

A Study on Gender Base Inheritance of Paternal and Maternal Heredity

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Abstract

Original Research Article

Background: Allergy is an immediate hypersensitivity, or type I hypersensitivity reaction, caused by the release of mediators from mast cells. This release is often triggered by the binding of an immunoglobulin E (IgE) antibody (specific to an environmental antigen) to mast cells in various tissues. **Objectives:** The aim of this study was to determine Gender base Inheritance of allergy. **Method:** This prospective study was conducted at Pirganj Upazila Health Complex, Rangpur, Bangladesh from 11th November 2016 - 27th March 2017 and 8th July 2018 to 9th August 2019. **Result:** In 1st series total patients were 48 and among them 15 male patients acquired through maternal transmission and 8 male patients acquired through paternal transmission respectively and 16 female patients inherited through paternal transmission and only 4 of the female patients inherited through maternal transmission. In 2nd series number of patients were 100. Out of 100 patients, 43 male patients were inherited by maternal transmission and 8 male patients were inherited by paternal transmission. In case of female, majority patients were inherited by paternal transmission which is 13 and maternal transmission was low which were nine (9). **Conclusion:** It was concluded that maternal transmission is higher in case of male and paternal transmission is higher in female in both series of the study.

Keywords: Allergy, hypersensitivity, by paternal transmission.

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INTRODUCTION

For centuries, many explanations were put forth to explain the transmission of physical characteristics from parent to offspring. It was not until the mid-19th century (1865) when Gregor Mendel focused his study on easily characterized traits of the garden pea plant (*Pisum sativum*) that the link was defined between physical characteristics (phenotype) and genetic makeup (genotype). In his studies, Mendel proposed that “particulate factors” were the carriers of heredity, and in future studies by Fred Griffith [1] and others [2] in the 1900s, it was discovered that the “particulate factor” he proposed was deoxyribonucleic acid or DNA. These studies ultimately led to the fundamentals of heredity in use today that we now call “Mendelian” genetics. Scientists have studied human genes to learn how they normally work and how changes in genes can change how they work. Some changes are very minor and do not affect the way a gene works. These changes are often called single nucleotide polymorphisms (SNPs, pronounced “snips”) or gene variants. Other changes, called mutations, affect

how a gene works and can lead to disease. Diseases caused by mutations in a single gene are usually inherited in a simple pattern, depending on the location of the gene and whether one or two normal copies of the gene are needed, this is often referred to as Mendelian inheritance. Findings from 50 years of twin research estimate that ~40% of the variance within individual differences in childhood internalizing problems is due to genetic factors and up to ~36% is due to the common family environment, which encompasses parental factors that account for similarities within the offspring [3-5]. In the current genomics era of research, the latest developments in methods of polygenic analyses provide new ways to improve our understanding of the mechanisms underlying parental influence on offspring internalizing problems. Genome-wide complex trait analysis (GCTA) is used to investigate the impact that variation in measured genetic factors has on behavior [6]. Using genome-based restricted maximum likelihood (GREML) analyses, common genetic variants are studied to examine the extent to which genetic similarity between unrelated individuals is associated

with phenotypic similarity. Maternal-effects GCTA (M-GCTA) uses SNP data to investigate whether variance in an offspring trait can be explained by the effect of the maternal genotype, over and above the transmission of genes from mother to child. [7] Allergy is an immediate hypersensitivity, or type I hypersensitivity reaction, caused by the release of mediators from mast cells. This release is often triggered by the binding of an immunoglobulin E (IgE) antibody (specific to an environmental antigen) to mast cells in various tissues. Allergic diseases range in severity, from life-threatening anaphylactic reactions to a certain food or insect bite to recurrent asthma, allergic rhinitis (AR),

and atopic dermatitis (AD). The diagnosis of an allergic disease depends on the identification of allergen-related symptoms and the relevant allergen-specific IgE [8].

OBJECTIVE

The objective of this study was to find the pattern of Gender base Inheritance of allergy of Paternal and Maternal Heredity.

METHODOLOGY AND MATERIALS

Type of Study:	Place of Study:	Period of study:
A prospective study.	Pirganj Upazila Health Complex, Pirganj, Rangpur, Bangladesh.	<ul style="list-style-type: none"> 11th November 2016 to 27th March 2017 8th July 2018 to 9th August 2019

This study was conducted on 148 patients at Pirganj Upazila Health Complex, Rangpur, Bangladesh. It was two phases study. The first series of data was collected from 11th November 2016 to 27th March 2017 and second series of data was collected from 8th July 2018 to 9th August 2019. Study sample was 148. Data collected from the patient in a prescribed protocol.

All data were analyzed by standard statistical tools SPSS version 22.

RESULT

Figure 1 shows that out of 148 patients the number of male patients was 90 which is 61% and the number of female patients were 58 which is 39%.

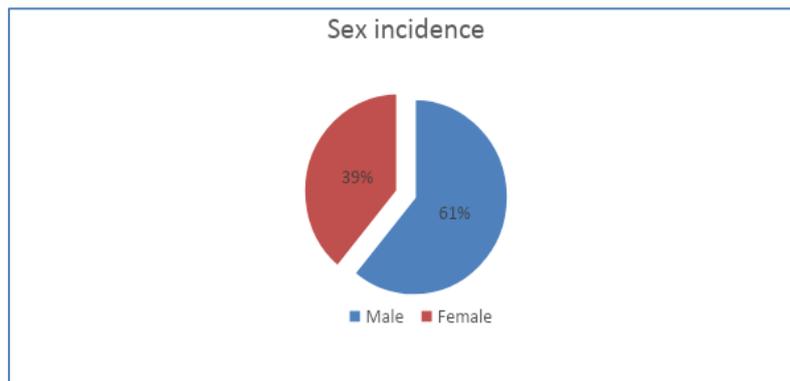


Fig-1: Sex incidence

Table 1, shows that the total number of Allergy patients in this series was 46. Number of male patients were 25 and female patients were 22. This

showing the data from the 1st part of the research which is conducted from 11th November 2016 to 27th March 2017.

Table-1: Frequency of Allergy transmission (n=46)

Gender	Transmission pattern of Allergy	Number of Patients
Male(26)	Paternal Heredity	8
	Maternal Heredity	15
	Mixed (Paternal+Maternal)	3
Female(22)	Paternal Heredity	16
	Maternal Heredity	4
	Mixed (Paternal+Maternal)	2

Figure 2 shows the inheritance pattern of male. Among those 26 male patients, 58% patients (15) acquired through maternal transmission and 30% (8) of patients acquired through paternal transmission

respectively. The rest 12% (3) acquired through both maternal and paternal transmission.

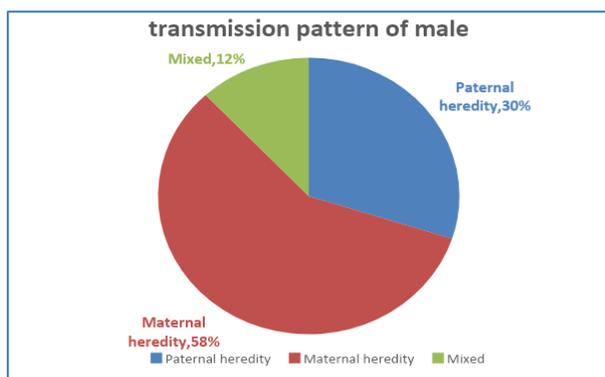


Fig-2: Transmission pattern of Allergy in male

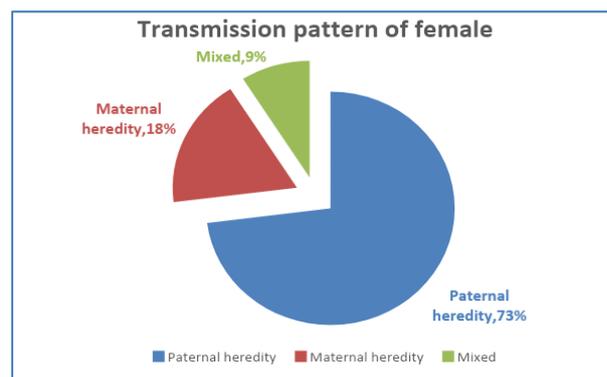


Fig-3: Transmission pattern of allergy in female

Figure 3 showing the inheritance pattern of allergy in female. Out of 22 female patients 73% (16) patients inherited through paternal transmission and only 18% (4) of patients inherited through maternal transmission.

Table 2 showing 2nd series of data, total number of patients in this series was 100. Number of male patients were 64 and female patients were 36.

Table-2: Frequency of Allergy transmission (n=100)

Gender	Transmission pattern of Allergy	Number of Patients
Male(64)	Paternal Heredity	8
	Maternal Heredity	43
	Mixed (Paternal+Maternal)	13
Female(36)	Paternal Heredity	13
	Maternal Heredity	9
	Mixed (Paternal+Maternal)	14

Figure 4 shows that among those 64 male, 67% (43) patients were inherited by maternal transmission and 13% patients were inherited by paternal transmission and other 20% patients were

mixed. In case of female, majority patients were inherited by paternal transmission which is 36% (13) and maternal transmission is low in case of female which is only 25% (9).

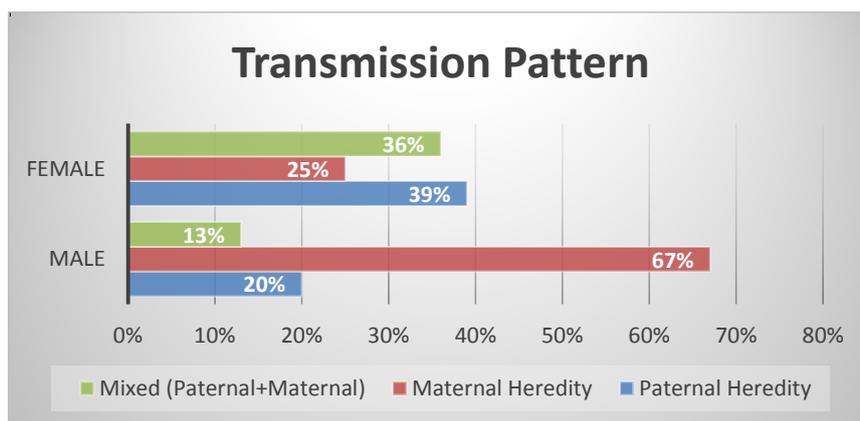


Fig-4: Transmission pattern of allergy in male and female

DISCUSSION

Several studies suggest a link between allergy and Bowel syndrome (BS). In Taiwan, a retrospective study showed that children with antecedent allergic diseases had a greater risk of BS than did control subjects. Among allergic conjunctivitis, AR, asthma, AD, urticaria, and food allergy, the highest adjusted odds ratio was observed among Allergy patients [9].

Similarly in UK, a retrospective chart review of 30,000 primary care records found that Allergy and eczema were significantly associated with BS, even after controlling for age, gender, and mood disorders [10]. This study suggest that transmission of allergic disease from parent to infants is more frequent in Father to daughter and mother to son. It was found that allergic disease transmitted more commonly from mother to son

and father to daughter. Our data also support that statement, as we can see in this study that maternal transmission is higher in case of male and paternal transmission is higher in female in both series of the study. Bowel syndrome is a common disorder and has been shown to affect almost a quarter of Western communities [11]. Some families appear to be more likely to be affected by allergic conditions than others and children born into these families have a higher risk of developing an allergic condition. This familial tendency to develop allergic conditions is thought to have a genetic link known as atopic. It is estimated that more than half of children born into atopic families will develop an allergic disease, whereas the incidence of children with no family history of allergic disease is one in five. The risk is elevated even further for families where both parents are affected by an allergic condition.

Limitations of the study

This was a single centre study with small sample size. So, the study results may not reflect the scenarios of the whole country.

CONCLUSION

We can conclude that there remains a lot to be discovered in the research field of allergies and genetics. Further studies are required to continue broadening the understanding of the genetic development mechanisms of allergic conditions, and begin to implement techniques to lessen the impact of allergies on the modern population.

REFERENCES

1. Griffith F. The significance of pneumococcal types. *J Hyg.* 1928;27:113e59
2. Avery OT, Macleod CM, and McCarty M. Studies on the chemical nature of the substance inducing transformation of pneumococcal types: induction of transformation by a desoxyribonucleic acid fraction isolated from pneumococcus type iii. *J Exp Med.* 1944; 79: 137e58.
3. Fedko IO, Wesseldijk LW, Nivard MG, Hottenga JJ, van Beijsterveldt CE, Middeldorp CM, Bartels M, Boomsma DI. Heritability of behavioral problems in 7-year olds based on shared and unique aspects of parental views. *Behavior genetics.* 2017 Mar 1;47(2):152-63.
4. Polderman TJ, Benyamin B, De Leeuw CA, Sullivan PF, Van Bochoven A, Visscher PM, Posthuma D. Meta-analysis of the heritability of human traits based on fifty years of twin studies. *Nature genetics.* 2015 Jul;47(7):702.
5. Wesseldijk LW, Fedko IO, Bartels M, Nivard MG, van Beijsterveldt CE, Boomsma DI, Middeldorp CM. Psychopathology in 7- year- old children: Differences in maternal and paternal ratings and the genetic epidemiology. *American Journal of Medical Genetics Part B: Neuropsychiatric Genetics.* 2017 Apr;174(3):251-60.
6. Yang J, Lee SH, Goddard ME, Visscher PM. GCTA: a tool for genome-wide complex trait analysis. *The American Journal of Human Genetics.* 2011 Jan 7;88(1):76-82.
7. Eaves LJ, Pourcain BS, Smith GD, York TP, Evans DM. Resolving the effects of maternal and offspring genotype on dyadic outcomes in genome wide complex trait analysis ("M-GCTA"). *Behavior genetics.* 2014 Sep 1;44(5):445-55.
8. Lambrecht BN, Hammad H. The immunology of the allergy epidemic and the hygiene hypothesis. *Nat Immunol.* 2017 Sep; 18(10):1076–83.
9. Tan TK, Chen AC, Lin CL, Shen TC, Li TC, Wei CC. Preschoolers With Allergic Diseases Have an Increased Risk of Irritable Bowel Syndrome When Reaching School Age. *J Pediatr Gastroenterol Nutr.* 2017 Jan;64(1):26–30
10. Jones MP, Walker MM, Ford AC, Talley NJ. The overlap of atopy and functional gastrointestinal disorders among 23,471 patients in primary care. *Aliment Pharmacol Ther.* 2014 Aug; 40(4):382–91.
11. Heaton KW, O'Donnell LJD, Braddon FEM. Symptoms of irritable bowel syndrome in a British urban community: Consulters and non-consulters. *Gastroenterology.* 1992; 102: 1962–7.