Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.bja.2023.04.027.

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Torture mechanisms and chronic somatic pain in US refugees

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Editor—There are >100 million global refugees according to the United Nations, 44% of whom have experienced torture.[1] The USA is the highest recipient of asylum applications,[2] and healthcare providers there and in other resource-rich nations are increasingly likely to see refugee patients in their clinical practices. We previously found that 85% of torture survivors experience chronic somatic pain, such as brachial plexopathy from upper extremity suspension or lumbosacral plexus injury from leg hyperextension; however, this pain was most frequently misdiagnosed by providers as a manifestation of post-traumatic stress disorder (PTSD), major depressive disorder (MDD), or psychosomatisation.[3] Several gaps remain in our understanding of pain after torture, such as whether this pain accords with the mechanism of injury. Moreover, the long-term morbidity of torture-related somatic pain has not been characterised, and evidence-based treatments are lacking. We conducted an analysis of chronic somatic pain after torture to define the concordance of pain with mechanism of injury, and to identify prevalence and modalities of treatment for this pain.

This prospective cross-sectional study was approved by the Weill Cornell Medicine Institutional Review Board (protocol 1608017472). The protocol was conducted according to the Declaration of Helsinki. Eligible individuals were 18 yr or older; spoke English, French, Spanish, Arabic, or Punjabi; and had survived torture as defined by the World Medical Association (WMA) Declaration of Tokyo.[4] Participants were recruited consecutively between February 1, 2017 and November 5, 2019 from the Weill Cornell Center for Human Rights, one of the largest academic medical–legal human rights centres in the USA, which evaluates a globally representative population of refugees. Participants who had previously consented to being contacted for research purposes were called and scheduled for a study appointment by the research team. All participants provided written informed consent in their primary language. They represented a global population, with home countries in Africa, Central America, South Asia, the Caribbean, and the Middle East. Each participant received a noninvasive physical examination by a trained specialist pain physician with data recorded into Case Report Forms. No adverse events were reported by participants during their study participation.

Data were collected from 29 participants, 22 of whom experienced torture as defined by the WMA. These 22 participants

were included in the analysis. They were subjected to persecution or violence including political (7/22), gang (5/22), racial or ethnic (1/22), LGBTQ+ (3/22), or female genital mutilation/cutting (FGM/C; 6/22). Chronic pain was diagnosed in 91% (20/22) of participants on evaluation by a trained specialist pain physician. Some 65% (13/20) reported this pain as moderate or severe. In participants with chronic pain, the pain was consistent with the mechanism of trauma in 70% (14/20) of cases and possibly consistent with trauma in an additional four cases, for a maximal concordance of 90% (18/20) (Table 1). Of participants with pain, only two had received treatment by their healthcare provider, but with incomplete resolution of symptoms. A total of 50% (10/20) of participants with pain self-medicated with over-the-counter treatments. Some 64% (14/22) of participants had symptoms or met diagnostic criteria for PTSD (two participants), MDD (three participants), or both (nine participants).

We found that 91% of torture survivors experienced chronic somatic pain as diagnosed by a pain specialist evaluation, and that this pain was consistent or possibly consistent with mechanism of injury in 90% of cases. In the remaining cases, there was no definitive non-concordance with torture mechanism. Although 64% of study participants also experienced psychological sequelae from their torture, the concordance of the chronic somatic pain with the mechanism of injury indicates that somatic pain is a distinct diagnosis, possibly in addition to psychological diagnoses. Our data counter the clinical assumption that pain after torture is singularly an expression of psychological distress from PTSD, MDD, or somatisation. While the complexity of health issues in refugee patients results in diagnostic challenges, defaulting to psychosomatisation hinders provision of appropriate clinical treatments. These can include the addition of localised pain treatments, interventional pain treatments, or appropriate pain medications for refugee torture survivors with chronic pain. To this point, despite the true prevalence of pain in >90% of the study population, only two individuals were treated by their healthcare providers, and to incomplete resolution. Even in participants for whom pain was moderate to severe, the opportunity to treat debilitating pain was missed by trained healthcare providers. Pain was instead largely self-managed with over-the-counter medications.

Torture is often designed to inflict maximal physical and psychological injury while leaving minimal residual evidence of trauma.[5] For example, *falanga*, or beating of the soles of the feet, has been shown in multiple studies to cause compensated gait, dysesthesia, and allodynia; *ghotna*, or roller crushing of lower extremity muscles, has been shown to cause pain on ambulation and severe quadriceps and adductor muscle pain; suspension by the upper extremities, particularly by the wrists in the reverse position described as *strappado*, can result in brachial plexus injury, neuropathic pain, and complex regional pain syndrome. Yet none of these torture mechanisms leaves a definitive or obvious physical trace.[6,7] In fact, they were designed in part to evade subsequent detection by authorities.[8] A 2016 systematic review described that this absence of physical evidence of torture contributes to the misdiagnosis of chronic somatic torture-related pain by healthcare providers as exclusively psychological or psychosomatic in nature.[9]

Although this study is limited by a modest sample size, with 22 participants it is one of the largest studies of torture pain in US refugees. The data here indicate that a better evidence-based standard of care for chronic somatic pain diagnosis and treatment must be established for torture survivors through dedicated research. The expertise of clinicians who specialise in the health of forcibly displaced people, pain management, complex trauma, or mental health should be incorporated. Rehabilitation is achievable in refugees and results in improved societal integration and health status,

Table 1 Concordance of chronic pain and mechanism of injury, and current pain medications taken. c/w, consistent with; FGM/C, female genital mutilation/cutting; N, no evidence of concordance; OTC, over-the-counter; P, possible; TMJ, temporomandibular joint; Y, yes. One additional participant who did not experience chronic pain took ibuprofen for occasional headaches.

	Mechanism of trauma	Pain symptom	Pain c/w injury	Medication
1	Beating; burned	Myofascial; cervical; thoracic pain	Y	'Pain pills'/name unsure
2	Beating; assault with object; knifing	Abdominal pain; costochondral pain	P	None
3	Beating; stabbing	Myofascial pain	Y	None
4	Beating; burned; FGM/C; rape	Vaginal pain; urethral pain	Y	Ibuprofen; paracetamol
5	Beating; assault with electrical wire; waterboarding	Joint pain; myofascial pain	Y	OTC pills/name unsure
6	Beating; FGM/C	Intermittent low back pain; scar pain	Y	Ibuprofen; paracetamol
7	Beating; choking; rape	Thoracic spine pain; myofascial pain	Y	None
8	Beating; assault; rape; FGM/C	Pelvic pain; menstrual pain	Y	None
9	Beating; choking	Myofascial pain	P	None
10	Beating; assault	Myofascial; low back pain	P	Naproxen
11	Beating; assault	Coccyx pain; TMJ pain; bone pain	Y	Ibuprofen; paracetamol
12	FGM/C	Pelvic; myofascial; neuropathic pain	P	Ibuprofen
13	Shooting	Bone pain at gunshot site	Y	None
14	Beating; sexual assault; rape	Headaches	N	None
15	Assault; knifing; rape; FGM/C	Dyspareunia; left lower quadrant pain	Y	Ibuprofen
16	Beating; rape	Abdominal pain; myofascial pain	Y	Unsure
17	Beating; suffocation; waterboarding	Costochondral pain; headache	Y	None
18	Beating; assault	Sacroiliac joint pain	Y	Naproxen
19	Upper extremity suspension; electric shock; sodomy; rape, *telefono*	Joint pain; musculoskeletal; neuropathic pain	N	Paracetamol
20	FGM/C	Vaginal pain; lumbar radiculopathy	Y	None

increased productivity and contribution to gross domestic product, reduced risk of substance abuse, and the use of preventative rather than costly emergency medical care.[3] As forced displacement drives record numbers of people across borders, healthcare providers in resource-rich countries will be equipped to provide these patients appropriate care only if our understanding of the pathophysiology of disease, methods of accurate pain diagnosis, and treatment options is improved.

Declaration of interest

HCH is editor-in-chief and KAP is a member of the associate editorial board of the *British Journal of Anaesthesia*. All other authors declare that they have no conflicts of interest.

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From pain intensity to a holistic composite measure for spinal cord stimulation outcomes

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