trapped in the lungs.
African Dust Storms Reaching Puerto Rican Coast Stimulate the Secretion of IL-6 and IL-8 and Cause Cytotoxicity to Human Bronchial Epithelial Cells (BEAS-2B)

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Abstract

African dust storm events (ADE) travel across the Atlantic Ocean (ADEAO) and reach the Puerto Rican coast (ADEPRC), potentially impacting air quality and human health. To what extent seasonal variations in atmospheric particulate matter (PM) size fractions, composition and sources trigger respiratory-adverse effects to Puerto Ricans is still unclear. In the present study, we investigated the pro-inflammatory and cytotoxic effects of PM samples harvested during ADEAO (PM10), ADEPRC (PM2.5 and PM10) and Non-ADE (Pre-ADE-ADEAO and Non-ADEPRC), using BEAS-2B cells. Endotoxin (ENK) in PM2.5 and PM10 extracts and traces of metals (TMEET) in PM2.5 extracts were also examined. IL-6 and IL-8 secretion and cytotoxicity were used as endpoints. ADEAO and ADEPRC extracts were found to be more cytotoxic than Non-ADE and ADEAO were more toxic than ADEPRC extracts. PM10 extracts from ADEAO and Post-ADEAO caused significant secretion of IL-8. IL-6 and IL-8 secretion was higher following treatment with PM10 and PM2.5 ADEPRC than with Non-ENK extracts. ENK levels were found to be higher in PM10 ADEAO than in the rest of the samples tested. TMEET levels were higher in PM2.5 ADEPRC than in Non-ENK extracts. Determine significantly reduced cytotoxicity and IL-6 and IL-8 secretion whereas Polynycin B did not. TMEET in PM2.5 fractions is a major determinant in ADEPRC-induced toxicity and work in conjunction with ENK to cause toxicity to lung cells in vitro. ENK and TMEET may be responsible, in part, for triggering PM-respiratory adverse responses in susceptible and predisposed individuals.

Keywords: dust storm, particulate matter, endotoxin, metals, BEAS-2B cells
Abstract

• Sand storms are increasing.
  • Evidence of the distance it travels.

• When dust particles enter the body:
  • Epithelial cells of respiratory ducts.
  • Activate cells of the immune system.
  • Initiate response of specific cells:
    • Cytotoxic T cells, LT, LB
Entering the body

• The PM$_{10}$ are the most abundant in the atmosphere and enter the body with each breath inhale.

• Other airborne particles may be deposited in:
  • Mouth
  • Nasal cavity
  • Esophagus
    • This way the particles are consumed.
Health effects

• Pathologic effects in the lungs.
• Initiation of the inflammatory response.
  • Active inflammatory cells.
• Aggravation of respiratory diseases.
• Toxic effects by absorption of toxic material.
• Effects of alergy or hypersensitivity
• Bacterial infections
• Fungus
• Fibrosis
• Cancer
• Irritation of mucous membranes.
• Asthma aggravation
• The risk are worse when considering sensitive groups: children and the elderly.
Associated diseases

- Chronic obstructive pulmonary disease (COPD)
- Silicosis
  - Silica (SiO$_2$) – mineral component
  - Inflamation and fibrosis of the lungs.
  - “Excessive exposure to silica also has been associated with tuberculosis, chronic bronchitis, COPD, and lung cancer”
- Potentially pathological microorganisms ($\leq 2.5 \mu$m).
Chronic Obstructive Pulmonary Disease (COPD)

Chronic Bronchitis
- Healthy
- Inflammation & excess mucus

Emphysema
- Healthy
- Alveolar membranes break down

Factors that influence

• The chemical and physical composition of the particles.
• The concentration of the particles in the air.
• The size of the particles.
  • Big VS small
• The duration of the exposure.
Exposure

- We are all exposed.
  - With the exception of filtrated environments.
- It may be higher in urban or industrial areas.
  - Natural environments.
- Examples of exposure...
Middle East dust storm puts dozens in hospital

8 September 2015

Roads were barely visible in the Syrian city of Homs

A large dust storm has hit western parts of the Middle East, putting dozens of people in hospital and leading to public health warnings.
Natural Environments

Europe

United Kingdom

http://cdn1.arkive.org/media/58/586383A9-18E4-4FF4-AB3D-B0B6613A453F/Presentation.Large/stroanlea-south-cliffs--rathlin-island-county-antrim-northern-ireland.jpg
Costa Rica

1. Put a mask over your nose and mouth. If you have a respirator or mask.

2. Protect your eyes. Sunglasses offer minimal protection from blowing dust or sand, but anti-fog goggles are better. If you don’t have goggles, shield your face with your hands.

3. Get to high ground. The densest concentration of sand or dust blows closest to the ground, so the storm will be less powerful at the top of a hill. Seek high ground if possible.

4. Shield yourself from flying objects. Seek out a large rock or other barrier to protect you at least partially. Cover as much of your body as possible to protect.

5. Pivot out of the storm. Don’t try to move through the storm; it’s much too dangerous. Stay where you are and wait for it to pass before you attempt to move to a different location.
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