

STUCK IN A MOMENT: TONIC IMMOBILITY PREDICTS POOR QUALITY OF LIFE IN TREATED PTSD PATIENTS

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SUMMARY

Background: Posttraumatic stress disorder (PTSD) is a prevalent and disabling multisystem disorder, with significant physical and psychiatric morbidity and poor quality of life (QOL). Although peritraumatic reactions - tonic immobility and dissociation - are established predictors of PTSD severity and development, there is a dearth of investigation assessing the impact of peritraumatic reactions on QOL of PTSD patients. Quality of life has become increasingly important in health care and research as a reliable outcome measure. It comprises psychological, physical, social and environmental domains, providing important information about the impact of diseases on patient's life. This study aims to investigate the impact of peritraumatic tonic immobility and peritraumatic dissociation on QOL of PTSD civilian outpatients.

Subjects and methods: It is a cross-sectional study of 50 victims of urban violence with current PTSD, recruited in a specialized outpatient clinic. Instruments used were: Structured Clinical Interview IV, Peritraumatic Dissociative Experiences Questionnaire, Tonic Immobility Scale and WHOQOL-BREF (psychological, physical, social and environmental domains). Linear regression models were fitted to evaluate the impact of peritraumatic reactions - tonic immobility and dissociation - on WHOQOL-BREF scores. We controlled for sex as potential confounding.

Results: The severity of peritraumatic tonic immobility negatively impacted on psychological and environment domains of quality of life. For each additional point on the Tonic Immobility Scale, there was a decreased of 0.8 points on the scores of these domains of WHOQOL-BREF. Neither the peritraumatic reactions showed effects on physical nor social domains. Possible limitations of this study include cross-sectional design, relatively small sample size of tertiary center outpatients and recall bias.

Conclusions: Peritraumatic tonic immobility is related to poor quality of life, adding new insights about the relationship between this immobility reaction and PTSD.

Key words: peritraumatic reactions – dissociation - tonic immobility - quality of life - post-traumatic stress disorder

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INTRODUCTION

Posttraumatic stress disorder (PTSD) is a prevalent, complex and debilitating multisystem disorder (McFarlane 2017, Yehuda et al. 2015) that is linked with several severe psychiatric (e.g., depression, anxiety, substance abuse/dependence and suicidality) (Brady et al. 2000) and medical comorbidities (e.g., cardiovascular and autoimmune diseases, musculoskeletal pain and gastrointestinal symptoms) (Pacella et al. 2013, Yehuda et al. 2015). PTSD is also associated with vocational, social and familial dysfunctions, and low levels of quality of life (QOL) (Balayan et al. 2014, McFarlane 2017, Nachar et al. 2013). Indeed, the overall disease burden - suffering, disability and premature mortality - related to PTSD is thus very high (Yehuda et al. 2015).

One of the strongest predictors of PTSD development are the peritraumatic reactions (Aho et al. 2017, Breh & Seidler 2007, Brewin et al. 2000, Ozer et al.

2003, Rocha-Rego et al. 2009). These are complex psychophysiological reactions experienced during or in the immediate aftermath of a traumatic event (Bovin & Marx 2011), including peritraumatic dissociation (PD) and tonic immobility (PTI).

Peritraumatic dissociation is characterized by a sense of unreality and alterations in perception of time, place, and person (Cardeña & Spiegel 1993, Marmar et al. 1998a). It is a well-established construct in the PTSD literature (Breh & Seidler 2007, Lensvelt-Mulders et al. 2008, Ozer et al. 2003, Velden & Witmann 2008) with considerable progress concerning its neurobiological correlates (Breh & Seidler 2007, Koenen et al. 2005). It has been shown to be a very important risk factor for PTSD (Breh & Seidler 2007, Ozer et al. 2003).

Peritraumatic tonic immobility is characterized by involuntary motor and vocal inhibition, analgesia and tremors with preserved awareness of the surroundings. This reaction is elicited in perceived inescapable, life-

threatening situations (Bracha 2004, Fusé et al. 2007, Galliano et al. 1993, Heidt et al. 2005, Marx et al. 2008). Although described in nonhuman animals for centuries (Maser & Gallup 1977), tonic immobility has received limited attention in humans. Recently, its biological relevance was confirmed by experimental studies (Mooren & Minnen 2014, Volchan et al. 2011). PTI is a predictor of PTSD development (Bovin et al. 2008, Heidt et al. 2005, Humphreys et al. 2010, Kalaf et al. 2015, Maia et al. 2015, Portugal et al. 2012, Rocha-Rego et al. 2009), symptom severity (Bovin et al. 2008, Humphreys et al. 2010, De Kleine et al. 2018, Maia et al. 2015, Portugal et al. 2012, Rocha-Rego et al. 2009) and poor therapeutic outcome (Fizman et al. 2008, Lima et al. 2010).

An important though relatively neglected clinical outcome measure is quality of life (QOL) (Mendlowicz & Stein 2000). It is a multidimensional construct that can be defined as “*an individual's perception of their position in life in the context of the culture and value system in which they live and in relation to their goals, expectations and standards and concerns. It is a broad ranging concept affected in a complex way by the person's physical health, psychological state, level of independence, social relationships, and their relationship to salient features of their environment*” (World Health Organization 1996). The construct of QOL comprises several domains, including the psychological, physical, social and environmental ones. Assessment of these domains may unveil the full impact of a disease on a patient's life (Mendlowicz & Stein 2000).

In fact, there is a dearth of holistic approaches that assess quality of life in PTSD patients reporting peritraumatic reactions. Only two studies explored the relationship between peritraumatic reactions and QOL and showed that PD predicts a poor QOL in traumatized immigrants (Hiar et al. 2016, Kounou et al. 2017). On the other hand, there are no studies investigating the association between peritraumatic tonic immobility and quality of life in PTSD patients.

The aim of the present study is to investigate the impact of peritraumatic dissociation and peritraumatic tonic immobility on quality of life of PTSD civilian outpatients. We hypothesize that both peritraumatic dissociation and tonic immobility would predict impairment in most areas of quality of life in PTSD patients.

SUBJECTS AND METHODS

Participants

It is a cross-sectional study of 50 victims of urban violence with current PTSD secondary to armed robbery (35%), kidnapping (24.5%), traffic accidents (12%), shooting (4%), sexual assault or rape (4%), and others (20.5%). The mean (SD) age was 40 years (SD = 8.2), 54% were men, 74% were married or living with partner and 62% had at least some college education (Table 1).

Table 1. PTSD patients with PTI and Dissociation: socio-demographic, peritraumatic reactions and quality of life characteristics

Variable	N	%
Sex		
Female	23	46.0
Male	27	54.0
Education		
Up to high school	19	38.0
At least some college	31	62.0
Marital status		
Single	8	16.0
Married/living with partner	37	74.0
Divorced/separated//widower	5	10.0
	Mean	Standard deviation
Age	40.0	8.2
Peritraumatic Tonic Immobility*	22.5	8.2
Peritraumatic Dissociation**	27.4	11.0
WHOQOL*** - physical	30.9	13.7
WHOQOL - psychological	31.8	18.6
WHOQOL - social	42.5	20.4
WHOQOL - environmental	41.7	15.9

* Range: 0-42; ** range: 0-55; *** range: 0-100

All participants signed an informed consent and were recruited from an outpatient university clinic specialized in posttraumatic stress. The study was approved by the Ethics Committee of the Institute of Psychiatry of Federal University of Rio de Janeiro, Brazil.

Instruments

Structured Clinical Interview for DSM-IV (SCID IV)

Patients were evaluated by an experienced clinician (MVM) using the Structured Clinical Interview for DSM-IV Axis I Disorders (Del-Ben et al. 2001) to confirm the diagnosis of PTSD and to determine the main psychiatric comorbidities. We excluded patients with psychotic disorders, severe personality disorders and dementia. All participants completed a self-reporting socio-demographic assessment elaborated by our group (Rocha-Rego et al. 2009).

WHO's Quality of Life Instrument - Short Version (WHOQOL-BREF)

To assess QOL, we used the self-reporting Brazilian-Portuguese version of the WHOQOL-BREF which comprises 26 items with four broad domains of QOL: psychological, physical health, social relationships, and environmental. All scores are scaled in a positive direction and range from 0 to 100 (Skevington 2002).

Peritraumatic Dissociative Experiences Questionnaire (PDEQ)

Peritraumatic dissociation (PD) was assessed through the Peritraumatic Dissociative Experiences Questionnaire (PDEQ) (Fizman et al. 2005, Marmar et al. 1998b).

This scale is composed of 10 items, each one presenting a 5-point Likert-type selection - ranging from 1 (not at all) to 5 (extremely) for the intensity of dissociative phenomenon during or immediately after trauma exposure.

Tonic Immobility Scale (TIS)

To assess peritraumatic tonic immobility (PTI), we employed a validated Brazilian version of the Tonic Immobility Scale (TIS) (Reichenheim et al. 2014). The original version of this self-report Likert scale has ten items, each one with a seven-point scale, and physical immobility and fear as two independent factors (Fusé et al. 2007). The Brazilian version of TIS has only one-factor, reduced number of items (from ten to six) and scores range from 0 to 36. The TIS scores were based on the worst experienced trauma (Reichenheim et al. 2014).

Statistical analysis

Firstly, we assessed the patients' characteristics according to sociodemographic variables and types of worst trauma. We also calculated the score means and respective standard deviations for the two types of peritraumatic reactions and the four domains of WHOQOL-BREF. Secondly, linear regression models were fitted to evaluate the impact of PTI and PD on the scores of WHOQOL-BREF. This analysis was carried out separately for each domain of QOL. As the exploratory analysis showed that sex was associated with peritraumatic reactions and QOL, we included it in all models to control for potential confounding. P-values ≤ 0.05 were considered statistically significant. All analysis were carried out in Stata 14.

RESULTS

Tonic immobility, but not dissociation, impacted on psychological and environmental domains of QOL.

For each additional point on the TIS, there was a decrease of 0.8 points on the scores of the psychological and environmental domains of WHOQOL-BREF. Neither the peritraumatic reactions showed effects on physical nor social domains of QOL (Table 2).

DISCUSSION

This is the first study to investigate the impact of peritraumatic tonic immobility (PTI) on quality of life (QOL). We found that PTI severity predicted poor QOL on the psychological and environmental domains in PTSD civilian outpatients.

Quality of life has become increasingly important in health care and research as a reliable outcome measure based on economic, health-related, and environmental parameters (Mendlowicz & Stein 2000, Pupo et al. 2015). It comprises "inside factors" like the symptoms severity, type of disorder, comorbidities and "outside factors" such as culture, social support, socioeconomic status, and medical care quality and accessibility (Sosnowski et al. 2017). Addressing QOL contributes to an accurate evaluation of mental illness that goes beyond patient's symptom profile and includes an individual perception of their own position in life (Mendlowicz & Stein 2000).

The mechanisms involved in the association between poor QOL and PTSD remain incompletely understood. Mounting research highlights PTSD as an often chronic and disabling condition, with significant physical and psychiatric morbidity and high personal, social and economic costs (Araújo et al. 2014, Pagotto et al. 2015, Sareen et al. 2007, Spitzer et al. 2009). Factors related to the individual (e.g., age, sex, coping strategies), PTSD (e.g., severity, comorbidities), the traumatic event (e.g., type, recurrence and magnitude), and peritraumatic reactions may impact on QOL (Bomyea et al. 2012).

Table 2. Crude and adjusted for sex association between peritraumatic reactions and domains of QoL- WHOQOL-BREF in PTSD patients

WHOQOL	Peritraumatic Tonic Immobility			Peritraumatic Dissociation		
	Coef	95% CI	P-value	Coef	95% CI	P-value
Physical						
Crude	-0.39	-0.87; 0.08	0.10	-0.16	-0.52; 0.20	0.38
Adjusted	-0.37	-1.00; 0.26	0.24	-0.001	-0.44; 0.43	1.00
Psychological						
Crude	-0.80	-1.42; -0.19	0.01	-0.37	-0.86; 0.11	0.13
Adjusted	-0.82	-1.65; 0.003	0.05	-0.05	-0.62; 0.51	0.85
Social						
Crude	-0.51	-1.22; 0.20	0.15	-0.17	-0.71; 0.37	0.54
Adjusted	-0.23	-1.16; 0.69	0.61	0.02	-0.62; 0.65	0.95
Environmental						
Crude	-0.98	-1.46; -0.49	<0.01	-0.44	-0.85; -0.04	0.03
Adjusted	-0.81	-1.45; -0.16	0.02	-0.08	-0.52; 0.36	0.72

Conceivably, the impact of peritraumatic tonic immobility on the QOL of PTSD patients could be mediated by direct and indirect mechanisms. PTI could impair QOL through a direct impact on mental health. For example, feelings of immobility and loss of control in response to situations of perceived life threat and overwhelming fear may lead to an intense peritraumatic distress with potentially devastating effects on mental health (Ozer et al. 2003, TeBockhorst et al. 2015.). Indirectly, PTI may be related to poor QOL through PTSD itself, since this peritraumatic reaction was found to be a clinical marker for PTSD severity and for worse treatment response and prognosis (Fizman et al. 2008, Kalaf et al. 2015, Lima et al. 2010, Maia et al. 2015, Portugal et al. 2012, Rocha-Rego et al. 2009).

According to the present study, PTI severity negatively impacts on the psychological domain of QOL - which evaluates how much a person experiences positive and negative feelings, thinking and self-esteem, including feelings of peace, happiness and hopefulness (WHOQOL Group 1994). Hypothetically, PTI could negatively impact on psychological QOL in several ways. First, a possible mechanism is the sensation of helplessness and horror triggered by the involuntary and uncontrollable reaction of immobility. Appraisals of low control may lead to negative emotions (e.g. pessimism, passivity), negative cognitions (about the self, about the world) and maladaptive coping strategies, contributing for posttraumatic psychological distress, psychopathology and poor mental well-being (Ehlers & Clark 2000, Skinner 1996). Indeed, Van Buren and Weierich (2015) found that peritraumatic perceived inescapability was positively associated with negative cognitions about the self and the world, avoidance/numbing symptoms, and PTSD severity in survivors of childhood sexual abuse. Further, as hypothesized by TeBockhorst et al. (2015), a “residual impact” of PTI may persist, keeping the horror and helplessness associated with this reaction.

Second, re-experiencing the immobility reaction triggered by trauma reminders (e.g. intrusive thoughts or flashbacks) and subsequent stressors (Hagenaars et al. 2008) may exacerbate the effects of PTI itself. De Kleine et al. (2018) demonstrated that re-experiencing tonic immobility fully mediated the association between PTI and PTSD symptoms severity. Re-experiencing PTI triggered by trauma reminders could even worsen feelings of loss of control and negative reappraisal - essential features of PTSD perpetuation (Ehlers & Clark 2000). Since trauma reminders can evoke PTI, the next revision of DSM could consider to include tonic immobility reaction in the B5 criteria inasmuch this is a “physical reactivity after exposure to traumatic reminders” (American Psychiatric Association 2013).

Finally, a third possible mechanism is that victims often feel guilty and ashamed by not having been able to react or scream, misinterpreting the PTI reaction as a personal weakness - mainly in victims of sexual trauma

(Marx et al. 2008, TeBockhorst et al. 2015). Also concerns about others` opinions about being sexually assaulted have a strong influence in coping and PTSD symptoms (Guay et al. 2006, Ullman 1999). If rape victims did not attempt to scape and show active struggling, they are more likely to be blamed, resulting in less emotional support and contributing to more maladaptive negative cognitions about themselves (decreased self-worth, hopelessness), negative cognitions about the world (judged as a dangerous and hostile place), and psychological distress (Ehlers & Clark 2000, Ozer et al. 2003). Hence, the presence and severity of posttraumatic negative cognitions have been assumed to be a risk factor for PTSD symptoms (Bomyea et al. 2012, Van Buren & Weierich 2015) and maybe, poor QOL.

Our second main finding was that PTI predicted low environmental QOL scores. This domain includes the person’s sense of independence, physical safety and security, the discernment of how his/her income is “enough” to obtain the needs and desires for a healthy and comfortable life style. It encompasses the ability to pursue one’s interests, housing, health and social care facilities and quality, recreation leisure activities and physical environment (WHOQOL Group 1994). Although the authors of QOL construct do not state this directly, we suggest that the environmental domain enquiry seems to be related to the concept of personal well-being and life satisfaction, since environmental domain englobes factors that lead people to subjectively experience their lives as worthwhile and rewarding (Diener et al. 2018). It could be hypothesized that environmental domain concept might be considered an umbrella term for an overall synthesis of QOL, in which individual’s general needs - like level of independence and subjective overall well-being and overall life satisfaction - are met. Thus, environment domain provides an “original contribution” to the assessment of overall QOL in health (Skevington & McCrate 2012).

The factors and circumstances that may affect quality of life in the environmental domain are still understudied. It has been shown that lack of support from family - and possibly from peers, organizations, the legal system, and the broader external experience environment - are associated with worse WHOQOL-BREF environmental domain scores (Wig et al. 2006). Family support may be an important resource of the immediate environment of the victim of traumatic events, providing not only material support but also a sense of safety, security and normality. In fact, most victims of rape and sexual violence tell friends and relatives about their assault and receive both positive and negative social reactions upon disclosure. The former, which includes listening to the victim and making him/her feel believed, is associated with fewer emotional and physical health problems (Campbell et al. 2001). In contrast, the latter, which encompasses what is known as the rape myth - prejudicial, stereotyped, or

false beliefs about rape, rape victims, and rapists, such as "any healthy woman can resist a rapist if she really wants to" – creates a climate that is hostile to rape victims (Burt 1980), fosters self-blame and stigma and exacerbates physical and psychological distress (Ullman 1999).

Police investigations of rape and other serious sexual offences usually take place in an organizational context shaped by masculine ethos, misogynist values and preconceived beliefs regarding this kind of crime. An attitude of suspiciousness regarding women's testimony tends to be pervasive in police processing of rape complaints. Serious bodily injuries are accepted by the police as an evidence that a rape has indeed occurred and are often considered as a *sine qua non* corroborative feature. The fact that many victims may fall into a state of immobility during the rape further undermines the credibility of the complainer and thus reinforces negative social reactions (Jordan 2004).

Historically, many courts adopted the "reasonable resistance requirement", which required that the victim must physically attempt to resist the attacker. The underlying assumption was that physical resistance amounted to an evidence of no consent. Only recently, courts came to acknowledge that physiological mechanisms can render rape victims immobile without implying in consent (MacKinnon 2016). Also, members of some occupational groups such as firefighters, soldiers and police officers can undergo administrative restrictions if they paralyze in response to traumatic on-the-job events (Ly et al. 2017, Maia et al. 2015, Marmar et al. 1994). Clearly, dissemination of research on tonic immobility for military and civilian justice system and the society at wide is essential for justice to be done for trauma victims.

Tonic immobility may be associated with compromised environmental quality of life in other contexts. Maia et al. (2015) remarked that "... Police work involves frequent exposure to high-risk situations that often require active response. For police officers facing imminently dangerous situations, such as shootings or high-speed pursuits, to experience tonic immobility could be physically and psychologically damaging. Furthermore, given the low level of public awareness regarding the existence of tonic immobility in humans, the lack of purposeful action in these contexts could be misinterpreted (and even stigmatized) as cowardice or another major moral flaw by the police officer or by third parties ..." (p. 52). Indeed, up to 14.3% of the police officers may experience a "freezing" reaction while facing particularly stressful events (Karlsson & Christianson 2003). Reprimand, gossip, humiliation, or even harassment or ostracism by fellow police officers may make the work environment unbearable (Hunt 1985). Similar sequences of events leading to comparable outcomes may take place with other high-risk occupations, such as military exposed to combat situations (Van der Hart et al. 2001) and rescuers facing life-threatening or fatal disasters (Leach 2004).

Our study could not find evidence of the impact of PTI neither on physical and social domains nor of peritraumatic dissociation (PD) on any domain of QOL. Only two previous studies reported an association between PD and impaired QOL (Hiar et al. 2016, Kounou et al. 2017). The divergence between ours and those studies findings could be explained by distinct sample characteristics and methodological issues. While our sample was a clinical one, theirs was composed by refugees affected by the Arab Spring (Hiar et al. 2016) and by the Ivory Coast sociopolitical crisis (Kounou et al. 2017). Our study has a cross-sectional design while theirs were a longitudinal one (Hiar et al. 2016, Kounou et al. 2017) and we used WHOQOL-BREF while Hiar et al. (2016) employed different instruments to assess quality of life.

Possible limitations of this study include cross-sectional design, relatively small sample size of tertiary center outpatients - increasing the probability of Berkson's bias (Berkson 1946), and recall bias.

CONCLUSIONS

Peritraumatic tonic immobility is related to poor quality of life, adding new insights about the relationship between this immobility reaction and PTSD outcomes.

Further research concerning the QOL, peritraumatic reactions and psychopathology is crucial. Longitudinal studies are necessary to investigate the main determinants of the relationship between quality of life and different variables: distinct types of traumatic events, peritraumatic reactions, PTSD development and severity and treatment response. Understanding these associations could inform the development of better assessment, prevention and treatment strategies, also providing the legal system with conceptual tools to handle cases related to interpersonal violence.

Contribution of individual authors:

Juliana Kalaf wrote the paper and interpreted and discussed the results.

Evandro Silva Freire Coutinho designed the study, analyzed the data, and interpreted and discussed the results.

Mauro Mendlowicz designed the study, wrote the paper, analyzed the data, and interpreted and discussed the results.

Carla Marques Portella, Eliane Volchan & Paula Rui Ventura designed the study and critically reviewed the manuscript.

Monique Nascimento Júdice, Sacha Alvarenga Flavio Blanco & Jéssica Meirelles Paiva performed the study and collected data.

Ivan Figueira designed the study, analyzed the data, and interpreted and discussed the results. Besides, he critically reviewed the manuscript.

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