The Role Of Genetic And Environmental Factors In The Development Of Schizophrenia

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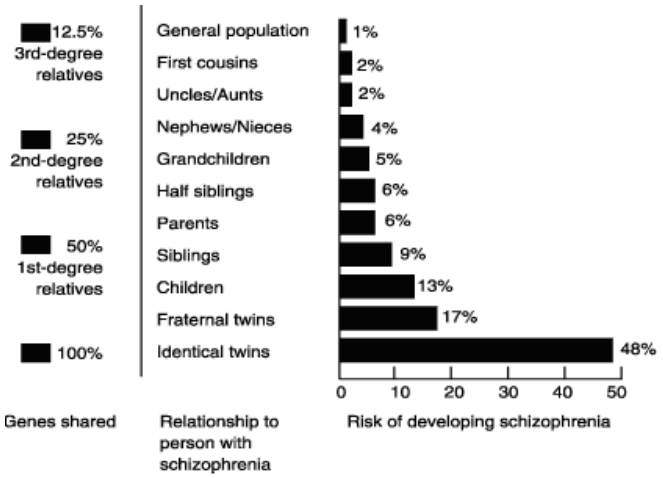
Introduction

Schizophrenia is a severe disorder characterized by profound disruptions in thinking, affecting language, perception, and sense of self. (World Health Organisation). Studies continuing and no exact result is found for the causes but it can divide into main two-part (genetic, environmental) and some studies suggest findings that can be a future on the way to resolving schizophrenia and it's development.

Role of Genetic Factors In the Development of Schizophrenia

Twin Studies

The most significant genetic risk determinant for schizophrenia is having an affected sibling. As the shared genes of the observed people increase the risk of having schizophrenia increase too. The concordance scale, the possibility that the other twin will evolve a disorder if the first observed twin has the disorder, is generally practised. For schizophrenia, this concordance rate for MZ twins is 46-52%. The risk of schizophrenia and schizophrenia-related disorders is similar for the offspring of both the unaffected and the affected monozygotic twins, which suggests that the unaffected twins do carry a heritable genetic risk for schizophrenia without expressing the disease. (Sanders, Gejman, and Duan, 2010)



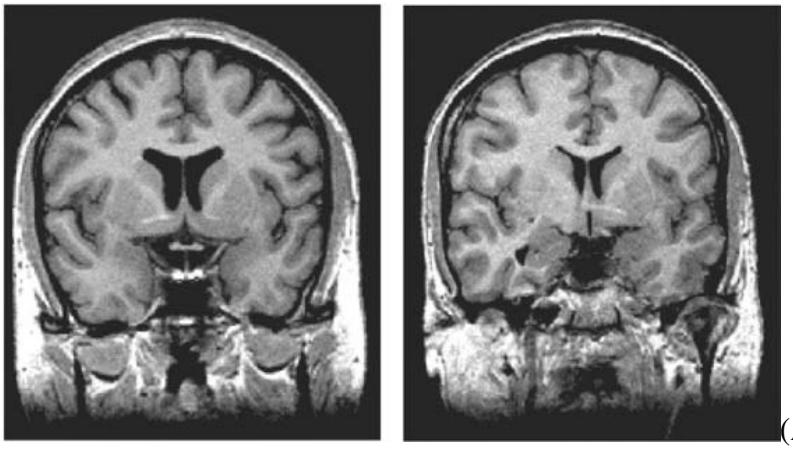
(Adapted from https://www.researchgate.net/figure/Risk-of-developing-schizophrenia-in-the-relatives-of-schizophrenic-patients_fig1_262843276)

Genes Related with Schizophrenia

Some genes reported as correlating with schizophrenia. NRG1 gene is a neurotropic determinant associated with neural maturation. Since schizophrenia's symptoms include abnormalities in the neural system studies suggest this gene can have a relation with schizophrenia especially in the path of maturing psychotic symptoms like hallucinations, delusions etc. Decreased levels of dysbindin protein and mRNA appearance have been found brains of patients with schizophrenia. (Picker, 2005). Reported that it maybe take part in synaptic glutamate release which is an abnormality of the brain which occur in the psychotic people. COMT is one of the enzyme demoting catecholamines as dopamine. (Picker, 2005). In schizophrenia dopamine have an association with hallucinations and delusions. That's why brain regions that work on dopamine can convert overactive. Since COMT has a connection with dopamine it may have a connection with schizophrenia too.

Brain Maturation

Schizophrenia is correlated with abnormal maturation of function and brain structure such as less volume of grey matter especially in the temporal and frontal lobe, brain tissue losses, decreased brain volume, decreased hippocampal volume, expanded ventricles. This abnormality is common among schizophrenics.



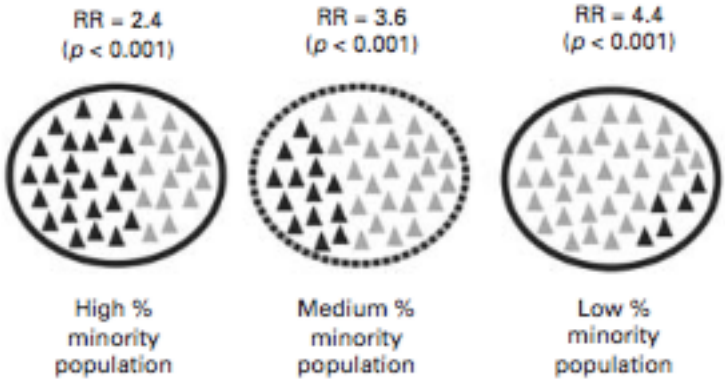
(Adapted from McDonald et al., 2002.)

Schizophrenics Controls

Role of Environmental Factors In the Development of Schizophrenia

Migration Studies

Study of Norwegian migrants to the United States demonstrated a 2-fold increase in first admission rates for schizophrenia compared with native-born Americans or Norwegians. (Fearon, and Morgan, 2006). They found that the incidence rate of schizophrenia was raised more than 12-fold in the African-Caribbean community, compared with the general population. (Fearon, and Morgan, 2006). Increased standards of schizophrenia observed in all minority groups but the African-Caribbean community's ratio was higher than expected. It found that rates of schizophrenia were markedly elevated in both African-Caribbeans (rate ratio = 9) and black Africans (rate ratio = 6), in both sexes and across all age groups (Fearon, and Morgan, 2006). It is necessary to remark that the further recent studies are original of second-generation migrants of these natal in the UK to migrant origins. Which also a evidence for migration is not only affecting the first generation's ratio of schizophrenia but also have an impact on the second generation.



(Adapted from Boydell et al., 2001.)

As the statistics and the graph show that migration is increasing the risk of developing schizophrenia. Also, the risk is a rise in the low minority populations. Migration's effect on psychosis remain unknown but discrimination, sense of isolation and exclusion, unemployment are all must be considered.

Drugs & Cannabis

Cannabis is the drug which is commonly used among people with psychoses in the name of self-medication. Most studies notify an affirmative relation between schizophrenia and cannabis but many other variables can affect this relation. Recent studies strengthen the argument that cannabis is a portion on the way over schizophrenia. Cannabis and drug usage at ages 15 and 18 yr increase the risk of schizophrenia with a 4-fold by age 26. Also as the dose increases the risk of psychosis. The greater the tendency to schizophrenia, very likely a self would have continued psychosis from these drugs.

		CSA		CPA		CSA or CPA		CSA and CPA	
	n	Female	Male	Female	Male	Female	Male	Female	Male
Freidman and Harrison[49]	20	12 (60%)	—	—	—	—	—	—	—
Goff et al[50]	61	—	—	—	—	10 (48%)	17 (42%)	—	—
Greenfield et al[15]	38	8 (42%)	3 (16%)	8 (42%)	9 (47%)	10 (53%)	10 (53%)	6 (32%)	2 (11%)
Ross et al[51]	81	8 (32%)	17 (30%)	8 (32%)	13 (23%)	12 (48%)	24 (43%)	4 (16%)	6 (11%)
Trojan[52]	96	12 (25%)	13 (27%)	—	—	—	—	—	—
Darves-Bornos et al[53]	89	30 (34%)	—	—	—	—	—	—	—
Miller and Finnerty[54]	44	16 (36%)	—	—	—	—	—	—	—
Goodman et al[55]	50	23 (78%)*	9 (45%)*	—	—	—	—	—	—
Lysaker et al[26]	52	—	18 (35%)	—	—	—	—	—	—
Friedman et al[2]	22	7 (78%)	0 (0%)	—	—	—	—	—	—
Holowka et al[56]	26	4 (57%)	9 (47%)	1 (17%)	4 (21%)	4 (47%)	10 (53%)	1 (17%)	3 (16%)
Offen et al[57]	26	5 (71%)	5 (26%)	—	—	—	—	—	—
Resnick et al[25]	47	14 (47%)	3 (18%)	—	—	—	—	—	—
Compton et al[14]	18	2 (100%)	5 (31%)	2 (100%)	12 (75%)	2 (100%)	12 (75%)	2 (100%)	5 (31%)
Lysaker et al[58]	37	—	14 (38%)	—	21 (57%)	—	23 (63%)	—	12 (32%)
Kilcommons and Morrison[59]	32	1 (14%)	3 (12%)	1 (14%)	8 (32%)	—	—	—	—
Schenkel et al[60]	40	7 (47%)	4 (16%)	7 (47%)	6 (24%)	8 (53%)	10 (40%)	6 (40%)	0 (0%)
Lysaker et al[61]	65	—	18 (28%)	—	—	—	—	—	—
Shafer et al[62]	30	11 (37%)	—	6 (20%)	—	12 (41%)	—	4 (13%)	—
Bowe et al[63]	22	5 (62%)	5 (36%)	6 (75%)	8 (57%)	6 (75%)	8 (57%)	5 (62%)	5 (36%)
Total		**165/389**	**126/446**	**39/113**	**81/211**	**64/127**	**114/226**	**28/106**	**33/186**
Weighted average (%)		**42**	**28**	**35**	**38**	**50**	**50**	**26**	**18**
Read et al[12] Weighted average (%)		**48**	**28**	**48**	**50**	**69**	**59**	**36**	**19**

Note: CSA, child sexual abuse; CPA child physical abuse.
*Mid-point of two measures.

(Adapted from Morgan and Fisher, 2007).

As shown in the table child who experienced sexual or physical abuse in his/her early ages have an increased tendency to develop schizophrenia. Sufferers with compassionate parents do all better than these with unkind individuals, that encounter added stress of their disapproving origins. For a patient with schizophrenia, stressful events can trigger his/her psychotic scenes which can even cause more serious things like hospitalization.

Conclusion

The exact cause of presence and development of schizophrenia is still unknown. Though none of them can be shown as an exact and single reason for schizophrenia there are several studies prove that some environmental and genetic factors that trigger symptoms of the disorder or increase the risk. As shown in the graph, the development of schizophrenia depends on the mixture of both environmental and genetic factors.

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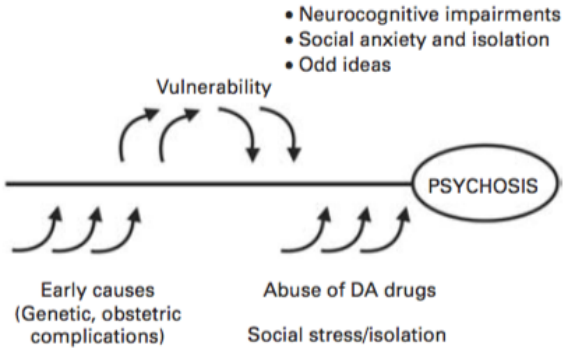
Category	Specific	Effect size
Genetic[a]	MZ twin	45
	DZ twin or sibling	5
Early environmental[b]	Obstetric complications	2
	Maternal infection	2
	City birth	1.4
	Late winter/spring birth	1.1
Late environmental[b]	Immigrant status	4
	Chronic cannabis abuse	2
	Adverse life events	1.5

[a] Relative risk; [b] Odds ratio.

(Adapted from Cannon and Clarke (2005).

(Adapted from Howes, McDonald, Cannon, Arseneault, Boydell and Murray, 2004)



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