Name(s)

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Project Number

J1201

Project Title

All About Allergies

Abstract

Objectives/Goals

The purpose of this research was to determine if there was a co-occurrence among allergies and asthma, if there was a certain age when people develop and outgrow allergies, and if there were geographic and genetic bases to allergies.

Methods/Materials

I created an anonymous, non-personally identifiable, survey on surveymonkey.com and a social campaign via Facebook and email to get hundreds of respondents from 14 countries. My data set included answers to 53 questions from 551 respondents. I analyzed my data using Microsoft Excel and computed the relevant metrics (e.g., co-occurrence, support, confidence, conditional probability, Pearson correlation coefficient).

Results

Food allergies, environmental allergies, and asthma co-occurred. Peanuts and tree nuts co-occurred the most among food allergies, pollen and grass co-occurred among environmental allergies, and asthma co-occurred most frequently with peanuts and pollen. The confidence data I computed shows, for example, that if anyone has one of the food allergies, they have a conditional probability of 66-84% of having peanut allergies as well. 21.6% of respondents outgrew their allergies by 11.4 years -- which is right around puberty. My data suggest a genetic basis to allergies for pollen and asthma (I did not have sufficient responses to determine the genetic basis for the other allergies). Finally, my results also showed that there is a geographic basis to allergies -- developed countries like the US and Canada show markedly higher allergy levels compared to a developing country like India.

Conclusions/Discussion

My data suggests that a number of food and environmental allergies and asthma co-occur -- across the globe. It also suggests that there is a geographic basis and a possible genetic basis to allergies. A possible explanation for the geographic difference can be the Hygiene Hypothesis.

The results from my work can be used in the real world. For example, my confidence data suggests that if the newborn is allergic to its mother's milk, there is 70+% chance they it will also be allergic to eggs and peanuts. Since dairy allergies are noticed early in life, doctors can guide parents to avoid these allergens. The same data can be used, later in life, to minimize the panel of painful skin prick tests. Also, my co-occurrence data can be used by chefs to design allergy-friendly menus and limit cross-contamination in kitchens.

Summary Statement

My project addresses the growing health concern around allergies -- and identifies age, co-occurrence, genetic and geographical trends from 551 respondents to a global survey that I ran.

Help Received

Mother helped explain Immunology concepts;Uncle and Aunt helped explain Math concepts; Dad helped with the survey and the board