

Serial killers: a review about the genetic influence on violent behavior

Abstract

Introduction: Since the beginning of time, violence has accompanied man's behavior. In this sense, the transgressions committed by the so-called Serial Killers involve the existence of heinous crimes. Thus, there is great interest in understanding how various elements can influence or predispose individuals to violence and crime. Objective: To analyze the influence between violent behavior and genetic factors, taking into consideration elements such as hormones and genes that have a relationship with such human conduct.

Methodology: This is a literature review with 12 studies published between 2011 and 2021, in the PubMed, BVs, Scielo, NLM Catalog, PubMed, LILACS, and PMC databases after combining the operators "Genetics" AND "Crime" AND "Violence".

Development: The following factors were found to be related to violent and potentially criminal behavior: low levels of serotonin in the brain and of 5-HIAA in the CSF; 5-HTTLPR polymorphism of the SLC6A4 gene and the HTR2A and HTR2B encoders. In the dopaminergic system, genes encoding COMT; the DAT1 and the DRD2 and DRD 4 receptors; the Val158MET COMT polymorphism; the low activity of the MAOA gene and its MAOA-uVNTR polymorphism and six other variants; the CDH13 and RBOFOX1 genes and 4 of its polymorphisms; Bipolarity and Schizophrenia disorders and, finally, Klinefelter Syndrome.

Conclusions: It was possible to conclude that, even under some limitations, there is a relevant influence of genetic issues on a violent and potentially criminal person. Although this relationship is permeated by several other coefficients, genetics offers important findings for the understanding of criminal conduct.

Keywords: behavioral genetics, crime, genes, influence, serial killers

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Introduction

Since the dawn of time, violence has been part of human nature. Thus, the term violence and all the implications it carries are intertwined with the history of humanity, including all individuals, without any means of distinction. It can therefore be said that, as a consequence, man commits crimes, in other words, he violates the rules of criminal law.¹ In this sense, the transgressions committed by the so-called Serial Killers involve the existence of heinous crimes, which have permeated society for a long time, generating great social commotion.² The definition basically refers to the perpetrator of a homicide against at least three people in a short period of time, with an interval between each act and a specific modus operandi, seeking unusual psychological satisfactions.³

There are more common characteristics observed, especially in childhood, in a Serial Killer, such as compulsive masturbation, chronic lying, low self-esteem, episodes of intense anger, pathological possessiveness, self-mutilation, torture of animals and children, destruction of property and family and social isolation. Despite these striking characteristics, their identification as a series is complex, since they act like people who behave decorously.⁴ For this reason, there is a great deal of interest among scholars in finding out how intrinsic and extrinsic elements in individuals can influence them or make them predisposed to violent behavior.⁵

Thus, when considering the analyses of the violent behavior of serial killers, it is possible to establish questions such as: What genetic and biological elements can influence violent behavior? How can these mechanisms work? Is it possible to diagnose a potential serial killer

in advance? Based on this proposal, a literature review was developed with the aim of analyzing the influence between violent behavior and genetic factors. The search for a better understanding of the factors that may influence an individual to have such violent attitudes is therefore of great importance, as it can shed light on possible ways to avoid these actions.

Material and methods

This is a literature review, which is based on a type of research that uses as a source information that already exists in the literature on a particular subject. The search was carried out in November 2021 in the electronic databases PubMed, VHL, Scielo, NLM Catalog, PubMed, LILACS and PMC. The search, in turn, was carried out using the Health Sciences descriptors (DeCs) using the keywords: "Genetics", "Crime" and "Violence". Twelve scientific articles were used, in which there was no distinction between languages. All articles published in the aforementioned databases between the years 2011 and 2021, found under the combination of descriptors, corresponding to the objectives of this research, were included. Likewise, articles that could not be accessed electronically, duplicates and that did not fit the descriptors were excluded.

Results and discussion

Violent behavior

More than 1.3 million people die every year due to aggressive behavior and violence, which represents around 2.5% of overall mortality. These aggressive mechanisms, evolutionarily speaking,

can be analyzed as an adaptation, belonging to the behavioral range of most animal species. Humans, when compared to other animals, have high levels of aggression, a behavior which, in mammals, such as humans, has high heritability.⁶ In this sense, heritability accounts for around 50% of the variance in aggression.⁷

The need to fight for resources was probably a factor that contributed to the formation of aggression, which could favor survival mechanisms.⁶ However, when its expression occurs inappropriately, there can be consequences such as social maladjustment and crime. Thus, there are various forms of manifestation, but its extreme form involves serious violence and homicide, causing damage to both the victim and the aggressor, families and society.⁸

Studies differentiate normal aggression, an intrinsic expression of human conduct itself, from pathological aggression, which is bilaterally destructive and characterized by hypervigilance and hyperresponsiveness to stimuli.^{9,10} Violent crime is a problem that impacts on people's quality of life. As such, it is a factor that causes great concern.¹¹

Aggression has a sexually dimorphic character, in which men, in most cultures, show higher rates than women, which may be related to higher levels of male impulsiveness and female sense of danger, in agreement with other studies.^{7,12} In terms of the way it is expressed, impulsivity, being an unpremeditated act of hasty involvement that disregards the consequences, has different genetic roots to premeditated violence, practiced after prior deliberation. This heterogeneity of violent conduct.^{13,14}

The determinants of aggression are highly complex, since they involve a range of genetic and environmental elements, and can be mediated by third parties, such as disorders and personality. Their action is not isolated to violent behavior, but also involves the interaction of genes and the environment of exposure.⁸ This environmental influence has been confirmed by studies which consider aggression and criminal behavior as a result of the interaction between these elements, in which the environment and disorders intensely potentiate certain genetic reactions.^{14,15}

Genes associated with violent behavior

The serotonergic system plays an important role, since disturbances and alterations in it are directly involved in the pathology of disorders such as pathological aggression. This influence is exerted through the low levels of serotonin in the brain and the reduced concentration of 5-HIAA in the CSF, as well as the 5-HTTLPR polymorphism of the SLC6A4 gene and the HTR2A and HTR2B coders, especially in an alteration in the stop codon of the latter.^{7,8,11,13,16–19}

In relation to the dopaminergic system, genes coding for COMT, DAT1 and the DRD2 and DRD4 receptors are related to certain violent behaviors. There is a specific analysis of the Val158MET COMT polymorphism, which influences violence in schizophrenics. In animal models, low COMT expression has a significant relationship with aggression, which is more pronounced in heterozygous animals.^{7,11,13,15,18,20–22}

Studies show that low MAOA gene activity is specific for violent crime, since it can affect the serotonin, dopamine and norepinephrine systems. 16 Males are more likely to commit such crimes in the presence of the MAOA-uVNTR polymorphism. These associations are in line with other studies.^{13,17,18,23,24}

The CDH13 gene is associated with cases of extreme violence, with certain variants and specific haplotypes standing out.^{8,11,16,24,25} A significant overlap between the MAOA and CDH13 genotypes was also identified. Likewise, the RBFOX1 gene, with significant associations between four SNPs in the introns of this gene. The relevance of this gene is confirmed by other studies.^{6,25}

Studies have found support for the existence of genetic effects linking bipolar disorder alone to an increased risk of violent events. Klinefelter's Syndrome, on the other hand, significantly increased the occurrence of sexual abuse and arson.^{26,27} As well as Jacobs Syndrome (47, XYY), which is marked by an increase in convictions for sexual abuse, arson and homicide, which also has a higher risk of violent behavior than the other syndrome mentioned.²⁸

Conclusion

Despite the important conclusions that hundreds of extremely relevant studies on the subject have drawn, there are still limitations, since coefficients of various kinds can alter the way in which the final result manifests itself in the individual, making them violent and criminal or not. This explains why some genetic factors are thought to be influential in a certain population and not in another. Thus, it is possible to conclude that, yes, genetics has great potential to influence aggressive, violent and, occasionally, criminal behavior. However, it would be a huge misconception to say that it alone is capable of having such a significant effect as to be the sole cause of a character of this kind.

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Conflicts of interest

There are no conflicts of interest presented or declared by the authors in this research.

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