

Associazione tra temporali/piogge intense e asma

Riunione gruppo Clima e salute – 24 Novembre 2010

Associazione tra temporali e asma

It seems reasonable to think that rain could help relieve symptoms of allergic rhinitis (hayfever) and asthma by "washing" pollen out of the air

Actually, heavy rain/thunderstorms often makes some people get worse

Associazione tra temporali e asma

Asthma associated with thunderstorms has been reported in several countries

Packe GE & Ayres JC first noted the association of thunderstorms with large numbers of patients presenting with acute asthma attacks after thunderstorms in Birmingham, England in 1983. They described a concurrent increase in airborne fungine spores (*Lancet 1985, 2:199*)

Since then, epidemics of thunderstorm-asthma have been described around the world including Australia, United Kingdom, Canada, United States, Italy

Studi sull'associazione tra temporali e asma-rinite allergica

| Author | Place and population | Study period | Type of study | Outcome | Main results |
|-----------------------------|--|-------------------------|------------------|----------------------------|---|
| D'Amato G 1994 | Napoli, Italy 6 adults and 111 yrs old | 04-Jun-04 | Case-series | Asthma ED visits | All patients were sensitized to Parietaria pollen. No air pollution peaks associated with thunderstorm |
| Higham J 1997 | England, 29 healthcall offices All ages | Jun-94 | Ecological study | Telephone calls for asthma | Significant increased risk of calls for asthma during storm nights vs control nights (OR=6.4) in the 17 areas affected by the storm |
| Newson R 1997 | England, 14 Regional Health Authorities Age: 0-14; ? 15 yrs | Jan 1990- March 1994 | Time series | Asthma Hospital Admission | High level of spheric densities associated with a 25% excess in both ages class Thunderstorm+high pollen count vs tunderstorms with low pollen count: 16% excess in children; 50% excess in adults |
| Marks GB 2001 | 6 cities SE Australia All ages | Jan 1995- Dec 1998 | Case-control | Asthma ED visits | Thunderstorms within 80 km OR: 5.0 Thunderstorm outflows OR: 15.0 |
| Dales RE 2003 | Canada, Eastern Ontario Children | 1993-1997 | Time series | Asthma ED visits | During thunderstorm days compared to control days, daily asthma visits increased from 8.6 to 10, and air concentration of fungal spores doubled |
| Pulimood TB 2007 | England, Cambridge All ages | Jul-02 | Case-control | Asthma admissions | Subjects sensitive to Alternaria species (OR=9.31) Subjects sensitive to Alternaria plus Cladosporium species (OR=63.9) |

Associazione tra temporali e asma: caratteristiche degli eventi "epidemici"

Common to all epidemics of thunderstorms-related asthma is a **significant increase in atmospheric allergen load**

There is a **close temporal association** between the start of the thunderstorm and the onset of epidemics

The epidemic are limited to season when there are **high atmospheric concentration of airborne allergenic pollens**

Patients affected are **invariably atopic**

Associazione tra temporali e asma: meccanismo biologico

Changes in the weather, such as rain or humidity, may induce hydration of pollen grains and their fragmentation, which generate atmospheric biological aerosols carrying allergens

Pollen grains ruptures by osmotic shock (also as a consequence of strong electric fields development) during thunderstorms result in the release of respirable, allergen-carrying cytoplasmic starch granules (0.5-2.5 μm) that can reach lower airways inducing asthma reactions in pollinosis patients

Marks GB et al. *Thorax* 2001, 56:468

D'Amato G et al. *Allergy* 2007, 62:11

Associazione tra temporali e asma: interazione con fattori climatici

- ✓ Irritant gases photochemically generated, NO_x → increase in O₃ levels
- ✓ Preceding dry spell followed by wind
- ✓ Sudden decrease in temperature
- ✓ Increase in humidity

Come il cambiamento del clima può influenzare l'associazione

"It is very likely that hot extremes, heat waves, and **heavy precipitation events and thunderstorms** will continue to become more frequent"

IPCC 4th Assessment Report 2007

Climate change may affect pollen distribution, pollen allergenicity, pollen season and amount

Evidence on increase of:

- pollen concentration
- duration of pollen season
- long distance transport

Evidence on altered spatial distribution of pollen and earlier onset of pollen season

Prevalenza di asma e rinite allergica in Italia: SIDRIA-2 e ECRHS

Prevalenza di sibili (ultimi 12 mesi)

8.6% bambini 6-7 anni

9.7% adolescenti 13-14 anni

8.5-10.7% adulti 20-44 anni

Rinite allergica (ultimi 12 mesi)

18.9% bambini 6-7 anni

35.1% adolescenti 13-14 anni

12.5-16.9% adulti 20-44 anni

Fonti dei dati

Dati su precipitazioni (mm/h)

Serie storiche disponibili al DEP (fonte: Aeronautica Militare – Servizio Meteorologico)

Dati su scariche elettriche (densità e conteggio) numero di scariche per unità di superficie (10Km×10Km)

Dati da acquisire: fonte Aeronautica Militare – Servizio Meteorologico

Fonti dei dati

Dati di monitoraggio aereobiologico

Rete Italiana di Monitoraggio Aereobiologico (R.I.M.A.) metodica standard di rilevazione



96 stazioni di monitoraggio in Italia (ARPA, ASL)

Disponibili i livelli di concentrazione relativi alla singola stazione di monitoraggio