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# Persistence and Inheritance of Blood Injury and Injection Phobia

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**SUMMARY**

Blood injury and injection (BII) phobia is a subtype of specific phobias. It is the unique phobia in which fainting occurs. The purpose of this study was to report the age of onset of BII phobia. Period of persistence of fear in BII phobic patients, the percentage of inheritance from generation to generation and the percentage of BII phobic patients who suffer spontaneously were analysed. A survey was performed among five sample populations and a total of 3261 individuals were interviewed for blood injury and injection phobia using a semi-structured questionnaire according the DSM V. A significantly higher number of subjects who are suffering from BII phobia had a familial history of the same phobia. Patients were analysed for three groups, those having persistence of BII phobia from 1-10 years, >10-20 years and more than 20 years. It was found that 5.74±2.49 (% mean ±SD), 5.94 ±1.09 and 4.89±0.69 of BII phobic patients have persistence of fear related to this phobia within these three groups. The pedigree analysis of the families of BII phobic patients reveals that 61.1%, (SD±9.30) showing more than one family member with this phobia, 13.85% (SD±9.39) were discontinuous expressions and 25.02, SD ±5.46 were spontaneous expressions whose Phobia is considered due to environmental factors. The persistence of fear related to BII phobia shows that a greater number of populations suffering from BII phobia are completely living in fear of blood, injury and injection or their related ques which make them inept in daily life. Patients suffering from BII phobia continuously live in fear and anxiety which decreases their efficiency in daily activities. This is a public health issue which must be addressed to create the chance for patients of BII phobia to become the productive members of the society.

**Key words:** *Blood Injury Injection, Phobia, persistence, Inheritance*

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## Introduction

The term blood phobia is commonly referred as blood injection and injury phobia (BII) in the literature. It is a common psychiatric disorder with an estimated prevalence of 3-4% in general population (1,2). BII phobia is a subtype of specific phobia according to the classification of diagnostic and stastical manual of mental disorders (3) and is the unique type in which complete fainting occurs at the sight of blood, injection or injury.

BII phobic patients generally faint at the sight of blood, any physical injury which results in the loss of blood or at the sight of injection. The patients generally avoid such interventions which trigger the phobic anxiety in them. Hospital visits of such patients cause an intense irrational fear which becomes compounded with medical procedures (3-7).

Though BII phobia is not so serious primarily, but possible serious general health complications of blood-injection-injury phobia have been discussed in previous reports (8, 9) and the most apparent complication of these phobias is that patients usually avoid vital medical procedures. BII phobia patients generally refuse hospital appointments and avoid insulin injections for diabetes, deny surgery for cancer, avoid visiting sick people, and women generally avoid becoming pregnant because of their fears (9).

BII phobia patients generally experience a wide range of symptoms. Individuals may report feelings of heat, dizziness, confusion, nausea and epigastric discomfort. Respiration becomes slow and deep and sweating is almost unavoidable (10). Unlike other phobias BII phobia consists of biphasic cardiovascular response which initially leads to an increase of the sympathetic activity that result in the elevation of blood pressure for a brief period and then parasympathetic activity predominates, results in an abrupt decline in blood pressure leading to vasovagal syncope and causing the person to faint.

Around 70-80% of the persons with BII phobia faint when exposed to the phobic stimuli (11-14). There is also a difference in the level of discomfort which the patient feels at the sight of blood, injection or injury. Persons having BII phobia with a history of fainting experience usually report higher overall levels of fear than those without fainting history (15, 16). There is a variable range in the prevalence of specific phobias as a general class, as reported in the literature (1,18-22). Specific phobias in general are twice as common in women as in

men (22,23). Individuals who have completed less years of education are found more prevalent to BII phobia than those who have completed more years of education (24). It is common in childhood or adolescence to acquire BII phobia. In one study the author has found 100% of the individuals had attained blood and injection phobia before the age of 18 years (25).

The prevalence of blood and injection phobia is mostly reported in population samples from clinics and hospitals. As patients suffering from BII phobia usually keep themselves out of such places, therefore the prevalence reported in those populations probably underestimate the actual prevalence. The present study has been taken in the populations outside clinics and hospitals by surveying five areas in the Aligarh region in order to obtain an estimation of actual population suffering from BII phobia. There has also been no report on the persistence of fear related to BII phobia and the percentage of inheritance of BII Phobia from generation to generation. This research also aims to grasp the idea about the persistence of fear and inheritance or frequency of expression of BII phobia trait among other individuals of the family in general population.

## Methodology

A survey was carried out in the Aligarh region which is located at the coordinate's 27.88°N 78.08°E and is part of the northern Indian state of Utter Pradesh. This survey includes subjects from its five prominent places (A) Maulana Azad Nager (B) Hamdard Nager and its adjacent areas (C) Logo Colony (D) Firdous Nager (E) Doharra Maffi. The data collected during this survey was categorized according to the population included and subdivided into 5 different samples for further analysis.

A total of 3261 individuals were interviewed from the general population. For interview purpose a semistructured questionnaire based on DSM-V was used (26). The internal consistency for the questionnaire indicated by Chronbachs α was 0.972

## Pedigree Analysis

Many disorders appear spontaneously in individual's life; however some disorders pre-exist in families. The critical observation of such familial aggregation of disorders serves as an imperative affirmation which suggests possible genetic basis. The pedigree analysis and family study almost go on together. The family study involves identifying the first person which has any disorder; such person is also called a proband. This proband is becoming the focussed and central person for deriving all the information regarding the family pedigree and also help in analysing the rates of disorder in his/her relatives.

The family study reveals the familial nature of a disease / disorder, its mode of inheritance, the range of clinical or phenotypic expression within the family and the inter-generational differences. The pedigree analysis was performed to analyze the percentage of BII phobia expression among the families affected with this phobia. The pedigree analysis was done by recording all the information regarding other family members of the proband, for example the total number of family members and whether is there any other member of the family suffering from the BII phobia or among other relatives of first, second or third degree relatives. All possible information regarding this was recorded. Based on this information the pedigrees were constructed and analysed for analysing the frequency of BII phobia and its inheritance among the family members and in general population. Phobias are persistent in the life of affected peoples. The persistence period of BII phobia in the life of people suffering from this disorder is also calculated based on the information provided by the patients and their relatives. This persistence helps us to analyze the other health related complications among the patients suffering from BII phobia.

Standard stastical tests like Chronbachs α for finding the reliability of questionnaire were performed in this study. F test were used to analyse the true differences existed if any among the samples. Student's t test was also performed to compare the differences in the age of onset among males and females. SPSS stastical package version 16.0 (Chicago, IL, USA) was used for all the statistical analysis.

Screening Questionnaire for Blood/Injection/Injury Phobia

i. Name of the person
ii. Age of the person
iii. Sex of the person
iv. Standard of the school
v. Occupation of the person (if employed)
vi. Address

Items

1. Are you phobic of blood, injection, injury, and needle?
2. Do you avoid seeing others blood?
3. Do you avoid looking at your own blood?
4. What is the age of onset of your blood phobia?
5. Do you faint at the sight of blood?
6. At what age you start getting faint at the sight of blood?
7. Do you avoid receiving injections?
8. Does needle size frighten you?
9. Do you generally avoid gatherings and crowded places?

10. Do you generally feel that heart rate is increased in phobic situations?
11. Do you feel suffocation because of fear?
12. Do you feel so scared that your tongue gets dried up?
13. D you feel that you lose presence of mind in phobic conditions?
14. Do you feel chest pain in phobic conditions?
15. Do you feel physical weakness?
16. Do you feel hot flushes in phobic conditions?
17. Do you feel that your mind is in numbness if you see serious objects?
18. Do you feel difficulty in respiration in phobic conditions?
19. Do you get disturbed by imagining the phobic conditions or objects?
20. Do you feel shortness of breath in phobic conditions?
21. Do you feel sweat in phobic conditions?
22. Do you feel lack of sleep by imagining the phobic conditions?

## Results

A random survey was performed from different regions of Aligarh which involves a total of 3261 individuals. From among those the percentage of Males were 50.53 (n=1648) and that of Females were 49.46 (1613). The mean percentage of individuals affected with BII phobia was estimated to be 17.78 with a standard deviation (SD) of 4.17. The age of onset was calculated and their values were found slightly variable among the samples in which the range of age of onset for males was found ranging from 7.6 ±2.57 years to 11.3 ±3.62 years. There was also slight variation in the age of onset among females in different samples whose values range from 5.8 ±2.59 years to 9.2 ±2.96 years. In all the samples the females were found to acquire this phobia earlier than males. This also indicates the early age of onset of BII phobia in females as compared to males. However the mean age of onset among males and females from all the samples was found to be as 9.3 ± 3.27 years to 7.5 ± 2.51 years. Student's t test was performed to compare the age of onset among male and female BII phobia sufferers from different samples. Results are illustrated in **table 1**

From family studies and pedigree analysis, it was also found that the different families show a variation among the inheritance pattern. In some of the family pedigrees it was found that the proband has directly inherited BII phobia from parents, as most of the pedigrees show continuous inheritance and expression from grandparent generation to parent generation and then to the children, their percent mean value has been found to be as 61.1%, (SD±٩,٣٠). Almost 61% of the cases are such where the sufferer of BII phobia has one or more first degree relatives affected from the same disorder. However a number of family pedigrees were found to have a discontinuous expression of the BII phobia, where proband or other relatives (sibs etc) were affected while their parents were normal, and their grandparents have lived or living presently as BII phobics and their percent mean value has been found to be as 13.85% (SD±9.39).

A number of family pedigrees form subjects who suffered BII phobia, shows the phobic individuals from only two generations that is the generations of children and grandparents and not any record of this phobia in parent generation, creating a generation gap. The percent mean value has been found to be as 11.46% (SD±7.52). There were a number of family pedigrees from the subjects who have got BII phobia spontaneously. Such BII phobia patients have not any record of this phobia among their parent or grandparent generation. Such cases were recorded as patients exhibiting spontaneous expression of BII phobia. These are the cases where environmental exposure of certain risk factors may be the possible cause; their percent mean value was found to be as 25.02, SD ±5.46. Results are depicted in Figure **1.**

BII phobia prevalence is one of the important features to be studied in the population. As BII phobia prevalence varies from population to population, its persistence also varies from person to person we have recorded the subjects with their persistency's of BII phobia and its related fear into three different groups based on the time period they are suffering from BII phobia. Results are illustrated in table **2**. The numbers of people who are suffering from BII phobia and having a persistent fear from one year to ten years are grouped and their percent mean value was found to be as 5.74% (SD±2.49). Those who have BII phobia persistent fear from more than ten years bur less than twenty years are grouped and their percent mean value was found to be as 5.94% (SD±1.09). The third and last group was those who have persistence of BII phobia and its related fear for more than twenty years, they were found to have a mean percentage of 4.89% (SD±0.69). Results are illustrated in table 2 and also depicted in Figure **2**

The probands examined in this study were grouped into four age ranges and all of 167 probands of BII phobia from all samples were in the following pattern. 39.8% of cases of BII phobia were in the age group of less than or equal to 12 years, while as 36.2% were from the age range of 12 years to 25 years, with a mean age of 14.84 SD±5.57, 14.97% cases were in between the age group of 26-40 years with a mean age of 32.11 SD±4.18 and the probands within the age group between 41-55 years mean age of 48.80 SD±4.21, were 6.586%, while only 2.395% was those probands whose age was above 56 years and a mean age of 63.00 SD±5.16 years.

**Table (T. 1)** The comparison of age of onset of Blood Injection and Injury Phobia in Male and Female Sufferers from five samples.

| Blood Injury Injection, Phobia, persistence, Inheritance | Age of Onset in Males (in Years) Mean ± SD* (n) | Age of Onset in Females (in Years) Mean ± SD | Comparison (t, p) |
|---|---|---|---|
| Sample 1 | 10.25 ± 3.73 (282) | 6.9 ± 2.23 (253) | 12.004, <0.001 |
| Sample 2 | 8.20 ± 3.15 (327) | 7.7 ± ٢,٧٣ (293) | 9.776, <0.001 |
| Sample 3 | 7.6 ± 2.57 (455) | 9.2 ± ٢,٩٦ (450) | 10.351. <0.001 |
| Sample 4 | 11.3 ± ٣,٦٢ (238) | 7.9 ± ٢,٠٧ (221) | 14.061, <0.001 |
| Sample 5 | 9.2 ± 3.31 (346) | 5.8 ± ٢,٥٩ (396) | 9.667, <0.001 |
| Mean ±SD | 9.3 ± 3.27 (1648) | 7.5 ± ٢,٥١ (1613) | |

**Samples 1- Sample 5,** correspond to five places like (1) Maulana Azad Nager (2) Hamdard Nager and its adjacent areas (3) Logo Colony (4) Firdous Nager (5) Doharra Maffi. *SD: Standard Deviation, n: Number, t: Student t test value.

**Table (T. 2)** Showing the persistence period of Blood Injection and Injury Phobia Sufferers in five population samples.

| Samples correspond to Five Places | Total interviewed | Persistence 1-10 years Total Sufferers | Percentage Sufferers | Sig. (p) | Persistence of >10 - 20 years Total Sufferers | Percentage Sufferers | Sig. (p) | Persistence of > 20 years Total Sufferers | Percentage Sufferers | Sig. (p) |
|---|---|---|---|---|---|---|---|---|---|---|
| Sample 1 | 535 | 41 | 7.66 | | 27 | 5.04 | | 28 | 5.23 | |
| Sample 2 | 620 | 41 | 6.61 | | 39 | 6.29 | | 36 | 5.80 | |
| Sample 3 | 905 | 13 | 1.43 | | 60 | 6.62 | | 45 | 4.73 | |
| Sample 4 | 459 | 27 | 5.88 | P < 0.03 | 33 | 7.18 | P < 0.05 | 22 | 4.79 | P< 0.03 |
| Sample 5 | 742 | 53 | 7.14 | F=2.23 | 34 | 4.58 | F=3.27 | 29 | 3.90 | F=2.45 |
| | Total= 3261 | | %Mean ±SD 5.74±2.49 | | | %Mean ±SD 5.94 ±1.09 | | | %Mean ±SD ٤,٨٩±0.69 | |

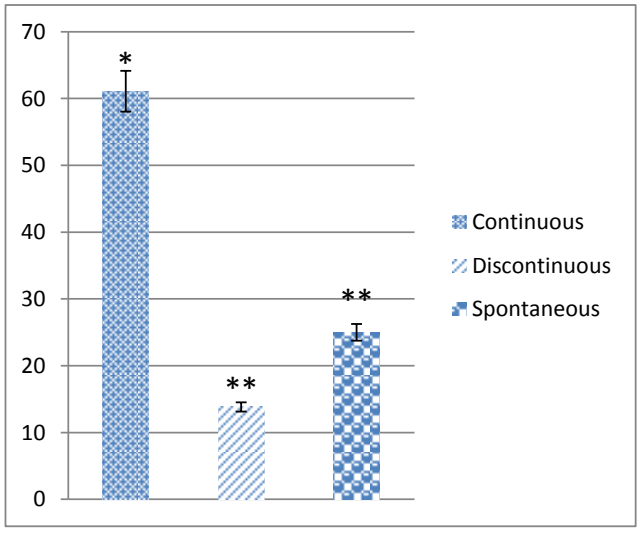


**Figure 1.** Mean Percentage of subjects showing the Continuous, Dis-Continuous, and Spontaneous expression of BII Phobia from all the samples. Head bars indicate ± standard error of mean, * p< 0.05, ** p<0.01

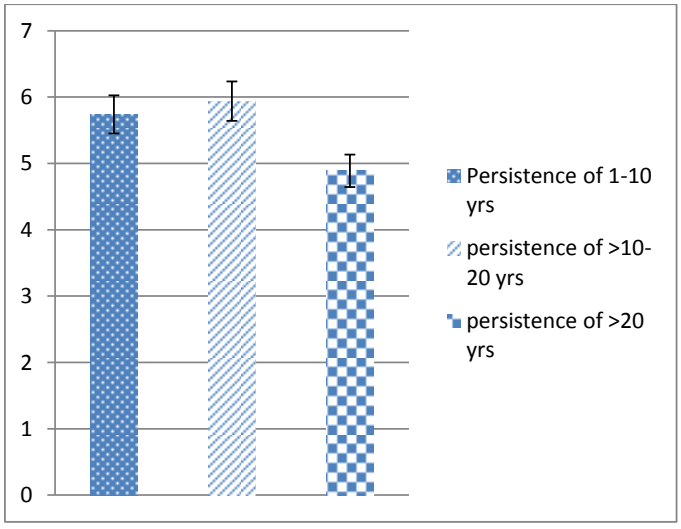


**Figure 2.** Showing the overall mean persistence period of BII Phobia in the subjects from all Samples. Head bars indicate ± standard error of mean. p< 0.05 The table gives the percentage of BII phobic patients divided into three groups according to the time Period they are suffering from BII phobia and its related persistence of fear. Those suffering from BII phobia in between 1 and 10 years are put in group first and accordingly

## Discussion

BII phobia is a dreadful phobia because it is often associated or is in comorbidity with other psychiatric disorders (9,24,26). We have also found in our previous study that the patients suffering with BII phobia are having high rate of comorbidity with depression and other psychiatric disorders such as, animal phobia, agoraphobia, social anxiety disorder, and panic disorder (26). The variations in the mean age of onset between the samples were found in this study which presumably is due to the variable environmental experiences. The early environment in which the individual develops may play an important role in the development and phenotypic appearance of many traits (27). The samples show a slight variation in the age of onset of the BII phobia. This study may help in detection of age range in which the children may have the chances of acquiring BII phobia from simple fear of the blood, injury and injection related ques due to early exposure of such things. The age range calculated from this study is 5.8 ±2.59 years to 9.2 ±2.96 years for females and 9.2 ± 3.27 years to 11.3 ± 2.51 years for males. This range possibly help in taking sufficient care during those years, where the children who are predisposed for developing phobia have the ample chances of appearance of phobia related symptoms phenotypically. Early detection would be beneficial for both the patient and the physicians or health practioners which would help them to take early necessary steps of care. This early detection if taken seriously helps in possible early intervention by using treatment methods like behavioral therapies, applied tension and others. The results from this study are evident that the patients suffering from blood phobia are having persistent fear for a long time. This also shows that the persons who got this phobia particularly during childhood, its fear and related symptoms get persistent to them. This may be because of the fear memories formed in the brain which are endured for a long time. The memories formed because of the life experiences are long lasting (28). The problems like this need an urgent attention (29). According to very recent research memories including phobias can be passed down to later generations through genetic switches or epigenetic marks that allow offspring to inherit the experience of their ancestors.

The frequency of expression of BII phobia in the affected families was also studied and a large number of probands were found to have other relatives suffering from the same disorder. This continuous expression of BII phobia trait from generation to generation consist a highest percentage of 61.1%, (SD±٩,٣٠) while as 13.85, SD ±٩,٣٩ cases were those in which a discontinuous expression of the BII phobic trait among other family members or other relatives was found, leaving a gap in between the generations where no case of BII phobia was present. The third type of cases which were recorded in this study was BII phobia cases in which the appearance of this phobia was all of a sudden in their life without having any history of BII phobia among their families. The percentage of such spontaneous expression of BII phobia was 25.02, SD ±5.46. However from all the cases it is evident that BII phobia has a high rate of familial expression. A recent study has showed that phobias are memories in the brain attained by life experiences and are transferred from generation to generation allowing the young generation to have the experiences of parents from their early age (30). This suggests that experiences which the person summons in the life are somehow imprinted in the brain and transferred from the brain into the genome, allowing them to be passed on to later generations. This can help us to understand how the phobias are transferred from generation to generation with such a high frequency of expression (31).

The inheritance of BII phobia is suggested by the mechanism of epigenetic transgenerational inheritance. This mechanism allows the inheritance of characters and even experiences of stress and behaviour from parents to offspring or from one generation to another (32). There are other studies which add the possible differences among genders in the onset of

different disease (33). The mechanism generally involves two ways through which transgenerational inheritance occurs that is DNA methylation and chromatin modification. However there are evidences from the literature showing that memories of fear can inherit from generation to generation (28) and a very recent one (30) in which the author Brian Dias states that our results allow us to understand from the translational perspective how the parental experiences even before conceiving offspring had an influence on the structure and function in nervous system of subsequent generations. However there is a recent research about how experiences can modulate the genetic material through epigenetic mechanisms. Some research has shown that maternal experiences and the experiences of individual's life time can change the genetic material through epigenetic mechanisms like DNA methylation and Chromatin Modulation. Such things cause the epimarks on the genes. These epimarks also inherit from parent to offspring which maximizes the chances of passing experiences from one generation to another generation. DNA methylation is also considered to be the responsible for memory formation through experiences. DNA methylation tags on DNA also passes from generation to generation makes the possibility of inheriting experiences stronger.

This will allow us to understand more about the etiology of neuropsychiatric disorders including the risk for the intergenerational transmission of several anxiety disorders such as phobias, anxiety and post-traumatic stress disorder. However the important question which needs to be understood is that how the information which was in the brain comes to be stored on the DNA. Future research is hoped to cast a light in this area of research.

## Conclusion

Blood Injury and Injection Phobia is a dreaded phobia which has the potential to limit the productive life of the individuals to a greater extent. This phobia is accompanied with a considerable risk of other anxiety disorders and medical comorbidities which make the problem compounded. The fear related with BII phobia has a long time persistence which has an imprinted effect on brain. This phobic imprinting on brain makes a long effect on memory which helps in the transmission of fear and phobia to subsequent generations. BII phobia has a high rate of inheritance from generation to generation passed to others as memories in the brain which makes the multiple members of a family to suffer. Other medical comorbidities if present with BII phobia will increase the chances of risk, as BII phobics usually avoid medical appointments and treatments. A further study on this area is deserved.

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