

## Belief and brain

In this issue of the JNRP, clinical researchers from the Himalayan kingdom of Nepal present the analysis of etiological belief system in patients with neurological disorders attending a tertiary medical center.<sup>[1]</sup> The results were not entirely unexpected. Only one in five patients were aware about the possible cause of their illness; half of these patients expressed the view that they had little or no idea about their neurological diagnosis and nearly 60% had approached the traditional healers to seek help regardless of their educational background.<sup>[1]</sup> The authors correctly emphasized the need for patient education by their treating physicians, but it remains an open question if belief system can be changed and treatment adherence may be improved by physicians educating their patients. Nearly a third of the western population may be seeking relief of their symptoms in complimentary and alternative medicine, and this is not because of lack of medical information or poor patient education.

Nearly two decades ago, I undertook a field study of anti-epileptic drug compliance in adult patients with epilepsy residing within a pre-defined geographic area of a large Indian metropolis. Over half (54%) of the patients I had interviewed on a door-to-door survey were non-compliant based on the operational definition used in the study (taking at least two-thirds of the recommended dose of anti-epileptic drugs, confirmed by therapeutic plasma levels). There was no significant difference between the compliant and non-compliant groups in terms of the prescribed medicine, the cost of therapy, frequency of drug administration, level of education, or religious belief. Lack of timely medical supervision was a risk factor to promote non-compliance, something that may be amenable to improved access to clinical service and patient education, but an equally important and probably stronger factor was the belief system – patients who were not adhering to their

treatment were more complacent and felt significantly less concerned about the effect of seizures. There was, however, no difference in seizure frequency and control of epilepsy between compliant and non-compliant patient groups.<sup>[2]</sup>

I consider epilepsy to be a good indicator of belief system in the population because it is a relatively common and chronic condition and has been historically associated with social stigma in all parts of the world. A study from Tanzania showed that traditional healing methods and religious prayers played an important role in people's belief regarding treatment success in epilepsy.<sup>[3]</sup> In the presented paper<sup>[1]</sup>, belief system in patients with epilepsy were comparable to some other neurological disorders and over half the patients attributed the disease to destiny or a combination of chance and witchcraft. The belief of patients in attributing the cause of their neurological illnesses beyond the power of medical science is probably the strongest motivation for seeking engagement with the faith healers and religious practitioners in the hope of a "cure."

But does belief system influence symptom control in neurological diseases? This is an important question because with few exceptions, western medicine in chronic neurological disorders such as epilepsy aims to achieve control of symptoms rather than promising a cure. In a recent study, it was found that religious believers were able to contain their pain perception probably by emotionally dissociating themselves from the experience and this was associated with preferential activation of non-dominant (right) ventrolateral prefrontal cortex (VLPFC) in the functional magnetic resonance imaging (fMRI).<sup>[4]</sup> It was, however, unclear how VLPFC activation directly reduced pain perception in religious believers. On the other hand, engagement of right ventromedial prefrontal cortex (VMPFC) was seen in the fMRI of subjects generating responses based on their belief biases in a logical reasoning analysis study.<sup>[5]</sup> Using fMRI, the authors found activation of bilateral parietal lobe in belief-neutral reasoning and left temporal lobe in belief-based reasoning; the fMRI activation of right VMPFC was only seen when the logical reasoning was overcome by belief bias. The observation indicated that belief-bias system in human brain can modulate

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the emotive effects sufficiently to override cognitive influence in reasoning.

From a patient's point of view, the perceived cause of a neurological disease could be understood by deductive reasoning from the physician-supported education program, but a belief-biased system may still override the logic of medical explanation. This probably explains why treatment compliance is so variable in chronic neurological disorders. We, however, do not know if such a belief bias is necessarily harmful and worsens the natural history of the brain disease beyond the risk of poor treatment adherence. Belief system certainly enhances analgesia and explains the large placebo effect of medical treatment. The right brain dominates in the belief-bias system, and the neural network of non-dominant ventral prefrontal cortex of human brain integrates the neurological function that forms the basis of self-awareness.

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