Too Much Gravity: Delusional Intensification of G Force

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Received: 22-Jun-2023, Manuscript No. JBTW-22-1035322; **Editor assigned:** 26-Jun-2023, PreQC No. JBTW-22-103532 (PQ); **Reviewed:** 10-Jul-2023, QC No. JBTW-22-103532; **Revised:** 17-Jul-2023, Manuscript No. JBTW-22-103532 (R); **Published:** 24-Jul-2023, DOI: 10.35248/2322-3308-12.4.002.

Abstract

Introduction: A misperception of intensified gravitational forces as a psychotropic effect has not heretofore been described.

Case presentation: A 37-year-old right-handed female with a history of hypertension, diabetes mellitus type 2, and schizoaffective disorder with bipolar subtype presented with presence hallucinations. For an epoch of 2 days, she experienced the sensation that something was "pressing down on her" and that gravity was too strong. She argued that gravity was too strong rather than feeling weak. The patient received carbamazepine 200 mg QHS, haloperidol 5 mg BID, baclofen 5 mg QHS, and chlorpromazine 50 mg PO BID at during the episode.

Results: Physical Examination: Diffuse thyroid enlargement. Neurological Examination: Mental Status Examination: The patient is awake with poor hygiene and eye contact. Hyperverbal, grandiose with expansive affect, poor insight, and judgment. Cranial Nerve (CN) examination: CN I: Alcohol Sniff Test: 8. CN II: Visual acuity with correction 20/20 OD, 20/25 OS. Motor Examination: Mild left pronator drift. Cerebellar Examination: Finger-to-nose dysmetria bilaterally. Reflexes: 3+ bilateral brachioradialis and biceps, 1+ left triceps, and absent reflexes in both lower extremities. Bilateral positive Hoffman's reflexes. The Patient Health Questionnaire 9: 7.

Discussion: The psychic slowing of schizoaffective disorder may lead to a more significant effort to contract muscles, thus reducing muscle contraction and strength, with an overwhelmingly pronounced perception of weight and gravity. Psychotropic medications may have acted to cause dysfunction in muscle initiation and preparation of muscle firing, causing a reduction of contraction of muscle spindles and reduced muscle tension, thus reducing weight perception. Peradventure, psychotropics may induce muscle stiffness, increasing weight perception.

Conclusion: Moreover, drug-induced Parkinson's symptoms have not induced weakness but rather a lag or delay between the motor command and muscle contraction, which was perceived as weakness and thus increased perception of gravitational force. Psychotropic drug evaluation would benefit those with a distorted perception of external objects and forces, especially those who do not complain of weakness or exhaustion.

Keywords: Delusional disorder • Schizoaffective disorder • Hallucination • Paranoia • Somatosensory • Psychopharmacology

Introduction

Physics defines gravity as mass × acceleration. The physical perception of gravity occurs through integrating a variety of somatic sensory and motor systems combined with visual input, expectation effect, and immediately preceding sensory experience. Gravitational force pulls downwards on the body, causing deformation of the Pacinian and Meissner corpuscles, present subcutaneously and in intra-articular spaces [1]. Rotational inertia may be the physical parameter to which these sensory receptors respond, interpreted as gravitational force. The resulting somatosensory discharges ascend through the posterior columns and anterior spinothalamic tracts through the ventral posterolateral nucleus of the thalamus and to the parietal lobes project when the perception of gravity is conceptualized [2]. The gravity's downward force on the body is particularly impacted upon mobile parts of the body.

Downward pressure on such joints forces the muscles to increase contraction, remain stable for standing, and counterbalance the low gravity. The continued discharge of the muscle leads to tiredness and fatigue, which also impacts the perception of weight. Thus, paradigms that enhance muscle fatigue and are associated with the induction of muscle strain can contribute to an enhanced perception of gravity and, by implication, perception of self-weight. For example, prior muscle contraction can lead to the development of fatigue and the formation of metabolites, which may act to sensitize the muscle to further downward forces and thus increase the perceived gravitational influence. On the other hand, recurrent muscle stimulation may cause enhanced muscle contracture strength and thus reduce the perception of gravity. Preloading also increases strength and thus further reduces the perception of gravity. Alternatively, prolonged preloading can lead to muscle fatigue and weakness, thus increasing the perception of gravity. The expectation effect can also determine perceived gravity as it occurs with other sensory phenomena, including smell and taste [3].

Furthermore, immediate activity before sensory gravity assessment will also affect people's perception of gravity by changing preconceived set points. Thus, fatigue will increase weight perception, a physiologic surrogate for gravitational force. Hence, weakness with reduced strength leads to an increase in the effort of muscle contraction. Such an increase in effort is associated with increased weight perception and, thus, increased gravitational pull assessment [4]. Thus, medications that facilitate acute muscle weakness can also be agents that coincidentally increase weight perception. On a top-down basis, motor strip discharge can project directly to the lateral corticospinal tract, anterior horn cells, and muscle, as well as to the sensory cortex, and impact the perception of exertional effort and, thus, the perception of gravity as measured by weight estimation. In this study, muscle fatigue reduced weight perception by 17 percent, most likely due to facilitated arm fatigue [5]. In the clinical setting, intensification of perception gravity is heretofore described and therefore such a case is presented.

Case Presentation

A 37-year-old right-handed female with a history of hypertension, diabetes mellitus type 2, Schizoaffective Disorder, Bipolar subtype with four past psychiatric admissions for depression with suicide attempts through overdose, presented with presence hallucinations, the perception that others were near her, even though she could not see or hear them. She believed a spirit would sometimes touch her and feel the energy all over her face "like powder. This energy around her lips would force her lips closed. The patient was paranoid and expressed that other patients were

not real but were "undercover investigators." She experienced frequent deja vu, feelings of unreality, and at times, the perception that her face had been transformed into a horse. At other times, when she would gaze at herself in the mirror, she would see not her face but rather the visage of an "old person". Moreover, at times she would feel as if the spirit of deceased relatives had possessed her, at which point she acquired their characteristic associated movement disorders. Independent of the above, she also had an epoch of 2 days, where she felt as if gravity was too intense and she had been pulled to the floor. She felt the presence of a force "pushing down on her." This was so intense that she had to lie down on the floor. She denied feeling weak but rather that gravity was too strong. She denied falls, loss of consciousness, change in vision, deja vu, paresthesias, or other neurological symptoms during the episode. This lasted for two days and then resolved later and has not recurred. During this event, the patient was taking haloperidol 5 mg BID, baclofen 5 mg QHS, carbamazepine 200 mg QHS and chlorpromazine 50 mg PO BID.

Results

Abnormalities in physical examination

General: Diffuse thyroid enlargement. Complete blood count, Liver function tests, Thyroid function tests, and Electrolytes-Normal.

Neurological examination

Cranial Nerve (CN) examination: *CN I*: Alcohol sniff test: 8 (Hyposmia).

CN II: Visual acuity with correction 20/20 OD, 20/25 OS.

Motor examination: Mild left pronator drift.

Cerebellar examination: Finger-to-nose dysmetria bilaterally.

Sensory examination: Rydel-Seiffer.

Vibratory sense evaluation: normal.

Reflexes: 3+ bilateral brachioradialis and biceps. 2+ right triceps, 1+ left triceps.

Absent reflexes in both lower extremities. Bilateral positive Hoffman's reflexes.

Other: Magnetic resonance imaging/magnetic resonance angiography of brain with infusion-Normal.

The mental status examination findings, as outlined in Table 1, and Neuropsychiatric testing results, as summarized in Table 2, highlight specific areas of concern.

Table 1: The findings of mental status examination.

Mental status examination
Awake with poor hygiene and eye contact
Oriented X3
Cooperative
Hyperverbal, grandiose with expansive affect
Poor insight and judgment
Able to remember 7 digits forward, 5 digits backward
Recalls 3 out of 4 objects in 3 minutes
Recalls all 4 objects with reinforcement
Able to spell "WORLD" forwards and backwards
Interpretation of similarities: normal
Proverb testing: correct abstraction
Calculation ability: normal

Table 2: The findings of neuropsychiatric testing.

Neuropsychiatric testing	
Semantic fluency testing: animal fluency test	18 (Normal)
Go-No-Go test	6/6 (Normal)
The patient health questionnaire	9:7 (Mild depression)
Centre for neurologic studies lability score	11 (Normal)
Michigan alcohol screening test	0 (Normal)

Discussion

The increased perception of gravity may have resulted from her underlying psychiatric disorder or medication effect or side effects. The psychic slowing of schizoaffective disorder may lead to a more significant effort to contract muscles, thus reducing muscle contraction and strength, overwhelming weight and gravity perceived to be greater [6]. Alternatively, in schizophrenia, there is a reduction in the orbitofrontal cortex and basal ganglia size, dysfunction of which may produce Parkinson-like symptoms even in the absence of neuroleptics, which could be misperceived as weakness and thus greater gravitational force [7]. The psychotropic medication may have acted to cause dysfunction in muscle initiation and preparation of muscle firing, causing a reduction of contraction of muscle spindles and reduced muscle tension, thus reducing weight perception [8]. Alternatively, the neuroleptics may have precipitated drug-induced parkinsonism with slowing movements which were misperceived as weakness have been noted in patients with schizoaffective disorder on aripiprazole [9]. Supporting the concept that drug-induced Parkinson's disease could precipitate the enhanced perception of gravity force is the observation that in drug-induced Parkinson's disease, perceived heaviness is associated with haptic dysfunction is commonly seen with postulated be due to dysfunction of cerebral-basal ganglia loop, and consistent with the concept of alteration of a threshold for the gravitational load [10]. Peradventure, psychotropics may induce muscle stiffness, increasing weight perception [11]. Alternatively, medication may have created drug-induced myopathy associated with muscle weakness-induced misperception of gravitational forces [12,13]. Alternatively, the neuroleptic-induced myopathy may have induced muscle rigidity and associated physiologic pathology and damaged the oxidative stress reaction and membrane changes [13]. Moreover, drug-induced Parkinson's symptoms have induced not weakness but rather a lag or delay between the motor command and muscle contraction, which was perceived as weakness and thus increased perception of gravitational force [14].

Conclusion

In conclusion, the heightened perception of gravity experienced by the individual could be attributed to altered muscle function, reduced muscle tension, drug-induced parkinsonism, haptic dysfunction, muscle stiffness, myopathy, and motor coordination issues. Such manifestations can lead to the misperception of weakness and an increased perception of gravitational force. Psychotropic drug evaluation would benefit those with a distorted perception of external objects and forces, especially those who do not complain of weakness or exhaustion.

Declarations

Ethics approval and consent to participate

The patient provided informed consent.

Consent for publication

Written informed consent was obtained from the patient to publish this case report.

Availability of data and material

Not applicable.

Competing interests

The authors declare that they have no competing interests.

Funding

Not Applicable.

Acknowledgments

Not Applicable.

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