

ID Design Press, Skopje, Republic of Macedonia
 Open Access Macedonian Journal of Medical Sciences. 2019 Aug 30; 7(16):2667-2670.
<https://doi.org/10.3889/oamjms.2019.399>
 eISSN: 1857-9655
Neuroscience, Neurology and Psychiatry



Schizoaffective Disorder That Is Induced By Electrical Voltage That Is Treated with Risperidone

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Abstract

Citation: Fadhilah I, Amin MM. Schizoaffective Disorder That Is Induced by Electrical Voltage That Is Treated with Risperidone. Open Access Maced J Med Sci. 2019 Aug 30; 7(16):2667-2670.
<https://doi.org/10.3889/oamjms.2019.399>

Keywords: Electrical injuries; Psychosis; PANSS; Risperidone

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Received: 11-Jun-2019; **Revised:** 13-Jul-2019;
Accepted: 14-Jul-2019; **Online first:** 28-Aug-2019

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Funding: This research did not receive any financial support

Competing Interests: The authors have declared that no competing interests exist

BACKGROUND: Electricity is a necessity for humans to carry out their daily activities, wherein modern times there are many human life support devices require electricity that makes humans depend on their existence, it cannot be denied that electricity is the energy needed by humans in everything that supports human activities, that increased injury due to electric shocks such as the cardiovascular system, nervous system, respiratory system, cutaneous injuries, burns, neurotransmitter system and death. Psychiatric disorders such as psychosis, mania, depression, post-traumatic stress disorder, conversion disorder, adjustment disorders and schizophrenia have been reported as diseases triggered by electrical injuries.

CASE REPORT: This study reports cases of electrical injuries that cause psychotic symptoms such as schizophrenia. After low voltage electrical injury. A 20 years old male, Malay, Indonesian, graduated from high school, worked, unmarried, a history of psychiatric disorders was not found, family history of experiencing the same disease was not found. Reported to have suffered an injury due to electricity twice the first injury occurred, and caused a change in behaviour and emotions, and the second injury caused obvious psychotic symptoms, aggressive behaviour and mood enhancement. A brief review of the literature on the occurrence of psychiatric disorders in these injuries is also presented.

CONCLUSION: Electrical injuries can cause sequelae such as psychotic disorders, the increased mood has occurred after an electrical injury in someone without prior mood disorders and personality. This is associated with circulatory hormone changes that occur in the hippocampus.

Introduction

Electricity is the flow of electrons (electrons are a negatively charged outer particle of an atom) which is delivered through a conductor. If an object that can collect electrons is negatively charged, and when electrons flow away from this object through a conductor, they create an electric current, which is measured in Amperes. The power that causes electrons to flow is voltage and measured in Volts. Anything that blocks the flow of electrons through a conductor creates an obstacle, measured in Ohms. Electrical injuries will occur when a person comes into contact with a current produced by a power source. This source can be either human-made (e.g., household electricity lines or industrial electricity) or natural, such as lightning. Most homes and buildings in the United States and Canada have 120/240 V, while the Lightning Voltage is more than 1,000,000 V

and can produce currents > 200,000 A [1].

Table 1: Pathophysiological effects of various intensities of electric current

Current Intensity	Probable Effect
1 mA	Tingling sensation; almost not perceptible
16 mA	Maximum current a person can grasp and "let go"
7-9 mA	"Let-go" current for an average man
6-8 mA	"Let-go" current for an average woman
3-5 mA	"Let-go" current for an average child
16-20 mA	Tetany of skeletal muscles
20-50 mA	Paralysis of respiratory muscles; respiratory arrest
50-100 mA	Threshold for ventricular fibrillation
>2 A	Asystole
15-30 A	Common household circuit breakers
240 A	Maximal intensity of household current (U.S.)

Quoted from: Koumbourlis AC. Electrical injuries. Crit Care Med. 2002 January; 30 (11): p. 424-430 [1].

At present, the use of electricity in households and the industrial sector is increasing which causes

the risk of injury from electric shock also increasing. Electrical injuries can directly affect many central and peripheral nervous systems and organs such as the cardiovascular system, nervous system, respiratory system, cutaneous injuries, burns, neurotransmitter system and death [1], [2], [3].

Electrical injuries can cause immediate neuropsychological disorders sequelae such as changes in orientation, anxiety, temporary emotional instability and memory disorders, resembling traumatic brain injury. Psychiatric disorders such as depression, post-traumatic stress disorder, disturbance conversion and impaired adjustment have been reported and are associated with high and low electrical stresses against electrical injuries. Among psychotic disorders, mania has been reported under the rubric of organic psychotic disorders. However, the organic or reactive properties of this disorder remain debatable. Schizophrenia has been reported, triggered by electrical injuries [3].

Case Report

A 20 years old male, Malay, Indonesian, graduated from high school, worked, unmarried, a history of psychiatric disorders was not found, family history of experiencing the same disease was not found. Come to the polyclinic of Mental Hospital, Prof. dr. M. Ildrem Medan with complaints of rampage, anxiety, increased motor activity was found, talked a lot, insomnia, heard voice of people talked other couldn't hear, feeling possessed of greatness/strength feeling possessed of strength that can heal a sick person, he also felt he had received a revelation from the Prophet Muhammad, he also felt that a sniper would shoot his brother. He had a feeling of being harmed, tortured and beaten by his brother in fact all that is not true, when people talk he also felt that they talked about him and he got angry and destroyed things, he often throws stones at his neighbour's house because he felt that his neighbours talked about and he also felt his thoughts were controlled by an external force.

This has been experienced by him for more than 1 month. Initially 3 months ago he was electrocuted while climbing a mango tree to pick the mangoes accidentally he held an electric cable which caused him to be electrocuted for about 5-10 seconds, and he fell from the tree, he was unconscious for 15 minute. after that he was rushed to the nearest health centre when he was conscious and with first-degree burns on his right hand, vomiting, headaches and no symptoms that showed an increase in intracranial pressure were found. After the examination and treatment of his wounds, he was advised to be treated as an outpatient, after that incident he often seemed daydreaming, alone and

occasionally frequent emotional upsets such as anger were before illness he was a cheerful young man, many friends, obedient and patient.

Two months later he was have electrocuted for the second time, he was watching the football match, and his favourite team was lost then he was angry, and he destroyed things, unexpectedly he ran and climbed the electricity pole and damaged the electrical installation which caused him to be electrocuted for a second the time for 5-10 minutes later he was taken in an unconscious state to the regional general hospital Dr R.M. Joelham Binjai, North Sumatra, Indonesia, After he regained consciousness he looked confused and for a moment he did not recognize his family. There is no vomiting, headache, or any symptoms that indicate an increase in intracranial pressure. After 14 days of treatment, he was declared by the doctor to have recovered and was able to have medical treatment at the polyclinic. After a few days at home, behavioural changes began to appear; he heard the voice of people who are talking that is not heard by others, he started to talk a lot, talk to himself, laughs alone, nervous. Then he went when to the outpatient clinic, he was recommended to be referred to a psychiatrist, but his family refused and want to try alternative medicine first.

After almost a month, underwent an alternative treatment with no changes in symptoms, and the symptoms became more severe, and finally, the family decided to look for treatment at the outpatient clinic of Prof. dr. M. Ildrem Mental Hospital Medan, North Sumatra, Indonesia. From the examination of mental status found a man's appearance, according to age, not neat, the impression of not being able to take care of themselves, not wearing footwear, physical health seemed healthy, psychomotor activity there were psychomotor agitation, attitude towards examiners was less cooperative. The flow of his conversation was fast, normal tone, normal productivity, the content of the conversation is irrelevant and stereotypic. The affect is irritable, dysphoric and elevated moods are encountered; other emotions is tension. Mind-form disorders commonly encountered are interrupted Reality Test Ability (RTA), psychosis, in which disorders of specific forms of mind are encountered tangentiality, clang associations, a flight of ideas. Disorders of the contents of the mind were found delusion of reference, persecutory delusion, the delusion of greatness, thought of control. In perception disorders, there were auditory and visual hallucinations. Sensorium compliments, place and time orientation disturbed, good personal orientation, disturbed concentration, disturbed calculation.

Immediate memory and long-term memory, are interrupted, short-term memory is fine. Concrete thinking was good; abstract thinking was disturbed. First degree insight, social judgment and personal disturbance. An MRI examination (Figure 1)

previously on this patient found no abnormalities. He was diagnosed with Organic Psychotic Disorders like Schizophrenia ' by the ICD-10 classification of mental and behavioural disorders. Moreover, the result of the positive and negative sign and symptom (PANSS) assessment was 44 for positive scale and 24 for the negative scale; general psychopathological scale was 67 with a total score was 135 (Table 1).

Table 1: PANSS score and pharmacotherapy follow up

PANSS	Day 1	Day 3	Day 6	Day 9	Day 12	Day 15	Day 18	Day 21	Day 24
Positive scale	44	42	38	31	20	18	15	11	9
Negative scale	24	23	21	19	17	14	12	10	8
General	67	65	59	47	30	26	23	20	18
Psikopatologi Scale									
PANSS Total Score	135	130	118	97	67	58	50	41	35
Risperidone dose	2 mg	3 mg	4 mg	5 mg	5 mg	5 mg	5 mg	5 mg	5 mg

Note: The third day of risperidone dose was raised to 3 mg because there was no decrease in PANSS score > 50%; -The sixth day of risperidone dose was raised to 4 mg because there was no decrease in PANSS score > 50%; -The ninth day of risperidone dose was raised to 5 mg because there was no decrease in PANSS score > 50%; -The twelfth day of risperidone dose was raised was maintained because there had been a decrease in PANSS score > 50%.

Patients were admitted to the hospital and treated with Risperidone 2 mg per day. Panss score was measured every 3 days. On the 24th day, patients were allowed to go home for medical treatment.

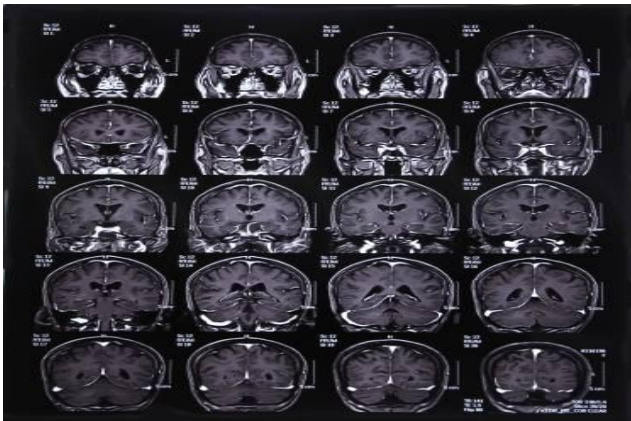


Figure 1: MRI results after a second electric injury, with no abnormalities found

Discussion

As a result of electrical injuries can cause sequelae, many similar findings of the late effects of two electrical injuries. However, the onset of symptoms sometimes occurs for days to years after an electrical injury, including changes in behavior and difficulties with verbal memory and attention, irritability, frustration, aggressive behavior, psychotic disorders, increased mood has been explained after an electric injury to a person without previous mood disorders and personality [3], [4]. The partial theory of the causes of injury has been suggested, however, there is no convincing explanation for sequelae arising from electrical injuries. A theory of cause and effect is

proposed that meets these two constraints. This theory suggests circulating hormones such as cortisol, together with nitric oxide and oxidant free radicals from hyper glutamatergic stimulation, work on tissues that are far from injury pathways including the hippocampus [5].

Risperidone has a high affinity for dopamine 2 (D2) and serotonin 2A (5-HT2A) receptors. Where it works to block dopamine 2 receptors so that it reduces positive symptoms and stabilizes affective symptoms and it also works to block serotonin 2A causing an increase in dopamine release in several brain regions and also reducing motor side effects and the possibility of improving cognitive and affective symptoms. Risperidone can correct positive, negative and affective symptoms in chronic psychotic patients [6], [7].

Risperidone also shows high affinity for adrenergic α_1 and α_2 -H1 histaminergic receptors, has a moderate affinity for serotonin 5-HT1C, 5-HT1D and 5-HT2A receptors and weak affinity for dopamine receptor D1. Risperidone has no affinity for cholinergic muscarinic receptors or β_1 and β_2 adrenergic receptors. Although risperidone has a high affinity for D2 receptors, it does not have a high potential drug level for extrapyramidal syndrome (EPS) such as First Generation Antipsychotic (FGA). This is most likely due to the promotion-dopamine effect of 5-HT2A antagonists. Risperidone blocks 65 percent of D2 receptors (the lowest percentage threshold for antipsychotic efficacy) at an average dose of 2 mg per day. At an average of 6 mg per day, 80 percent of D2 receptors are blocked, and EPS can occur. At a dose of 2 mg the effect of 5-HT2A may not be optimal [6].

Changes in psychotic symptoms begin to appear at 1 week of use but it takes several weeks to get the full effect on behavioral, cognitive and also affective stabilization. Usually it is recommended to wait around 4-6 weeks to get the efficacy of treatment. The dose for acute psychotic used is 2-8 mg/day/oral, the recommended initial dose is 1 mg/day/oral divided into 2 doses. The dose is increased by 1 mg/day/oral until an efficacy dose is reached. The maximum effect seen is usually at a dose of 4-8 mg/day/oral and the maximum dose is 16 mg/day/oral [6].

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