IBRO Neuroscience Reports 14 (2023) 435–440

Contents lists available at ScienceDirect

IBRO Neuroscience Reports

journal homepage: www.sciencedirect.com/journal/IBRO-Neuroscience-Reports

Research paper

Advantage of neuroeducation in managing mass psychogenic illness among rural school children in Nepal

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ARTICLE INFO

Keywords:
Education
Awareness
Nepal
Conversion disorders
Psychosomatic disorder
Mental health

ABSTRACT

Introduction: Mass psychogenic illness (MPI), also known as mass hysteria (MH), is a mental health disorder that frequently occurs in Nepal. It primarily affects female students in government high schools and occurs during the course of the school day over a few days without corresponding organic causes.
Purpose of the study: This study set out to evaluate and give neuroeducation with the goal of preventing and/or managing MPI after documenting the existing state of knowledge regarding MPI.
Materials and methods: A total of 234 female students in grades 6 through 10 who attended MH-affected schools (SMH, n = 119) and schools without a mass hysteria history (SNOMH, n = 114) participated in this mass hysteria awareness study. Participants received written pre- and posttests formatted as questionnaires before and after receiving neuroeducation by watching a drama, viewing a human brain—spinal cord model demonstration, and attending an instructive lecture on the human neurological system, stress, and mass hysteria.
Results: Our neuroeducation awareness study on mass hysteria was found to be effective among all of the participants from both SMH and SNOMH. The results indicated that the aforementioned neuroeducation tools are more effective in improving knowledge about mental stress differently in different grades of SMH and SNOMH students. The basic understanding of the human neurological system was not improved by the neuroeducation tool, according to our findings.
Conclusion: Our study suggests that using day-structured neuroeducational tools might be an efficient way to treat mass psychogenic illness in Nepal.

1. Introduction

Concerns have been raised in Nepal regarding mass psychogenic illness (MPI), also known as mass hysteria (MH). More than one hundred schools in Nepal have documented epidemics of mass hysteria, colloquially known as "chhopne rog" ("to cover, to capture, to get hold of"), that affect hundreds of students at once, mostly females in grades five and up (Sapkota et al., 2020, 2019). When MPI outbreaks occur in large numbers, schools must be temporarily closed for weeks or months (Shakya, 2005; Poudel et al., 2020; Sharma et al., 2010; ANON, 2022a). The American Psychiatric Association describes "MPI" as a sort of "somatoform disease," which is further classified as a "conversion disorder" or "hysterical neurosis, of conversion type" (Bartholomew and Wessely, 2002). In Nepal, this incidence triggers a single student who subsequently spreads the stereotypical motor symptoms of conversion, dissociative stupor, fainting, and shouting to other students (ANON, 2022b). Most of the reported MPI cases in Nepal have symptoms that are similar to those of MPI documented in the literature (ANON, 2022a). In

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https://doi.org/10.1016/j.ibneur.2023.05.003
Received 21 July 2022; Accepted 7 May 2023
Available online 12 May 2023

case—controlled studies from Nepal, students who had been affected by mass hysteria manifested with both physical and psychological symptoms. Trauma (Bartholomew and Wessely, 2002), low socioeconomic status, poor academic performance (Sharma et al., 2010), exposure to violence, peritraumatic dissociative experiences (ANON, 2022b), and mental illness (including anxiety and depression) (Sapkota et al., 2014) have all been identified in relation to the etiology of MPI in relation to Nepal. Mental illness is one of the causes of MPI, and it affects approximately 20% of the general population in Nepal. However, less than 1% of the government's overall health budget is designated for funding mental health, and there is only one psychiatrist per million people, as per the WHO (World Health Organization) and Ministry of Health (Ministry of Health, 2017; Chaulagain et al., 2019). Besides these, preference of local shamans over doctors for the treatment, considering evil spirit or angry deities as a causative factor of MPI is a much bigger hindrance in resolving the incidences. As reported in national newspapers, villagers, students and teachers have been observed to follow the acts of appeasing the spirits and deities (Shakya, 2005; Poudel et al., 2020; Sharma et al., 2010). Studies have already established that it is a psychological condition marked by the transformation of mental stress into bodily symptoms or a shift in self-awareness (Sapkota et al., 2014; Mink, 2013; Van Ommeren et al., 2001). According to some reports, individuals who are developing MPI may develop depression and other mental disorders if they are not given counseling and medical care (Boss, 1997; Chowdhury and Brahma, 2005; Hanel et al., 2009). Ironically, the incidence of MPI is still common in government schools in rural Nepal, despite changes in socioeconomic position and a rise in literacy rates (Sharma et al., 2010; Boss, 1997). There are still unidentified root reasons (Sapkota et al., 2020; Poudel et al., 2020; Sharma et al., 2010; Mai, 1995). We postulated that scientific mass education planned with local socioeconomic and cultural elements in mind might be an efficient tactic in lowering the recurrent cases of mental illness in schools. This study was performed with the aim of evaluating and delivering neuroeducation with the intention of preventing recurrence and/or managing MPI and describing the generally accepted understandings regarding MPI in schools that encountered MH. To dispel falsehoods, disseminate the truth, and subconsciously treat the afflicted through music and theatre, we assembled a team of neuroscience academics, physicians, and musicians. Pamphlets were distributed, local politicians, policy-makers, and educators were invited to participate in the campaign, and the event was covered by the local press and radio stations for wider audiences. To date, Nepal has not conducted any systematic research to develop neuroeducational tools. To gather both quantitative and qualitative data for the study, specified questions were formatted in standardized questionnaires.

2. Study design

A cross-sectional study was carried out in the spring of 2017 two weeks after "chhopne rog" instances in the Dhadhing district community school were publicized in national newspapers (ANON, 2022b). The team, which included two clinical doctors, two neuroscientists, three clinical physiologists and anatomists, a media specialist, a veteran national singer, and other supportive staff, visited two remote government schools—a school without a history of mass hysteria (SNOMH) and a school recently affected by MH (SMH)—in the Dhading district, 80 kilometers west of Kathmandu, Nepal, to verify the MPI cases during school time without informing the school's concerned students in advance. To lessen the possibility of MPI reoccurring in schools that had already encountered it and to prevent the occurrence in schools where MPI has not yet occurred, our study's pretest/posttest proforma was used to investigate differences in knowledge and beliefs after completion of neuroeducation in secondary schools in the Dhadhing district of Nepal that had experienced MPI and those that had not. The procedures are explained below in detail.

3. Materials and methods

3.1. Material

An example of a self-reported pretest questionnaire with three sets of 15 questions (three questions about general knowledge of the human nervous system in the first set, three questions about mental stress and their school lives in the second set, and three six questions about mass hysteria in the third set) is attached in the supplementary section. The remaining three questions (Q.no. 13–15) were about optimistic thoughts, and all the questions were written in Nepali. All the questions were translated into English by Google translation and are attached in the supplementary section. The Brief Childhood Trauma Questionnaire (BCTQ), The Peritraumatic Dissociative Experiences Questionnaire (PDEQ), and The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, Text Revision (DSM-5-TR) (ANON.; Bernstein et al., 2003; Marmar et al., 1997) were used to create the pretest and posttest questionnaires, and the posttest questionnaires have an additional eight questions. The formatted standardized questionnaires in this study consisted of two broad parts: one with demographic information on age, gender, and education and the other with knowledge information about the nervous system, mental stress, and MPI. In brief, nervous system-related questions included the following: What do you know about the human nervous system? What are the major parts and functions of the nervous system? What are the building blocks of the nervous system? Mental stress-related questions included the following: What is mental stress? What time do you have mental stress? What do you do if you have mental stress? Similarly, mass hysteria-related questions included the following: What are hysteria and mass hysteria? How do you know about mass hysteria? What happens when there is hysteria? What scares you the most? What do you do if you have mass hysteria? All questionnaires were multiple choice questions with 5 options allowing more than 1 correct answer. Other materials used in this study included a plastic model of the human nervous system (the brain and spinal cord), pamphlets, a drama script about MPI written with the assistance of a dramatist based on signs and symptoms of MPI reported in the literature, and a didactic mass talk or lecture about causes, management, and treatment of mental stress and MPI that was presented using pamphlets and a physician. The printed pamphlet was also in the Nepali language, and the Google translation is attached in the supplementary section. In brief, the pamphlet consists of written detailed explanation of mass hysteria and mental stress-related pre- and post-questionnaires. Similarly, the performed drama script also had similar explanations of the human nervous system, mental stress, and mass hysteria.

3.2. Methods

3.2.1. Neuroeducational study at a school that encountered MPI(SMH)

Shree Mahakali Secondary School in Kumpur Village, Dhadhing (Pic. 1): Next, after an explanation of the program's goals to the school's administration and instructors, the program was held the following day in the open schoolyard in front of approximately five hundred pupils and forty to fifty local villagers. After informing the local residents and school administration of the study, written consent was obtained. Prior to the start of their normal class on the study day, students in grades six, seven, eight, nine, and ten were given baseline self-report questionnaires (pretest) printed in Nepali. Following the questionnaire session, another portion of the neuroeducation was given to all of the students while they were seated outside. These include a forty-five-minute lecture using a human brain model demonstration, booklet exhibition, and explanations of the functional anatomy of the human nervous system, mental stress, and mass hysteria. Following this open lecture, fifteen more senior students who had not been a member of the study group for the previous thirty minutes performed a theater script about mental illness and MPI as the next stage of neuroeducation. Following the drama, the

Pic. 1. MPI encountered school after neuroeducation at Shree Mahakali Secondary School in Kumpur Village, Dhadhing, Nepal.

last section of neuroeducation—which covered the causes, management, and treatment of MPI—was presented utilizing pamphlets and a speaker for approximately forty minutes. The same students were administered the subsequent self-report questionnaires (posttest) on the same day with eight additional questionnaires (related to optimistic thoughts, a demonstrated drama, and pamphlets) for a total of no more than thirty minutes in their classrooms. That is, on the day of the intervention, after all the interventions had been given, posttest questionnaires were given. The physician team member conducted a medical examination of each individual but found no indications or symptoms of any observable organic illness.

3.2.2. Neuroeducational study at a school that never encountered MPI (SNOMH)

The same district's Shree Kalidevi Higher Secondary School, Salang, which is approximately 30 kilometers to the west, has never experienced widespread panic MPI. The following day, the team went to this SNOMH school. This school, which serves students in grades six through ten, underwent the same protocol as SMH. The physician team member also conducted a medical examination of each participant in this school but found no indications of an identifiable organic illness. Approximately three hundred pupils including school's staffs and twenty-five to thirty local villagers attended the presentation at the SNOMH.

3.3. Sample size and exclusion criteria

One hundred nineteen (of three hundred eighty pupils of both genders) from grades six through ten at SNOMH and one hundred fourteen (of the total of four hundred sixty-eight students of both genders) from those grades at SMH school were included in this study. Boys' performance was excluded from the data analysis. Since the study was done in person at the school during regular school hours, we did not consider marital status or other family difficulties while analyzing demographic data. Three of the fifteen questions (issued before and after neuroeducation) were excluded from the data analysis because they linked to optimistic thoughts (Q.no. 12–15). In a similar vein, eight more questions from the posttest were not taken into account while analyzing the data.

3.4. Statistical analysis

Microsoft Excel 2019 was used for data entry and Statistical Package for Social Sciences (SPSS) version 22(SPSS Inc., Chicago, IL, USA) was used for analysis of collected data. To compare two means of normally distributed data, an independent t-test was performed. For parametric data, the ANOVA (F-test) was employed to compare more than two means. Value for probability less than 0.05 ($p < 0.05$) at 95% confidence interval was considered statistically significant. For the purpose of data analysis, percent of correct answers (responses) were calculated by sum of the correct response divided by total responses multiplied by hundred on each set of questionnaires. Participants with more than 50% correct answers were considered as having a positive impact of neuroeducation.

3.5. Footnotes

Data availability statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.

3.6. Strength and limitation

Our study has certain limitations. We excluded male pupils since female pupils account for the bulk of reported MPI cases. We excluded individuals' marital status, family issues, and parental involvement from our study. Additional research is required to address various other ethnic and cultural issues and social context elements that could result in more successful management or intervention of MPI outbreaks. To avoid inter and intra-observer bias, the data collection crew (ten concerned school teachers and five citizen volunteers) underwent three hours of training on the questionnaire to assess the preparedness and the quality of the asking and reporting.

4. Results

Female students in grades six through ten from schools with a history of mass hysteria (SMH) and those without such a history (SNOMH) participated in a neuroeducation MPI awareness study, which examined three areas: understanding of the human nervous system, mental stress, and mass hysteria.

4.1. Demographic data

Table 1 contains comprehensive student demographic information.

Table 1
Demographic data of the studied groups.

Demographic data[a]	School with mass hysteria		Schools without mass hysteria		Remarks
Sex	Male (48.3%)	Female (51.7%)	Male (41.5%)	Female (58.5%)	
Age (mean year)	16.4 ± 3.6	14.4 ± 1.9	13.3 ± 5.5	14.12 ± 2.25	
Residence	Rural (96%)	Rural (98%)	Rural (95%)	Rural (97%)	
Education	-		-		Total n = 233
Grade six	-	n = 14	-	n = 22	
Grade seven	-	n = 21	-	n = 18	
Grade eight	-	n = 27		n = 25	
Grade nine	-	n = 32	-	n = 31	
Grade ten	-	n = 25	-	n = 18	

[a] Data of the female student participants were only taken into account

In all, 233 female participants from both the SMH (14.4 ± 1.9 years) and SNOMH (14.12 ± 2.25 years) groups (n = 119, 51.7% and n = 114, 58.5%) freely participated in our study. The average age of SNOMH and SMH students was statistically similar for both genders. Table 1 contains details.

4.2. Effects of neuroeducation on knowledge about the human nervous system (HNS) based on pre- and posttest questionnaires

Fig. 1 and Table 2 detail participant responses to questions about fundamental HNS knowledge. In short, female students of all grades gave statistically similar correct answers about their fundamental knowledge of HNS based on questions 1–3 (Table 2) before and after receiving neuroeducation. However, of those, 88.4% of grade eight and 75% of grade nine SNOMH students gave accurate answers about the functional anatomy of HNS after receiving neuroeducation, compared to 63.3% and 63.7% before receiving neuroeducation in the same grades. Participants from various grades of SNOMH and SMH had similar knowledge of HNS both before and after neuroeducation. The percentage of combined SNOMH and SMH female participants' mean accurate response to the HNS question after neuroeducation was 47.79 ± 25.32%, which was significantly different from the preneuroeducation HNS response (44.47 ± 18.88%; df1; f 0.11; T value (two-tailed): + /- 12.70). The same parameter was tested between SNOMH females (n = 114) and SMH females (n = 119) before and after neuroeducation, and the results were statistically insignificant (F-statistic value = 0.00567, P value = 0.9418, and F-statistic value = 0.084, P value = 0.779, respectively).

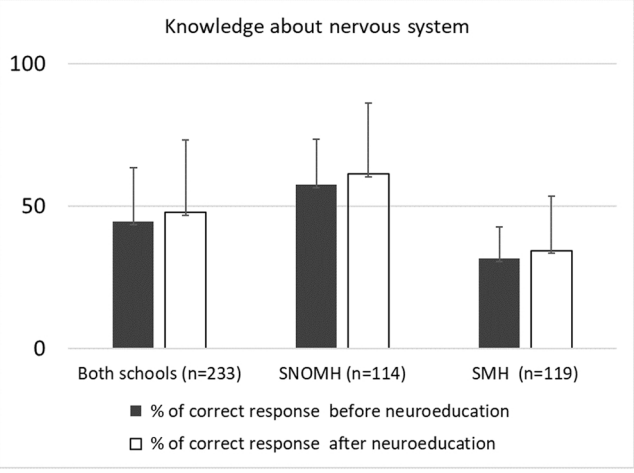

Fig. 1. Mean(+SD) percent correct response about human nervous system based on questionnaire1–3 (two-Tailed test and ANOVA between groups).

Table 2
Knowledge about nervous system among participating female student.

About Human Nervous system (based on Questionnaires 1–3)				
Schools	Grades	Before Neuroeducation	After Neuroeducation	
		Correct response (%)	Schools	Correct response (%)
SNOMH	Six	42	SNOMH	42.3
SMH		13.4	SMH	28.2
SNOMH	Seven	40.4	SNOMH	28.2
SMH		34.1	SMH	9.3
SNOMH	Eight	63.3	SNOMH	88.4
SMH		30.6	SMH	38
SNOMH	Nine	63.7	SNOMH	75
SMH		43.8	SMH	33.8
SNOMH	Ten	77.9	SNOMH	72.2
SMH		35.5	SMH	62.5

*Number of participants from SMH, n = 119 and SNOMH, n = 114 schools.

4.3. Effects of neuroeducation on knowledge about mental stress (MS) based on pre- and posttest questionnaires

Table 3 and Fig. 2 show participant responses on MS from SMH and SNOMH. Following neuroeducation, correct responses on MS among individuals from SMH and SNOMH improved (not significantly). After receiving neuroeducation on MS, the percentage of properly answering SNOMH participants (n = 114) increased from 54.46 ± 10.63% to 69.24 ± 13.96% (F-statistic value = 3.542, P value = 0.096). When performance was evaluated according to student grades, only SNOMH participants in grades eight and nine showed an improvement following neuroeducation, going from 55.5% to 88% and 50.0–72.2%, respectively. Similarly, after receiving neuroeducation, those with SMH in only grades 9 and 10 saw improvements of 40.8–70.4% and 72–88.6%, respectively. After receiving neuroeducation, participants with SMH and SNOMH combined (n = 233) showed an improvement in their mean correct response on MS knowledge, going from 58.43 ± 14.6% to 72.08 ± 11.12%, a difference that was statistically significant (F-statistic value = 5.50729, P value = 0.03058, df1, T value (two-tailed): + /- 20.80216).

4.4. Effects of neuroeducation on knowledge about mass psychogenic illness (MPI) based on pre- and posttest questionnaires

Table 4 and Fig. 3 show participant responses to MPI from both SMH and SNOMH schools. Following neuroeducation, the percentage of correct responses in both categories improved significantly. After receiving neuroeducation on MH, the percentage of individuals from SNOMH who responded correctly increased from 70.2 ± 4.7% (n = 114) before neuroeducation to 91.9% (SEM ± 3.34) (F-statistic

Table 3
Knowledge about mental stress among participating female student.

About Mental stress (based on Questionnaires 4–6)				
Schools	Grades	Before Neuroeducation	After Neuroeducation	
		Correct response (%)	Schools	Correct response (%)
SNOMH	Six	53.4	SNOMH	49.1
SMH		46.0	SMH	75
SNOMH	Seven	42.2	SNOMH	71
SMH		69.9	SMH	69.2
SNOMH	Eight	55.5	SNOMH	88
SMH		83.3	SMH	71.4
SNOMH	Nine	50	SNOMH	72.2
SMH		40.8	SMH	70.4
SNOMH	Ten	71.2	SNOMH	65.9
SMH		72	SMH	88.6

*Number of participants from SMH, n = 119 and SNOMH, n = 114 schools.

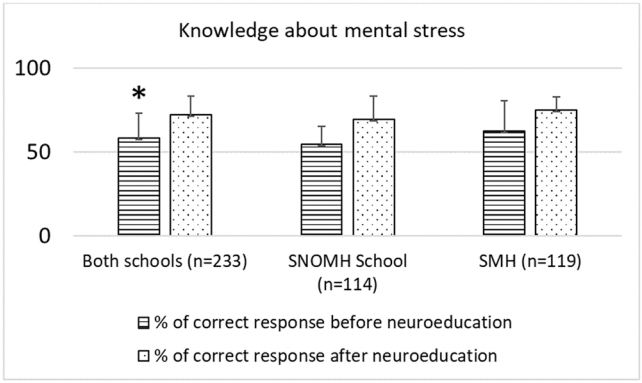

Fig. 2. Mean (+SD) percent correct response about mental stress based on questionnaire 4–6. (*p < 0.05) (two-Tailed test and ANOVA for between groups).

Table 4
Knowledge about mass hysteria among participating female student.

About Mass hysteria (based on Questionnaires 7–12)				
Schools	Grades	Before Neuroeducation	After Neuroeducation	
		Correct response (%)	Schools	Correct response (%)
SNOMH	Six	65	SNOMH	90.0
SMH		65	SMH	81.1
SNOMH	Seven	65	SNOMH	90.0
SMH		77.2	SMH	82.9
SNOMH	Eight	74.1	SNOMH	95.3
SMH		67.1	SMH	78.3
SNOMH	Nine	73.1	SNOMH	95.7
SMH		58.4	SMH	81.9
SNOMH	Ten	73.8	SNOMH	88.5
SMH		67.7	SMH	78.1

*Number of participants from SMH, n = 119 and SNOMH, n = 114 schools

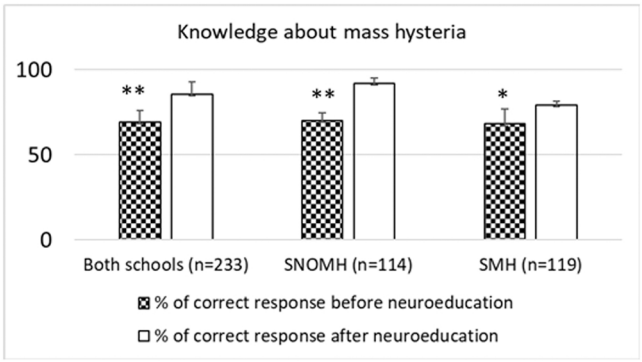

Fig. 3. Mean (+SD) percent correct response about mass hysteria based on questionnaire 7–12. (*p < 0.05, **p < 0.001, (two-Tailed test and ANOVA for between groups).

value = 69.53431, P value = 0.00003, df1, T value (two-tailed): + /- 21220.66). Similarly, after receiving neuroeducation, the percentage of participants from SMH (n = 119) who correctly answered was 79.32 ± 2.05% (F-statistic value = 7.233, P value = 0.02752 df1, T value (two-tailed): + /- 23.564), as opposed to 68.22 ± 8.9% before receiving neuroeducation. Table 4 shows that participant performance across all grades from SNOMH and SMH improved significantly when examined in relation to student grades. The difference between the mean correct response on knowledge about MH among participants with SMH and SNOMH combined (n = 233) before (69.29 ± 6.86%) and after neuroeducation (85.61 ± 7.12%) was statistically significant (F-statistic value = 27.45883, P value = 0.00006, df1, T value (two-tailed): + /- 10610.3).

5. Discussion

In this study, we evaluated the impact of a one-day neuroeducation program on female students at two separate schools in the rural Dhadhing district of Nepal. The program included general knowledge about the nervous system, mental stress, and mass hysteria. According to school staff and local residents, female pupils in grades six through ten were primarily affected by MPI incidents. A recent meta-analysis also reported that MPI is more prevalent in adolescents and children and that its attack rate is higher in rural areas (Zhao et al., 2021). This study found no change in students' understanding of the human nervous system among students in grades six through ten, making it a less effective component of our neuroeducation. According to Nepal's Curriculum Development Center (CDC), all private and public schools teach the fundamentals of the human nervous system in grades six through ten as a component of the topic "Health, Physical Activities Education" (ANON, 2022c). The content covered in their normal, daily lesson served as the basis for questions 1 through 3. Our neuroeducation on the fundamentals of the human nervous system lasted just one day, and there were only three questions linked to it, so it might not have been enough to assess and raise participants' understanding levels. Another factor can be the incomplete alignment of the questions 1–3 with the intervention's substance. Following neuroeducation, knowledge regarding mental stress was improved. Following our neuroeducation, approximately 70% of participants in SNOMH schools learned more about mental stress. Further research revealed that grade eight and nine individuals from SNOMH were better at learning about mental stress from our neuroeducation than were grade nine and ten participants from SMH. Participants in sixth grade at both schools showed no benefit from our neuroeducation program. Despite the fact that the mean age of students in grade six was comparable to that of students in higher grades, we do not know the exact cause(s), but it may be because of their general level of understanding and maturity. The SMH and SNOMH participants agreed that our neuroeducation on mass hysteria was helpful. Trauma, low socioeconomic position, poor academic achievement, exposure to violence, mental disease (including anxiety, depression, and peritraumatic dissociative experiences), and mental illness in relation to Nepal are some of the most likely causes of mass psychogenic illness (Sapkota et al., 2014; Mink, 2013). Even though we did not examine the etiology, we assumed that the synergistic impacts of these causes were brought on by peritraumatic dissociation experiences brought on by the extremely jolted shock in 2015 that occurred in the Kathmandu Valley and its surroundings.

6. Conclusion

Showing a mannequin, distributing written pamphlets, performing a drama script, and giving a didactic lecture containing neuroeducational awareness program helped participants learn more about mass psychogenic illness and mental stress. Few studies have been published in Nepal that address the occurrence, pathogenesis, and treatment of MPI (Sapkota et al., 2020; Shakya, 2005; Poudel et al., 2020; Sharma et al., 2010; Sapkota et al., 2014; ANON.). Thus, in order to eliminate misconceptions and superstitious beliefs and enhance therapy, it is imperative to increase community awareness of the problem and how to handle it. The informal follow-up study revealed no further instances of mass hysteria in the school where there had previously been incidents. Instead, it was determined that the condition was an expressional physiological problem, rather than a pathological one (Medeiros De Bustos et al., 2014; Broussolle et al., 2014). For the control of MPI incidents and outbreaks in Nepal, extensive neuro-educational research at the school level should be required in the future.

Ethical approval

This was obtained from the local village development committee; written consent was taken from school authority and parents and according to 1964 Helsinki declaration.

Funding

This research was supported in part by IBRO "IBRO Global Advocacy Seed Grant, dated 30 Sept, 2016 and Neuroscience Society of Nepal (NSN). The opinions, results and conclusions are those of the authors and no endorsement by IBRO and NSN are intended or should be inferred.

CRediT authorship contribution statement

Sunil Dhungel: Conceptualization, Data curation, Formal analysis, Methodology, Project administration, Software, Writing – original draft, Writing – review & editing. **Barun Mahat:** Conceptualization, Data curation, Project administration, Writing – review & editing. **Prakash Limbu:** Data curation, Project administration, Writing – original draft, Writing – review & editing, **Sandeep Thapa:** Data curation, Project administration, Writing – original draft. **Janak Raj Awasthi:** Data curation, Project administration, Writing – original draft and editing. **Sabin Thapaliya:** Data curation, Project administration, Writing – original draft. **Mukesh Kumar Jha:** Data curation, Project administration, Writing – original draft. **Ajay Jung Kunwar:** Methodology, Project administration, Supervision, Writing – review & editing.

Conflicts of interest

The authors declare no conflicts of interest.

Acknowledgments

We thank to Mr. Sunil Thapa Magar and other 10 persons from Dhading for volunteer service and active logistic support for neuro-education camp. We also thank Nepali pop singer Mr. Nabin K Bhattarai and student assistants who visited with us to recruit the subjects.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.burns.2023.05.005.

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