Original Article

Infrequent near death experiences in severe brain injury survivors - A quantitative and qualitative study

Yongmei Hou, Qin Huang[1], Ravi Prakash[2], Suprakash Chaudhury[2]

Department of Psychology, Guangdong Medical College, 2 Wenming East Road, Xiashan District, ZhanJiang, Guangdong, [1]Department of Neurosurgery, Guangdong 999 Brain Hospital, Guangzhou, China, [2]Ranchi Institute of Neuropsychiatry and Allied Sciences, Kanke, Ranchi, India

Abstract

Background: Near death experiences (NDE) are receiving increasing attention by the scientific community because not only do they provide a glimpse of the complexity of the mind-brain interactions in 'near-death' circumstances but also because they have significant and long lasting effects on various psychological aspects of the survivors. The over-all incidence-reports of NDEs in literature have varied widely from a modest Figure of 10% to around 35%, even up to an incredible Figure of 72% in persons who have faced close brush with death. Somewhat similar to this range of difference in incidences are the differences prevalent in the opinions that theorists and researchers harbor around the world for explaining this phenomena. None the less, objective evidences have supported physiological theories the most. A wide range of physiological processes have been targeted for explaining NDEs. These include cerebral anoxia, chemical alterations like hypercapnia, presence of endorphins, ketamine, and serotonin, or abnormal activity of the temporal lobe or the limbic system. In spite of the fact that the physiological theories of NDEs have revolved around the derangements in brain, no study till date has taken up the task of evaluating the experiences of near-death in patients where specific injury has been to brain. Most of them have evaluated NDEs in cardiac-arrest patients. Post-traumatic coma is one such state regarding which the literature seriously lacks any information related to NDEs. Patients recollecting any memory of their post-traumatic coma are valuable assets for NDE researchers and needs special attention. **Materials and Methods:** Our present study was aimed at collecting this valuable information from survivors of severe head injury after a prolonged coma. The study was conducted in the head injury department of Guangdong 999 Brain hospital, Guangzhou, China. Patients included in the study were the ones Recovered from the posttraumatic coma following a severe head injury. A total of 86 patients were chosen. Near death experience scale (NDES) score of 7 or more was used as the criteria of screening NDE experiences. After identifying such individuals, the Prakash-modification of the Interpretative Phenomenological Analysis (IPA) was used to interview and record the data for qualitative analysis. **Results:** We found that contrary to earlier incidence reports, NDEs in post head injury patients were markedly low. Only 3 out of 86 of the patients recruited had a clear and confident experience of NDE. We conducted a qualitative study to explore further into these experiences. IPA of these 3 patients revealed four master themes: 1. Unique light visions 2. Intense feelings of astonishment, pleasure, and fear 3. The sense of helplessness 4. Supernatural but rationality of experience. **Conclusion:** NDE is uncommon in head-injury cases as compared to other near-death conditions. But the persons experiencing it have immense impacts on their belief systems and emotions. This experience should be further explored by studies of larger samples.

Key Words

Near- death experiences, post- traumatic coma, qualitative analysis

For correspondence:

Dr. Ravi Prakash, Senior Resident, Ranchi Institute of Neuropsychiatry and Allied Sciences, Kanke, PIN: 834006, Ranchi, India.
E-mail: drravi2121@gmail.com

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Introduction

Near death experiences (NDE) are receiving increasing attention by the scientific community because not only do they provide a glimpse of the complexity of the mind-brain interactions in 'near-death' circumstances but also because survivors with NDEs have profound and lasting changes in their beliefs, attitudes towards life, and emotional states.[1-3] The over-all incidence of near-death experiences in literature have varied widely from a modest Figure of 10%[4] to around 35%,[5,6] even up to an incredible Figure of 72% in persons who have faced close brush with death.[7] However, these studies have been mostly retrospective in designs,[5,7] so statistically, these incidence reports cannot be considered scientific. In this regard, there has been a prospective study of NDE in coma patients in elderly group of patients by Yamamura,[8] which found an incidence of NDE in 37% of survivors of coma due to various etiology.

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Somewhat similar to this range of difference in incidences are the differences prevalent in the opinions that theorists and researchers harbor around the world for explaining this phenomena. Overall, most abundant theories among these perspectives have been the physiological. Although no theory to-date has been able to even reach near providing a complete explanation of NDE, a wide range of physiological processes have been targeted for this purpose. These include cerebral anoxia,[9-12] chemical alterations like hypercapnia,[10,13] presence of endorphins,[10,14] ketamine,[15] and serotonin,[16] or abnormal activity of the temporal lobe[12,17-21] or the limbic system.[22,23] The main reason for this abundance of biologically-oriented theories seems to be the ease with which biological derangements can be measured in brain. In spite of the fact that these physiological theories are numerous, but there have been several criticisms of these biologically-based theories as well.[24-26] At best, these physiological findings can be best stated as correlates of NDE rather than its causative biological underpinning. It was for this reason that we tried to incorporate into our study a design, which could be able to tap the biological as well as the subjective essence of NDEs. Thus, on one hand, where we are studying this phenomena in brain injury patients, we are also trying to take into account the subjective experiences by the qualitative methodology for evaluating their experiences. In spite of the fact that the physiological theories of NDEs have been mostly linked to the derangements in brain,[27,28] no study till date has taken up the task of evaluating the experiences of near-death in patients where specific injury has been to brain. Most of them have evaluated NDEs in cardiac-arrest patients.[13,29] Post-traumatic coma is one such state regarding which the literature seriously lacks any information related to NDEs. In our opinion, patients recollecting any memory of their post-traumatic coma are valuable assets for NDE researchers and need to be tapped by more sophisticated scientific tools for the purpose of enhancing our understanding of NDEs. Present study was aimed at collecting this valuable information from survivors of severe head injury after a prolonged coma.

Materials and Methods

The study was conducted in the head injury department of Guangdong 999 Brain hospital, Guangzhou, China. Patients recruited for the study were the ones recovered from the post-traumatic coma following a severe head injury. The patients were selected after screening the case record files of the head injury department of the hospital. The recruited patients were both the ones admitted at present and the patients who had come for follow-ups after being discharged from the hospital.

Inclusion criteria

1. Age: 18-45 years
2. Patients giving written informed consent
3. Patients fulfilling the below-mentioned criteria for severe brain injury

For defining severity of brain injury, following criteria were used:

1. GCS score<8 at the time of admission. The GCS score is the most prevalent method of classifying the severity of the head injury, and a score of<8 has been considered as severe in most of the studies
2. Duration of post-traumatic coma >72 hrs. The duration of post-traumatic coma was included not only because it is reliable indicator of severity of head injury but also because it has been correlated with fatality; therefore, more purposeful for our present study as a state of near-death. There have been several studies, which reported a high correlation of incidence of death and duration of post traumatic coma.[30,31] A Figure of 72 hrs was chosen because most of the patients with a longer duration of coma had either died at the time of study or could not be contacted.
3. Duration of post-traumatic amnesia >7 days. This criterion was adapted from Tate *et al.* 2000 where a PTA score of >7 days was indicator of very severe injury.[32] Our study definition of PTA was adapted from the Guangdong 999 brain hospital criterion as –'regaining of continuous memory of day-to-day activities.'[33] This criterion was included in spite of the pervious findings of van Lommel[34] that severe memory deficits lead to fewer reportings of NDEs. The reason for this criterion was that it is a well-known fact that length and depth of post head injury coma (nearness of death in present study) is directly proportional to the severity of head injury. Secondly, we are just at the elementary stage of evaluating NDEs, thus any finding that we get should be as authentic as it can get.

Inclusion criteria

All the patients were recruited after >14 days of regaining of consciousness for eliminating the memory problems secondary to PTA.

Exclusion criteria

1. MMSE scores <24 at the time of study
2. Present GCS <15 at the time of study
3. Presence of PTA at the time of study
4. Patients not giving written informed consent

The study was approved by the ethical and hospital research committees of the Guangdong 999 Brain Hospital.

Assessment

All patients underwent a screening interview followed by evaluation on near-death experience scale (NDES). The interview consisted of few open-ended questions to explore the memories of the patient after he lost awareness during the trauma until regaining of awareness during/after the treatment.

Results

A total of 86 patients (52 males and 34 females) were interviewed and assessed by NDE scale. Of them, only 7 (5 males and 2 females) reported of having any memories of the period after losing awareness in the accident. On the NDE scale, only these 7 individuals could provide some scores; four of which, however, were having <7, which has been considered cutoff for having NDEs. However, only 3 (2 males and 1 female) of them were clear and confident about their experiences and had the NDE scale score >7.

Qualitative analysis of the near-death experiences

The 3 patients who were very clear about that they experienced

the NDE were subsequently assessed by interpretative phenomenological analysis (IPA). IPA has been used several times for obtaining the subjective picture of different conditions, but only once has it been used to study any state of consciousness.[35] This was the technique used to elaborate the richness of the Inner light perception experience of Vihangam Yogis. The same technique as modified by Prakash *et al.* [35] was used as a method of qualitative data collection in present experiment. Considering NDE as a unique state of consciousness, IPA was used to get a detailed picture of subjective experiences of the individuals during these experiences.

This method was considered ideal because of its ability to tap the essence of the subjective experience and to analyze these experiences by interpretation of the story told by an individual in his own words. It is a unique qualitative method, founded on the principles of *critical realism*[36] and the *social cognition paradigm*.[37] *Critical realism* is based on the premise that there are states of reality, which are independent of human conceptualization and which can be given different meanings by different individuals. *The social cognition paradigm* underscores the importance of the abilities of speech and behavior in reflecting these differences in meanings directly or indirectly. As evident, this method underscores the importance phenomenology as an important methodology of science. Phenomenology was first described as an important way of exploring the world by Edmund Husserl in 1936.[38] He believed that the core meanings of entities in the world can be understood by intuition. This method also has the advantage that the information obtained is derived from the first-hand accounts of the experiential aspects of an individual, without being contaminating by the investigator's concepts or biases about the topic. This was a matter of grave concern for our study, specifically because of so many presumptions about the NDEs, which we did not want to create biases with our data collection.

Data collection-interview

Interviewing was the mode of data collection. The interview was recorded using a voice recorder [Figures 1 and 2]. The interview used was a semi-structured one, each starting with the same open question: 'Can you describe the experiences/memories that you just mentioned earlier to the question (item of NDES)?' The interviewees were allowed to speak as much as they wanted at a stretch. Further statements/questions were prompted in two circumstances. Leads of questions were taken from the questions of NDES on which the individual had responded:

1. When the interviewees wanted some clarification regarding the questions being asked.
2. When the interviewer wanted some clarification about the statements made by them.

These questions were non-leading, and no options were provided. They usually had the following framework:

'We were unable to follow you when you mentioned / said that "…."

Can you explain the topic a bit more so that we can understand your statements better?'

Techniques for improving communicability during the interview: Although all the three individuals were very spontaneous regarding expression of their experiences, but as the topic of discussion was very unusual and at times statements were emotionally-laden, special additional considerations were made for enhancing the empathic bonding between the interviewer and interviewee:

Mostly, head nodding was used as a non-verbal affirmation along with low-pitched sounds (mmmmhmmm, yes, ok, that's interesting.etc.) for the statements made by the patients to facilitate the flow of speech of the interviewee.

Encouraging statements like 'Please proceed, you are describing nicely,' 'Thank you very much for that great description' were used occasionally at places where the individual was found fumbling or at loss of words for describing his experiences.

Non-judgmental and neutral answers were provided to the patients whenever they asked for the interviewers views about supernatural elements like God, spirits, after-death life, and so on. Interviewers mostly answered by statements like "I really

Figure 1: Patient fulfilling GCS<8 criteria (at the time of admission) being interviewed for NDE experience by the qualitative methodology

Figure 2: Patient fulfilling the PTA>7 criteria of inclusion being interviewed for NDE experience by the qualitative methodology

don't know about that you know, so I really cannot give you an answer in favor or against your belief," "It is really very difficult to answer your question at this point of time, maybe I could speak more after we have acquired enough data," or "We are still searching for answers to these questions."

The length of the interviews ranged from 60 minutes to 120 minutes. Each interview was audio-taped and subsequently fully transcribed by the researcher.

The occasional questions were put by researchers so as to cover the following areas in the descriptions:

a. Description of the experiences of near-death state.
b. Individual interpretations of the state.
c. Impact of the near-death experience on the individuals.

Analysis of data

The analysis was performed with the 'idiographic approach,' one of the original two outlined by.[39] This method involved a detailed initial analysis of a single interview transcript prior to analyzing the others. During this initial stage, any issues and ideas emerging from the transcript, understood by the individual researcher as important from the viewpoint of study, were recorded in the left-hand margin. The transcript was reread a number of times, and existing ideas and concepts were given more abstract keywords that were recorded in the right-hand column and provided a synopsis of the text.

Examination of this one interview provided a list of preliminary themes. Subsequently, the remaining two transcripts were examined keeping these themes in mind, using the same procedure in which the researcher continued to search for descriptions with meanings of existing themes but also identified novel emergent themes. Using this method, a list of themes for each interview was produced, together with transcript extracts that supported and illustrated them. The list of themes (and corresponding transcript extracts) for each interview were read together to identify connecting themes and parallels between the interviews. Once the preliminary themes that pervaded the interviews (i.e. common themes across the interviews) had been established, several were grouped together based on their conceptual similarity, allowing master, and subordinate themes to be identified.

The transcript extracts that had been paired with the preliminary themes were reread, and instances that supported the master and subordinate themes were assigned accordingly. Each transcript was then reread to ensure that the final master and subordinate themes were characteristic of the original material. This was all done in accord with the description of interpretative phenomenological analysis method originally described by[39] along with guidance taken from other studies, which have used this method so far.

Results

Master themes and subthemes

From the interviews, four master themes emerged:

1. Unique light visions
2. Intense feelings of astonishment, pleasure, and fear
3. The sense of helplessness
4. Supernatural but rationality of experience

In addition, a fifth master theme was frequent observation in all the three meditators transcripts:

5. Individual differences in the opinions regarding death. However, because this theme is only tangentially related to the present topic, we will just present a summary of this master theme.

As the details of these master themes and subthemes are out of the scope of present article, we present a brief description of them:

Unique light visions

The interviews of all the three individuals were rich in the descriptions of light visions. The uniqueness of the light visions can be described under three subthemes:

a. *Unique Figures of light:* A striking similarity of the descriptions of all the three individuals was that all of them tried to convey that their visions had some unique Figures made up of light. Two of the survivors were not sure of the exact structure but were of the opinion that the structure was non-human. One of them reported it to be a form-changing creature, which could smoothly flow from one 3-dimensional geometrical structure in to another. Other survivor recollected a structure made up of many animals. However, one of them gave the description of a human Figure, but the identity could not be specified. Even the gender of the individual could not be recollected by her. She was sure that the person was one of his deceased family member because of the attachment that she felt with her (described below in the next subtheme), but the Figure was so enormously large that she could not exactly indentify it.
b. *Unique interactions with the light structure:* Out of the three, two individuals were sure that the structure had some message to convey to them and for conveying this message, they interacted with the subjects in a unique way. The one seeing the unique 3-D structure could not make out any interaction or message with the light but perceived a relative movement with it (described below). The subject who saw a structure of many animals said that he was very scared by the animal was looking at him, which reminded him of the wrong deeds that he had done in his whole life. Although the structure did not move, but it was sending some light rays that pierced his chest region and created huge waves of negative feelings like fear, sadness, and anger in him. He could also hear loud sounds but were like having large bass and no sound. The woman who saw a human reported that the enormously big Figure touched her in forehead, but it was not like skin touch but like a breeze. She could feel the cool and peaceful sensation over her whole body. She felt that the Figure was attracting her towards her.
c. *Unique relative movement of the individual with the light-Figure:* This subtheme was difficult to delineate not only because it was very intermingled with other subthemes but also because it was given by only one of the individuals. He gave a detailed description of how he moved towards the 3-D structure by flying, but the structure continued to move away as it flowed from one structure into other. Subsequently, when he (the individual) stopped, the structure started to move towards him and as it did so, its size went on increasing incredibly so that finally it covered the whole back ground and there was nothing else, except for itself. The light finally engulfed the individual also, after which he could not remember anything.

Intense feelings of astonishment, fear, and pleasure

This theme constituted of two subthemes: 1) Experience of the feeling 2) Impact of the feeling on everyday thinking. However, we are not elaborating the second subtheme because of its details are out of scope here. All the three of them expressed their intense feelings of astonishment when they had their first encounter, followed by intense fear (in the case of multiple-animal Figure encounter) and pleasure (in the case of human Figure encounter). The feeling was reportedly so overwhelming that they could not find words to express it.

Sense of helplessness

A constant theme in all the transcripts was a sense of extreme helplessness that the individuals faced during their strange experiences. All of them expressed that they were out of their control in facing this situation, that they were compelled to have this experience and that they were completely helpless in getting out of the situation. One of them reported that he felt as if he was 'caught in the body and was not pulled out but felt like being pushed into his own body, after which he started having the unique experiences of some strange world. Still other reported that even though he was feeling extreme fear while facing the dreadful creature, he could not resist it and felt as if some power had caught hold of his leg so that he could not move even a bit. The version of the third subject was, however, a bit different. She felt as if she had become slave of her own emotions and could not think of anything else other than the peace that she was experiencing there. But after sometime, in spite of the ecstatic feeling, she was pulled vigorously by some invisible force and forced back to this world.

Supernatural but logical experience

Two of the individuals stated that although the experiences were strange and supernatural but were rational and meaningful. The subject who had a human-figure vision was very sure that her (?) deceased relative wanted to say something to her about the importance of spiritual activities for after-death lives. On the other hand, the subject with dreadful-figure experience was sure that through this experience, he was being warned about stopping his unethical works or else he will face worse consequences. However, the third individual having the strange 3-D light Figure experience could not make out any sense of his experiences, and was of the opinion that his experience just showed him a glimpse of the after-life world.

Individual differences in opinions about death

In addition to above-mentioned subthemes, the patients often tended to digress from the question asked and would often start presenting their own views regarding the event of death itself. All the three of them had a different opinion about death, which they attributed to their own near-death experience they had. As this theme is not directly related to present study, we just present their verbatim here:

The lady who had the human-figure experience stated that: "I now firmly believe that death is nothing but a transition of consciousness. Earlier I used to think that death is…….you know…..the end of the life. But actually it is just…a sort of break, or say a change of life. Yes. It's a mere change and not the end. But the change is a very significant one….You have to see it to believe it."

The second subject who had the 3-D light experience on the other hand opined that death is the end of material life: "You know, the more I think of it, it makes me think that death actually takes everything away from you and gives you a whole new identity. It's like….you don't die exactly. But you do die in terms of materialism. Your body dies….your sense of having body dies…your all materialistic possessions die…. You actually die… and then, there is a completely new you. I don't know if it's after-life…or just a big vacuum up there. But there is for sure, I….I….just can't explain it."

The third subject with the dreadful Figure experience was, however, too terrified to give any opinion, but did mention that life exists after death: "As the dreadful Figure approached towards me, I became more and more sure that it was coming at me to punish me of my wrongs….I just prayed so heavily to God to give me one more chance to correct my wrongs….You know, you should never think of death as the end of your life…. It is….a sort of kicking mechanism….kicking you into the court of God. I don't exactly remember the pain of dying…..but, I do remember the pain of living in that court….and believe me, it was the most horrifying experience I ever had."

Discussion

Our study results can be grossly divided into the incidence (or objective results) and the descriptive (or subjective) results. Our incidence results are in accordance with those of Lommel *et al*.[34] who reported of a very low incidence of NDE in survivors of cardiac arrest (12% showing core experiences). However, as mentioned in the introduction, there is a wide variation in the incidence results in literature so far. There seems to be three main reasons for this wide variation in incidence rates: (A) The high rates have been mostly reported in retrospective studies where by statistical definition, incidence rates calculation is not scientific at all. (b) The selection criteria of the patients recruited in the study seems to be a major determining factor for incidence rates. Our selection criteria were strict as those of Lommel *et al.*,[34] which could have been the reason for low incidence rates in our study as well as theirs. On the other hand, another prospective study by Yamamura[8] reported of high incidence rates of NDE in coma patients. This study constituted of patients from a wide group of coma survivors including cardiac, pulmonary, and cerebro-vascular causes. So, their high incidence could be because of lack of more specific criteria of patient inclusion. Memory-related differences in the study samples could be one major issue for reporting of NDEs. For example, Lommel *et al.* reported that patients who underwent long CPR procedures and thus with higher chances of memory defects reported of significantly less NDEs.[34] Similarly, Greyson attributed his low NDE incidence in cardiac arrest survivors (10%) to the amnesia resulting after cardiac arrest.[29] In our patient group, head injury is known to specifically affect the memory systems. Additionally, we recruited patients with severe head injury having post-traumatic amnesia duration >7 days. Thus, inability to recall could have been one possible reason of lower reporting of NDEs in our patient group. For this study, we used NDES score >7 criteria for NDE criteria. The items of NDES represent common experiences that people undergoing death-like states experience.[40] However, ours is the second study

aimed to explore the NDE experiences in patients during their deep and prolonged coma, the first being that by Yamamura.[8] However, ours is the first study to exclusively explore the coma occurring secondary to severe head injury. Unexpectedly, the prevalence of NDE in such patients was much less in our study. Only 3 out of 86 such individuals reported of experiences, which fulfilled the above-mentioned criteria. These three individuals were similar only in their religious background; in that, all of them were Buddhists, which is one of the most prevalent religions in Guangzhou and China as a whole. Other than this, there was no similarity between the subjects, which is of little significance here given that 3 subjects are too few to be compared sociodemographically.

This low prevalence arises an interesting question: "*Is the brain integrity important for having such kinds of experiences*?" Earlier reports of higher prevalence of NDEs have been mostly reported in cardiac arrest patients.[13,29] This raises the possibility that NDEs are actually visions of dying brain or brain facing anoxia. In fact, this theoretical perspective has been raised and entertained several times.[2,16,27] In our cases, although the state can be called as near-death, but the process of *dying*, specifically in the context of brain, is not present. In fact, our sample consisted of head injury-related coma, in which the gap between head injury and loss of awareness would have been so less that the patient could not have been able to have a prolonged experience of the events related to "*dying process*" of the brain. In our study, this was a limitation that we could not record the time gap between head injury and loss of awareness. Recently, the biologically-simulated artificial neural networks (ANNs) have shown that the neuron facing hypoxia behaves in a complex pattern in terms of its action potential discharges (ANN), which is not present in other neural states. These specific neuro-electric recently recorded in the simulated ANNs[41,42] further support this possibility that NDEs could be dying-brain related experiences, which typically lack in patients of post-head injury coma because of the shortness of the duration of gap between trauma and loss of consciousness.

The qualitative method used in present study, the *'interpretative phenomenological analysis,'* has not been used before for studying NDE. As pointed out before, the strength of this technique is the freedom that the interviewee has for speaking out his experiences. The themes that we obtained are the commonly encountered experiences in NDE, especially the light-FIGUREs confrontation.[43-46] However, none of our subjects mentioned that the Figure interacted with them verbally. Still they were very sure of the message that the Figure was trying to convey to them. This is an interesting fact because it could represent a way of communication that we do not understand yet. Another interesting and rather unexpected finding of this study was that none of the individuals reported of out-of-body experiences (OBE). In fact, rather than gaining a freedom of self as in the experience of floating outside in OBEs, our subjects reported of a sense of helplessness (mentioned in the theme above) as a result of being under control of some external force, which compelled them to experience all of it. Whether the depth of coma or the nature of head injury had to do something with it cannot be pinpointed at present, but it seems that the NDEs in post-head injury coma are less well-formed than that of other near-death conditions. Especially, the richness of classic NDEs seem to lack in post-head injury coma. However, all the three individuals did have strong opinions about the event of death as can be seen in the fifth master theme of the IPA analysis. This master theme makes the point clear that the individuals facing NDEs have a significant impact of this experience in their lives and belief systems. This could have significant meaning from the psychological view point and should be explored in details in further studies. Definitely more studies are warranted in head injury patients to take a closer look at these experiences.

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