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Effectiveness of virtual reality therapy on anxiety and symptom distress with chemotherapy among children with cancer

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ABSTRACT

The present study was undertaken to determine the effectiveness of virtual reality therapy on anxiety and symptom distress with chemotherapy among children with cancer. The present study was quasi experimental design with one group pretest and posttest design. A total of 12 participants were recruited in the study following the inclusion and exclusion criteria. After recruiting the participants, they were assigned to experimental and control groups with six participants in each group. The participant was exposed to virtual reality therapy for at least 30 minutes during the chemotherapy administration. The control group was given the wait list measures at the end of the post test. The presents study results support virtual reality therapy as an effective tool in anxiety and symptom distress with chemotherapy among children with cancer. Further, detailed studies are recommended with higher sample size and multi centers to support the implementation of virtual reality therapy as a therapeutic tool in the management of mental health disorders.

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INTRODUCTION

Mental health issues are very important to manage at earliest to avoid further deterioration. Recent era, mental health management of the patient is recommended along with the regular treatment (Sailesh *et al.*, 2014). Anxiety and the symptom distress are the commonest stressors of child and family undergoing cancer treatment, ranging from sadness to anxiety and depression (Satyanarayana *et al.*, 2014). After the diagnosis of illness, most of the children doesn't attend schooling, as there is a change in child way of life, due to treatment modalities, physical or mental struggle with treatment process. Anxious children's are usually easily irritable and often through tantrums, poor sleep, head ache, stomach aches are often found (Satyanarayana *et al.*, 2014). Anxiety can be triggered with the real or imagined threats and cause a fight flight freeze reactions in the children. Some children's are more prone for anxiety because of the genetic predisposition, their temperament and coping style, environment factors like anxious parenting or trouble early childhood experiences.

It can be even the side effects of the medications. Often it prevails as palpitations, increased respiration, profuse sweating, tensed muscles, nausea and dread feeling. Approaching anxiety rather than avoiding anxiety will make the child have better management. Cancer is the ninth common cause for

deaths among children aged 5 to 14 years in India. The proportion of childhood cancers relative to all cancers reported by Indian cancer registries varied from 0.8% to 5.8% in boys, and from 0.5% to 3.4% in girls. Leukemia and lymphoma were the commonest malignancies in boys whereas leukemia and brain tumors were commonest in girls in India.

Alternative therapies were recommended in the management of cancer and other diseases, along with regular treatment. Virtual reality therapy is one such alternative therapy that provides virtual rehabilitation. The virtual environment is created and the specific task will be administered to the patient as per the disease condition (Scapin *et al.*, 2018). The participant will be exposed to virtual reality therapy for at least 30 minutes, two times a day. The child will be taught about the anxiety and self-care management for 10-15 minutes to improve the quality of life of the child.

The present study was undertaken to determine the effectiveness of virtual reality therapy on anxiety and symptom distress with chemotherapy among children with cancer.

MATERIALS AND METHODS

Research design

The present study was quasi experimental design with one group pretest and post test design. Pretest assessment of anxiety and symptom distress was assessed using a self structured interview, from the children both in experimental group and control group. After the pretest, the experimental group participants underwent virtual reality therapy for next 5-6 days.

Pre and post test of basic physiological parameters will be measured every time before and after each therapy session. Post test was conducted at the end of the 5th day. Level of anxiety and symptom distress was assessed. Control group was given the wait list measures at the end of post test.

Study setting

The present study was conducted at the Department of Pediatrics, All India Institute of Medical Sciences.

Study participants

A total of 12 participants were recruited in the study following the inclusion and exclusion criteria. After recruiting the participants, they were assigned into experimental and control groups with 6 participants in each group.

Sample size

As this is a pilot study, we have considered 12 participants to conduct the study.

Inclusion Criteria

Children who belong to age group of 10-18 years and belong to both the gender. Children who are diagnosed with hematological cancer and undergoing chemotherapy and willing to participate in the study. Children who know to speak Hindi or English.

Exclusion Criteria

Children diagnosed with functional and organic psychiatric disorders. Children having clinical primary or metastatic diseases to the brain. Children with a history of motion sickness and seizure. Children with sensory perceptual alteration (Visual and auditory impairment) are excluded from the study. Children who have already undergone similar training elsewhere.

Intervention

The participant was exposed to virtual reality therapy for at least 30 minutes during the chemotherapy administration. The child was taught about the anxiety and self-care management for 10-15 minutes individually to improve the quality of life of the child, where the researcher was addressing individual focused problems.

At least two to three cycles of chemotherapy the child will be followed and virtual reality therapy and one-to-one monitoring will be done for the children in the experimental group, whereas the children in the control group were given the hospital routine care with monitoring. The control group was given the wait list measures at the end of the post test.

Tools

The level of anxiety was measured using the revised children manifest anxiety scale and the symptoms of distress was assessed using M.D. Anderson symptom inventory (Reynolds and Richmond, 1985).

Data analysis

Data was analyzed using SPSS 20.0. The data will be analyzed using both descriptive and inferential statistics. Probability value <0.05 was considered as significant.

Ethical considerations

The study protocol was approved by the institutional human ethical committee of AIIMS, Raipur (AIIMSRPR/IEC/2018/205). Prior approval was obtained from the department head of pediatrics to conduct the study at their department. Informed consent was obtained from all the participants as per the guidelines of the Indian Council of Medical Research.

Table 1: Demographic distribution of the variables of the children undergoing chemotherapy in the experimental and control groups.

Demographic variables		Group			
		Experiment (n=6)		Control (n=6)	
		n	%	n	%
Age	10 -14 years	5	83.33%	5	83.33%
	15 -18 years	1	16.67%	1	16.67%
Gender	Male	4	66.67%	6	100.00%
	Female	2	33.33%	0	0.00%
Education status	Illiterate	0	0.00%	0	0.00%
	Primary	2	33.33%	3	50.00%
	Secondary	3	50.00%	2	33.33%
	Higher secondary	0	0.00%	0	0.00%
	Dropout	1	16.67%	1	16.67%
Height in cm	<120 cm	1	16.67%	4	66.67%
	121-140cm	3	50.00%	0	0.00%
	141-160cm	2	33.33%	2	33.33%
Weight in Kg	<20 kg	1	16.67%	1	16.67%
	21-30 kg	2	33.33%	3	50.00%
	31-40 kg	3	50.00%	2	33.33%
Nutrition status	Underweight	5	83.33%	4	66.67%
	Normal	1	16.67%	2	33.33%
	Over weight	0	0.00%	0	0.00%
	Obese	0	0.00%	0	0.00%

Data was presented in frequency and percentage.

RESULTS AND DISCUSSION

Table 1 present demographic distribution of variables of children undergoing chemotherapy in the experimental and control group. Tables 2 and 3 present distribution of demographic variables among the control and experimental groups. Table 4 present pretest and post test level of anxiety among children undergoing chemotherapy in experimental group. Post test total score of symptoms interfere with life in last 24 hours score was significantly decreased (P<0.05) when compared with a pretest. Table 5 present pretest and post test level of anxiety among children undergoing chemotherapy in participants of the control group. Experimental group reduced the level of anxiety 14.41% score after with virtual reality therapy. Mean differed symptom distress were 20.34% in symptoms distress score, which suggest the effectiveness of the virtual reality therapy among the children undergoing cancer chemotherapy Table 6. Cancer is a major health problem. Chemotherapy is most commonly prescribed in the management of cancer. In the majority of cases, the chances of survival increase if the patients receive prescribed chemotherapy in regular intervals (Arthur, 1992; Coons *et al.*, 1987).

However, due to the distress experienced, most of the patients fail to follow the scheduled chemotherapy. Management of the distress in these patients plays a big role in enhancing their chances of survival (Ezzone *et al.*, 1998; Goldstein, 1995). Mental health care is gaining more importance in recent years (Grant, 1997). It is recommended to manage the mental health of the patient along with the regular treatment for better treatment outcomes. Anxiety usually accompanies chronic pain because pain is the warning signal to indicate something in the body requires attention, or it can be a warning signal to make the nervous system prepared for flight or fight reaction. In chronic pain, the anxiety and pain become avoidant behavior and becomes chronic on them. Increased cognitive focus on the danger further makes the mind vigilant on the painful stimuli.

The present study was undertaken to determine the effectiveness of virtual reality therapy on anxiety and symptom distress with chemotherapy among children with cancer. Experimental group had a reduction in the level of anxiety (14.41%) score after with virtual reality therapy and the mean differed symptom distress were 20.34% in symptoms dis-

Table 2: Distribution of demographic variables among the control and experimental groups.

Demographic variables		Group			
		Experiment (n=6)		Control (n=6)	
		n	%	n	%
Diagnosis	ALL	3	50.00%	6	100.00%
	Hodgkin's	2	33.33%	0	0.00%
	Sarcoma	1	16.67%	0	0.00%
Duration of illness (months)	0-3 months	1	16.67%	4	66.67%
	4-6 months	4	66.66%	2	33.33%
	>6 months	1	16.67%	0	0.00%
Duration of treatment (months)	0-3 months	0	0.00%	4	66.67%
	4-6 months	5	83.33%	2	33.33%
	>6 months	1	16.67%	0	0.00%
Side effects experienced due to treatment	Abdo. Swelling	0	0.00%	2	33.33%
	Fatigue	3	50.00%	2	33.33%
	Fever vomitting	1	16.67%	1	16.67%
	Others	2	33.33%	1	16.67%
Achievement of milestones	Normal	6	100.00%	6	100.00%
	Abnormal	0	0.00%	0	0.00%
Academic performance	Excellent	1	16.67%	3	50.00%
	Average	5	83.33%	3	50.00%
	Poor	0	0.00%	0	0.00%
Co-Morbid illness	Yes	0	0.00%	2	33.33%
	No	6	100.00%	4	66.67%

Data was presented in frequency and percentage.

Table 3: Distribution of demographic variables among the control and experimental groups.

Demographic variables		Group			
		Experiment (n=6)		Control (n=6)	
		n	%	n	%
Temperament of the Child	Sanguine	5	83.33%	4	66.67%
	Choleric	0	0.00%	1	16.67%
	Melancholic	1	16.67%	1	16.67%
	Phlegmatic	0	0.00%	0	0.00%
Type of Family	Nuclear family	4	66.67%	5	83.33%
	Joint family	2	33.33%	1	16.67%
Monthly Income	Below Rs.10,000	4	66.67%	6	100.00%
	Rs.10001-45000	2	33.33%	0	0.00%
	>Rs.45000	0	0.00%	0	0.00%
Birth order in the Family	One	1	16.67%	0	0.00%
	Two	2	33.33%	2	33.33%
	Three	2	33.33%	0	0.00%
	Four	1	16.67%	4	66.67%
Types of Residence	Urban	0	0.00%	2	33.33%
	Rural	6	100.00%	4	66.67%
Type of diet	Vegetarian	1	16.67%	1	16.67%
	Non Vegetarian	5	83.33%	5	83.33%

Data was presented in frequency and percentage.

Table 4: Comparison of pretest and post-test level of anxiety among children undergoing chemotherapy in the experimental group participants.

	Anxiety scale factors	Pre test	Post test	P-value
The level of anxiety	Physiological factor	3.50±2.57	3±2.68	0.20
	Worry/over sensitivity factor	3.33±1.03	2±0.89	0.5(s)
	Concentration anxiety factor	1.5±1.38	1.33±1.03	0.36
	Lie 1	4.5±1.87	5±0.89	0.54
	Lie 2	1.67±0.82	1.67±0.82	1.00
	Total	14.5±3.51	13±3.41	0.22
Symptoms of distress	Total score of severity of symptoms	40.67±23.51	25±17.39	0.24
	Total score of symptoms interfere with life in last 24 hours	34.67±19.26	13.83±9.58	0.02

Data was presented as mean and SD. *P value less than 0.05 was considered as significant.

Table 5: Comparison of pretest and Post-test level of anxiety among children undergoing chemotherapy in the participants of control group.

	Anxiety scale factors	Pre test	Post test	P-value
The level of anxiety	Physiological factor	2.17±2.32	2.33±2.16	0
	Worry/over sensitivity factor	1.33±1.37	1.33±1.37	1
	Concentration anxiety factor	1±1.26	1±1.26	1
	Lie 1	3.67±2.16	3.83±2.32	0
	Lie 2	1.67±1.37	1.67±1.37	0
	Total	9.83±3.31	10.17±2.64	0
Symptoms of distress	Total score of severity of symptoms	41.83±35.3	40.33±37.21	0.44
	Total score of symptoms interfere with life in last 24 hours	34.83±19.2	33.17±17.58	0

Data was presented as mean and SD. *P value less than 0.05 was considered as significant.

Table 6: Effectiveness of virtual reality therapy on the level anxiety and symptom distress score in the experimental group participants.

	Test	Maximum score	Mean score	Mean difference	Percentage difference
The level of anxiety	Pretest	37	15.50	5.33 (2.5-8.12)	14.41% (6.86%-21.94%)
	Post-test	37	10.17		
Symptoms of distress	Pretest	190	75.33	38.6 (5.37-82.70)	20.34% (2.82%-43.52%)
	Post-test	190	36.67		

tress score which suggest the effectiveness of the virtual reality therapy among the children undergoing cancer chemotherapy. Virtual reality therapy (VR) was a feasible method to apply in the clinical setting (Hoffman *et al.*, 2000). It was reported that VR not only manages the stress of the patients but also improves the quality of life (Schneider *et al.*, 2004).

Majority of the patients who underwent VR found to follow the scheduled chemotherapy cycles and were happy mood during the therapy (Schneider and Hood, 2007). VR was found to be very effective in elderly women who have breast cancer. There were absolutely no side effects like cybersickness etc and it was recommended to use for the cancer patients (Schneider *et al.*, 2003).

VR was found to be very effective in children suffering from cancer and undergoing chemotherapy. The decrease in the anxiety levels was confined to trait anxiety and not state anxiety (Schneider and Workman, 1999). Though the trait anxiety is not influenced by VR, the treatment outcome was significantly improved (Schneider and Workman, 2000). A clinical trial conducted by Prasad reported no sig-

nificant improvement with VR alone in the management of the patients with spinal cord injury (Prasad, 2018). VR was highly effective in children undergoing pulp therapy (Niharika *et al.*, 2018). Kumar *et al.*. reported that VR was very useful in managing paretic leg in stroke patients (Kumar *et al.*, 2019). Khurana *et al.* reported profound improvement in the balance functions in the patients with paraplegia followed by VR (Khurana *et al.*, 2017).

Another study reported that the VR was very effective in managing post-traumatic stress disorder (Jiandani *et al.*, 2014). The present study supports the earlier studies as there was a significant decrease in the anxiety scores followed by the VR. VR reduces the mental stress of an individual and restores mental balance needed to the cancer patients. This mental balance even supports early recovery and positive outcomes of the undergoing treatment.

CONCLUSIONS

The presents study results support virtual reality therapy as an effective tool in anxiety and symptom distress with chemotherapy among children with cancer. Further detailed studies are recommended with higher sample size and multi centers to support implementation of virtual reality therapy as a therapeutic tool in the management of mental health disorders.

Limitations

Study results may not be generalized as study was conducted at one center and sample size is less.

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The authors declare that they have no funding support for this study.

Conflict of Interest

The authors declare that they have no conflict of interest for this study.

REFERENCES

Arthur, C. 1992. Did reality move for you? *New Scientist*, 134:22–27.

Coons, H. L., *et al.* 1987. Anticipatory nausea and emotional distress in patients receiving cisplatin-based chemotherapy. *Oncology Nursing Forum*, 14(3):31–35.

Ezzone, S., *et al.* 1998. Music as an adjunct to antiemetic therapy. *Oncology nursing forum*, 25:1551–1556.

Goldstein, H. 1995. *Multilevel statistical models*. Wiley. Pages: 384.

Grant, M. 1997. Nausea and vomiting, quality of life, and the oncology nurse. *Oncology nursing forum*, 24(7):5–7.

Hoffman, H. G., *et al.* 2000. Use of virtual reality for adjunctive treatment of adult burn pain during physical therapy. *The Clinical Journal of Pain*, 16(3):244–250.

Jiandani, N., *et al.* 2014. Efficacy of virtual reality exposure therapy in the management of symptoms associated with post traumatic stress disorder. *Value in Health*, 17(7):572.

Khurana, M., *et al.* 2017. Study on the effectiveness of virtual reality game-based training on balance and functional performance in individuals with paraplegia. *Topics in Spinal Cord Injury Rehabilitation*, 23(3):263–270.

Kumar, D., *et al.* 2019. Virtual reality-based balance training system augmented with operant conditioning paradigm. *BioMedical Engineering OnLine*, 18(1):90.

Niharika, P., *et al.* 2018. Effects of distraction using virtual reality technology on pain perception and anxiety levels in children during pulp therapy of primary molars. *J of Ind Soc of Ped and Prev Den*, 36(4):364–364.

Prasad, S. 2018. Efficacy of virtual reality in upper limb rehabilitation in patients with spinal cord injury: a pilot randomized controlled trial. *Asian Spine Journal*, 12(5):927–934.

Reynolds, C. R., Richmond, B. O. 1985. *Revised Children's Manifest Anxiety Scale (RCMAS): Manual*. Western Psychological Services. Pages: 102.

Sailesh, K. S., *et al.* 2014. Controlled vestibular stimulation: A physiological method of stress relief. *Journal of clinical and diagnostic research*, 8(12):1–2.

Satyanarayana, L., *et al.* 2014. Childhood cancer incidence in India: A review of population-based cancer registries. *Indian Pediatrics*, 51(3):218–220.

Scapin, S., *et al.* 2018. Virtual Reality in the treatment of burn patients: A systematic review. *Burns*, 44(6):1403–1416.

Schneider, S. M., *et al.* 2003. Virtual reality intervention for older women with breast cancer. *CyberPsychology & Behavior*, 6(3):301–307.

Schneider, S. M., *et al.* 2004. Virtual reality as a distraction intervention for women receiving chemotherapy. *Oncology Nursing Forum*, 31(1):81–88.

Schneider, S. M., Hood, L. E. 2007. Virtual reality: A distraction intervention for chemotherapy. *Oncology Nursing Forum*, 34(1):39–46.

Schneider, S. M., Workman, M. L. 1999. Effects of virtual reality on symptom distress in children receiving chemotherapy. *Cyber Psychology & Behavior*, 2(2):125–134.

Schneider, S. M., Workman, M. L. 2000. Virtual reality as a distraction intervention for older children receiving chemotherapy. *Pediatric Nursing*, 26(6):593–597.