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Sex and Gender in Asthma

What is Asthma?

Asthma is a chronic inflammatory disorder of the airways. Chronically inflamed airways are hyper-responsive; they become obstructed and airflow is limited (by bronchoconstriction, mucus plugs, and increased inflammation) when airways are exposed to various risk factors. Symptoms include chest tightness, coughing, shortness of breath and wheezing. Asthma can be triggered by a variety of exposures such as dust mites, mildew mould, pets, rodents, tobacco smoke, dampness, chemical exposure and strong odors. Uncontrolled asthma can result in hospitalisation and potentially death.¹

How Big is the Problem?

In Europe, rates of asthma have doubled in the last ten years. About thirty million people have asthma, about six million of whom have severe symptoms. Annually, asthma costs Europe €17.7 billion, including an estimated €9.8 billion annual loss in productivity from poorly controlled asthma.² In 2009, asthma accounted for 53 of 100,000 hospital admissions in the EU. Hospitalisation from asthma was twice the EU average in Slovakia and Latvia. In adult populations, women had higher hospitalisation rates than men from asthma. On average in the EU, hospitalisation rate was 70% higher in women than men.¹² Among children, asthma prevalence and hospital admissions are higher in boys than in girls.¹³ The reasons for gender differences in asthma related hospital admissions are not well understood.¹⁴ Rates of asthma in women have increased in Europe. Thus, compared to men, women have poorer quality of life and increased hospitalisation despite having comparable baseline pulmonary function and medical treatment.¹⁵

Why Sex and Gender Matters: Biological Differences

According to the OECD, in Europe, asthma is more common in females (4.3%) than in males (3.3%) ages fifteen and older with the exception of Slovenia.⁴ In childhood, boys have twice the rate of asthma as girls, but they are more likely to grow out of it. However, the rates reverse once girls reach puberty. Research, therefore, has found that gender differences in asthma manifest at the early stages of puberty.⁵ In adulthood, more women suffer from asthma than men. Women in the age group twenty to fifty are especially affected. Severe complications from asthma are more common in women than in men, leading to more frequent or longer hospitalisation and higher rates of death.^{6,7,8} Women have a higher rate of nonallergic asthma, occurring in 65% of new-onset cases in women compared to 37% of new-onset cases in men.⁹ The reasons for these gender differences are not entirely understood, though researchers believe that the answer is strongly connected to hormones.^{10,11}

Hormones and Asthma

Female hormones have a large impact on asthma, affecting 40% of women and can have almost as much of an impact as triggers such as allergens. Fluctuation in levels of estrogen can lead to airway inflammation. Thus, asthma attacks are more likely to occur right before a women's menstrual cycle when her estrogen is low. Most hospitalisations from asthma occur at the perimenstrual state. In particular, girls during puberty can find that their asthma worsens before their cycle, though the frequency and severity may decrease with age.^{16,17,18} Scientists believe that genetic differences may impact the gender differences in asthma rates and severity. Certain specific genes are correlated with asthma in women but not in men. Researchers also speculate that there may be sex-specific differences in the regulation and expression of genes, which impact on female prevalence and severity as regards asthma.¹⁹ In addition, women of the same age and height as men have smaller lungs and narrower bronchi than men.²⁰

Men and Asthma

Although studies have found that women have 10.5% higher chance of developing asthma over their lifetime than men, boys under the age 18 have a 54% higher chance of developing asthma than girls of the same age, and boys under the age of 15 are twice as likely to be hospitalised from asthma than are girls. It is important to note that recent evidence suggests a possible narrowing of this childhood gap. Similarly, although women are more likely to die from complications from asthma, the gender difference seems to be most primarily after the age of 65.³⁵

More research is needed on sex and gender differences in asthma. For example, a recent observational study suggests but does not prove that men with asthma are less likely than those without asthma to die from prostate cancer. Specifically, asthmatics were 29% less likely than non-asthmatics to be diagnosed with prostate cancer and 36% less likely to die from prostate cancer. The reason for the finding is unknown.³⁶

Social Factors, Gender and Asthma

Environmental exposures vary much between gender as women typically spend more time at home than men, which exposes them more to asthma triggers than men.²² Certain occupations in which the majority of workers are women, such as domestic cleaning, have elevated rates of asthma.²³ Women generally have a disproportionate greater share of caring and household responsibilities than men. As a result, they tend to be more exposed to asthma triggers like allergens (dust, fungus, mould, and yeasts) and sensitising agents (cleaning materials and household sprays). Also, perfumes, scented personal care products, cosmetics, and other products can trigger asthma.²⁴ With regard to healthcare, women may be more likely than men to identify their asthma symptoms, report them to a doctor and seek medical care during an asthmatic episode.²⁵

Asthma and Osteoporosis

People with asthma can suffer from higher rates of osteoporosis than those without asthma, particularly in the spine.^{26,27} Generally, women are more susceptible to osteoporosis, so women with asthma should be careful. Research indicates that over time, the continuous use of oral steroids or high doses of inhaled steroids may increase the risk of osteoporosis.²⁸ Medication that many asthma patients take, can reduce the amount of calcium available to be absorbed in food. In addition, many patients with asthma avoid dairy products due to concerns that they may be allergic, and it will trigger an asthma attack, further increasing the risk of osteoporosis. Furthermore, some individuals with asthma avoid weight-bearing exercise, which has been shown to increase bone strength.²⁹

Asthma, Pregnancy and Menopause

Pregnancy has varied effects on women with asthma. For 1/3 of women, their asthma worsens during pregnancy, another 1/3 have improvements and for another 1/3, pregnancy makes no difference. Controlled asthma has no impact on complication rates in pregnancy, although uncontrolled asthma can be dangerous to the woman and her fetus. In pregnant women, uncontrolled asthma can result in high blood pressure and preeclampsia (high blood pressure and protein in urine that can harm the woman and her fetus). Most asthma medications are safe during pregnancy and the risks of uncontrolled asthma are far greater than the risks to mother or fetus from the medications used to control asthma.³⁰

Studies have found that smoking during pregnancy increases the risk of asthma in children even when children were not exposed to second-hand smoke after birth. Children exposed to smoking in utero were two-thirds more likely to have asthma by age six, compared to children whose mothers did not smoke during pregnancy. Smoking only during the first trimester—in cases where women quit smoking for the second and third trimester—was linked to higher asthma risk in children as well.³¹ Some women develop asthma for the first time in their lives during menopause. A recent literature review and meta-analysis found no significant association of menopause with asthma prevalence or incidence, except for women reporting use of Hormone Replacement Therapy (HRT—female hormones medication treatment for women after menopause). However, these findings resulted from a small number of studies, including only one large cohort with incidence rates for pre- as well as post-menopause. Further studies are needed to allow robust analyses of the association of HRT and asthma.^{32,33}

ABOUT THE EUGENMED PROJECT

Research addressing sex and gender (S&G) in biomedical sciences and health research is emerging as a novel and highly promising field. This interaction between S&G leads to different manifestation of diseases—such as infarction, heart failure, diabetes, rheumatic disease—in women and men.

Research in the area will lead to novel, better targeted and, therefore, to more efficient treatment strategies than the previous global approaches, creating additional opportunities for prevention and increased healthy life expectancy.

The EUGenMed Project is coordinated by Charité, Universitätsmedizin Berlin in partnership with the European Institute of Women's Health and the University Maastricht. The Project is funded by the European Commission under the Seventh Framework Programme and began on October 1st 2013. The Project aims to create a multi-sectorial source of knowledge based on consensus of experts.

Six meetings, including four workshops on specific S&G themes, of multi-sectorial and multidisciplinary groups of key stakeholders will be held by EUGenMed Project partners on a variety of topics related to S&G in health. These meetings will generate recommendations, guidelines and teaching materials for the implementation of S&G research for target audiences, doctors, medical associations, teachers, students, researchers, industry, health policy makers, funding agencies and politicians. Materials will be disseminated through a European Gender Health Portal.

The EUGenMed Project will produce an innovative roadmap for implementation of S&G in biomedicine and health, based on the generation of material and results from four workshops and the final project conference.

For more information, please visit the EUGenMed website: <http://eugenmed.eu>.



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