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Alleviation of depression in teenagers using light-sound technology

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Teenage years are a time of rapid psychological transition from child to adult. The myth of universal teenage turmoil must not cloud professional judgment to the point that teenagers are not treated seriously. Today Light and Sound Stimulation are very much effective for the teenage to stimulate the connative aspect and decrease depression of an individual. The study highlights research about the effect of light and sound stimulation to alleviate depression in teenagers. A Sample of 120 students was selected from teenage group that is, 13 to 19 years of both sexes belonging to middle socio-economic status by purposive random sampling technique. The experimental conditions were further divided into three experimental groups and were administered three different treatments that is, sound, light and light-sound through mind power music and mind machines. Pre and post treatment tests were administered to all subjects, using the self-rating Depression Scale as the dependent variable. Independent *'t'* statistic at the 0.01 level revealed a significant difference in the mean pre and post scores of the experimental and control groups. The finding of the present study reveals that after giving light-sound stimulation to the teenagers showed alleviation in depression.

Key words: Light-sound stimulation, audio-visual stimulation, frequency stimulation, mind power techniques.

INTRODUCTION

Depression is a common mental disorder that presents with depressed mood or loss of interest and it is due to adverse life events, disease or medications. The teenage years are a time when individuals develop their identity and sense of self. If a depression is left to develop, it can lead to isolation from family and friends, risk- taking behavior's such as reckless driving, drug and alcohol abuse. It can also have negative impact on school performance and study, which can have downstream effects on later career or study options. In young people, the prevalence of depression is 0.3% in preschool children; 2% in schoolchildren; and 4 to 8% in adolescents (Sabate, 2004). It becomes very necessary to eliminate depression by using various methods like light sound stimulation.

Light and Sound Stimulation, also known as audio-visual entrainment (AVE) is a technique using flashing lights through a pair of specially designed glasses and pulses of tones through headphones to guide the brain into various states of brainwave activity. AVE devices are often termed light and sound (L-S) machines or mind machines. Altering brainwave activity is believed to aid in the treatment of psychological and physiological disorders.The expectation of AVE is to effect brain wave activity through auditory and visual stimulation at specific frequencies. Nowadays light sound stimulation has

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become an effective method to alleviate depression.

Depression is a human experience where there is feeling of being pressed down by the external world. There are immense feelings of guilt, anger, despair rejection, disappointment but the over wheeling feeling is that of isolation. True depression in teens is often difficult to diagnose, because normal teenagers have up and down moods. These moods may go back and forth over a period of hours or days.

The prevalence of childhood depression has been estimated to be 1% in pre-pubertal children and about 3% in post-pubertal young people (as indicated in depression in children, clinical knowledge summaries, 2009). Depression is experienced by twice as many adolescent females as males. The prevalence appears to be increasing and affecting younger children due to greater awareness. Such adolescents frequently have psychosocial, education and family difficulties.

The work by Huxley (1963) and Budzynski et al. (1999) have shown that rhythmic information can produce unique sensory experiences, associated with the properties of the stimulation. These can include sensations such as activation, relaxation, discomfort and visual experiences. Shealy et al. (1989) research shows that light stimulation alone and electric devices can increase levels of a variety of neuro chemicals and hormones, including endorphins and growth hormones. This mainly explained many of the benefits noted by users, ranging from alleviation of stress, anxiety, depression and pain, to mental alertness and memory.

The study (Peniston et al., 1989) in which EEG biofeedback was used to train a group of chronic alcoholics to enter first the alpha and then the theta state, while another group served as a control group. They discovered that the alpha-theta group showed and extraordinary recovery rate many orders of magnitude grated than the control group. They found significant increases in warmth, abstract thinking, stability, conscientiousness, boldness, imaginativeness, and self-control, and significant decreases not only in depression but also in anxiety and other problems.

In Chaturvedi (1986) reported that negative symptoms in depression are the results of inability to enjoy recreational interests and activities. A study (Berg, 2004) revealed that by treating with the depression AVE session, depression was reduced significantly as recorded on the Geriatric Depression Scale (GDS). Seasonal Affective Disorder (SAD) affects up to 6% of the population, primarily in the winter months and at higher latitudes. Light-box therapy has been the traditional intervention for SAD, where the individual is exposed to a bright light for substantial periods in an effort to replace the lack of sunshine.

The study reported that Audio-visual entrainment (AVE) is a viable treatment for SAD (Berg, 2004). The study involved 74 participants in a comparison design with a control group (no flashing lights or pulsed tones) and an AVE group that received a placebo treatment (AVE at 1 Hz flashing lights and pulsed tones) for 2 weeks, followed by an active treatment phase (20 Hz flashing lights and pulsed tones) for another 2 weeks. The results indicated that 20 Hz AVE reduced both depression and anxiety symptoms. The 20 Hz AVE treatment condition also produced significant improvements in social life with the family and at work, and increased happiness and energy (Berg, 2009).

The rate of the flickering light causes the brain waves to "entrain" or match any set frequency to a more appropriate rate, such as beta, alpha, or theta, depending on the desired results. At certain frequencies, this flickering can cause a major reduction of anxiety and induce deep mental and physical relaxation. This stimulation also increases the release of certain known neurotransmitters such as dopamine, serotonin, acetylcholine, norepinephrine, and endorphin. Endorphin, which is an amino acid secreted in the brain, has a pain-relieving effect like that of morphine and lowers pain intensity (Ruth Olmstead) and research suggests this endorphin release reduces depression and aids emotional stability, giving one a calmer, more restful approach to life.

Up to 24% of young people will suffer an episode of major depressive disorder, with the mean age of onset for the first episode being about 15 years (Martin, 1996). The younger the teenager the more likely it is that depressive symptoms will be related to family dynamics. Depression in teenagers is under-recognised and under- treated. It is important to emphasise the new technologies to alleviate depression in teenagers. This paper highlights research about the effect of sound, light and light- sound stimulation to alleviate depression in adolescents.

METHODOLOGY

The locale of the study was confined to the schools of Udaipur and Jhunjhunu district of Rajasthan state in India as these schools are motivated for quality teaching and inspire their students for such mind empowering technology. The locale was selected according to the availability of sample, convenience and mobility of the investigator.

A sample of 120 students were selected from teenage group that is, 13 to 19 years of both sex belonging to middle socio-economic status by purposive random sampling technique from Udaipur and Jhunjhunu district of Rajasthan State. Out of which 90 subjects were selected as experimental group and remaining 30 were kept in controlled group.

The experimental conditions was further divided into three experimental groups and were administered three different treatments of mind power techniques that is, sound, light and light-sound through mind power music and mind machines (Michael, 1992; Bapna, 1992; Bapna, 1991). The sample was also divided on the basis of Gender that is, male and female and further by having early teenage (13 to 15 years) and later teenage (16 to 19 years) group of respondents to see the difference of mind power techniques among these group of respondents.

The data for present research was collected in different stages. A pilot study was conducted with 20 samples prior to the main data collection. For each treatment 5 samples were selected and given each treatment that is, sound, light and light- sound. Pre test, post test design was used by giving interventions of three type of experimental conditions. Each group was administered a group of pre test. In the experimental group each of the subject were given their treatment as selected by investigator and were instructed to use it for six days a

week for 7 weeks (42 treatments), under the guidance of the experimenter. After 42 days post testing was done immediately after the sound, light and light-sound treatment to the respondents for the variable under study that is depression.

Measures

A light and sound instrument is a mind entrainment tool Dhaka (2000). Light and Sound Stimulation, also known as brain wave entrainment, has been found to increase brain activity through mind machine and music using varied flickering lights placed over the eyes, and through the use of specified sounds and tones heard while wearing headphones. Through the use of audio (headphones) and visual (eye frames with LEDs) stimulation, listeners are gently guided into specific states of mind. Each audio beat and light pulse is a specific frequency. Minds think in terms of frequency. Brainwaves change frequencies based on neural activity within the brain, be it by hearing, touch, smell, vision and/or taste. These senses respond to activity from the environment and transmit that information to the brain via electrical signals. Hearing and vision are considered the favourable senses for affecting brainwaves safely. By presenting these beats and pulses to the brain, within a few minutes, the brain begins to mimic or follow the same frequencies as the stimuli (the beats and pulses). This process is known as brainwave entrainment. The investigators used commercially available cassette and mind machines for this study. These devices were based on sound, light and light-sound stimulations.

Instrument -I

Sound stimulation was given by "Dr. Anil Bapna's Mind Power Music"^{TM} cassette. These cassettes uses relaxing music based on raga Anil^{TM}. Raga Anil is the culmination of Indian music. It is defined as natures music. It means any music that gives you the feeling of being in a park or being in natural surroundings like near a river in the forest or near a seashore etc. is Raga AnilMind power music (Bapna, 1992; Bapna, 1991) contains subliminal messages. It means that there are messages, which are hidden from conscious mind. But, sub-conscious mind can hear these messages and accept them. Since conscious mind cannot hear them, it ones not interfere with these messages. They simply go to the sub-conscious mind and programs or control the mind to change the behaviour in the desired way. The cassette is of 30 min and both the sides are same.

Instrument-II (Universal's Mind Machine User's Guide 1997)

Light stimulation was given by "Universal's Mind Machine (Model Faster Learning)"^{TM}. The device is portable. It generates 14 Hz frequency (the scientific term for flashes or cycles per second) flashing light in both closed eyes simultaneously with variable intensity, which can be varied accordingly. The stimulation was given through special eye glasses which consisted by small red light emitting diodes (LED's) two per eyes are mounted in a black plastic frames of the folding sunglasses style.

Instrument-III

(Universal's Mind Machine User's Guide 1997) Light-sound stimulation was given by "Universal's Mind Machine (Model super IQ)"^{TM}. It combines rhythmic light and sound stimulation. The stimulation is given by special cassettes through special eyeglasses with flashing lights in both closed eyes simultaneously with variable intensity and stereophonic headphones. The cassette is of 10 min and both the sides are same. The lights flash in certain pattern and there are certain sound signals containing subliminal messages. As a result, it has the ability to change brain waves to alpha, beta, theta, or delta. This device has been used to explore consciousness, to relax, to enhance intelligence and performance, for learning, for sleep and energy.

Statistical analysis

Self-Rating Scale (SRC)

All the three treatments that is, sound, light and light-sound were considered as independent variables of the study. The result is concluded on the basis ofself-rating scale done by an individual.The scale was constructed by Zung (1965) as adapted in Hindi by Mirza (1983). It is a short, simple, self-rating scale. It consists of item, which characterize depressive symptomatology of an individual dealing with the areas of four basic disturbances, namely, Psychic or Affective, Physiological or Somatic, Psychomotor and Psychological concomitant. The total time for administration is 10 min. There are twenty items in the Scale with 2, 8, 2 and 8 items respectively for each of the said four areas. Rating is to be done on the four quantitative terms; none or little of the time, some of the time, good part of the time and most or all the time. The scoring of each of the said four points of the scale are 1, 2, 3 and 4 respectively. The scale rates the subjects so that more depressed subject will have higher scores. The maximum possible score that can be obtained by a subject is 80. There is no time limit in responding to the scale. The reliability of the scale by Split-half method is 0.73. The author has reported the scale to be valid by methods of Content validity, logical validity, construct validity and concurrent validity.

The mean, standard deviation and `t' values were calculated for each dependent variable and difference between male and female, early and later teenagers and pre and post scores. To see the difference between independent variables namely: sound, light and sound-light stimulation's, analysis of variance was done.

RESULT AND DISCUSSION

The results of various parameters were as follows: Table 1 shows that there was no difference in depression at pre and post testing stage in relation to sex. In relation to age it was found that early teenagers were less depressed than their counter parts at pre testing stage and post testing stage but the difference was non -significant.

Table 2 reflects that there is a significant difference between post test scores of Depression in different treatments. The males and later teenagers seem to be more depressed because they are worried about their future at this stage. During this period they are facing uncertainty for their future. They are searching for their career. It has been proven than Brain tools can produce deep and lasting relaxation to reduce the feeling of loss of control or helplessness that contribute to anxiety and depression.

Table 3 and Figure 1 indicate that all the three treatments are at par. From the Table 3 it is crystal clear that all the three treatments (Post test score) were found to be significantly higher than the post test of Control group. The scores obtained for Super IQ, Faster Learning and Music are 7.9, 9.0 and 9.35 respectively.

The pre-test SRC score for light-sound (Super I.Q.), Light (Faster Learning), Sound (Music) and controls groups were

Table 1. Showing Mean, Standard deviation and `t' value for Depression.

Testing stage	Pre test			Post test		
Gender	**Male**	**Female**	**`t' value**	**Male**	**Female**	**`t' value**
Mean	53.1	53.0		48.7	48.0	
S.D.	3.2	3.1	0.29	4.5	4.1	0.10
`t' value	63.5	64.6		42.0	45.1	
Stages of Teenagers	**Early Teenagers**	**Later Teenagers**		**Early Teenagers**	**Later Teenagers**	
Mean	52.0	54.1		47.0	49.8	
S.D.	3.1	3.0	0.51	4.4	3.7	0.65
`t' value	65.6	70.4		41.0	52.0	

Table 2. Mean squares of pre test and post test score for Depression.

Source of variations	Degree of freedom	Pre test	Post test
Effect between treatments	3	30.30	255.71**
Error (with in)	116	40.97	48.58

**Significant at 0.01 level.

Table 3. Standard deviation and ‘t’ value of pre test and post test scores for depression.

Treatments	Pre test		Post test		`t'value	Gain (%)
	Mean	**S.D.**	**Mean**	**S.D.**		
Super I.Q.	53.63	5.27	49.40	5.17	3.14**	7.9
Faster learning	53.87	6.08	48.97	7.19	2.85**	9.0
Music	51.63	7.36	46.80	8.45	2.36*	9.35
Control	52.90	6.69	53.77	6.67	0.60	-
SEM	1.17		1.27			
C.D. 5%	NS		3.58			

**,* Significant at 0.01 and 0.05 levels, respectively.

53.63, 53.87, 51.63 and 52.93 and the pre-test SRC score for light-sound, Light, Sound and controls groups were 49.40. 48.97, 46.80 and 53.77. Subjects of light-sound, Light, Sound and controls groupshad reduced depression 7.9, 9.0 and 9.35 percents, as shown in Figure 1.

There is powerful evidence that effect of electroencephalographic (EEG) driven photic stimulation on a case of depressive disorder, as measured by a psychometric test of mood states, EEG parameters, and several autonomic indices. The EEG-driven photic stimulation enhances the alpha rhythm of brain wave using photic signals, the brigtness of which is modulated by a subjet's own alpha rhythm. The treatments brought about the following changes: an improvement in general mood state, alpha rhythm increase, cardiac parasympathetic suppression, and increased skin conductance level. In addition, significant correlations between alpha rhythm increase and cardiac parasympathetic suppression or cardiac sympathetic predominance were observed with each inpatient treatment. Significant correlations between alpha rhythm increase, cardiac parasympathetic suppression, or cardiac sympathetic predominance and the improvement of general mood state were also observed. Thus, from these observations, it was concluded that the alpha enhancement induced by EEG-driven photic stimulation produced an improvement in the patient's depressive symptomatology connected with cardiac parasympathetic suppression and sympathetic predominance (Kumano et al., 1996).

There is also evidence that the brain wave asymmetries may be linked to depression. Henriques and Davidson (1990) tested the EEGs of a group of normal subjects who had never been treated for depression, and a group of subjects who had been previously depressed and later successfully treated for depression by giving light, sound stimulation. The finding of the present study also reveals the same that after giving light, sound stimulation to the teenagers they showed a significant decrease in

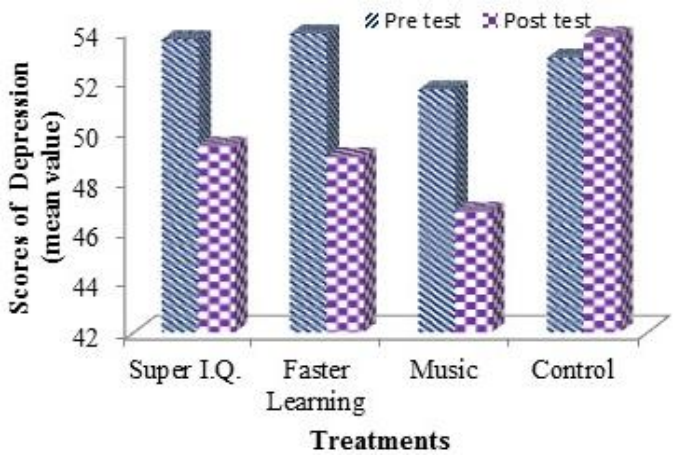

Figure 1. Comparison of SRC scores between groups.

depression as show in Table 3 and Figure 1.

Limitations of this study are that the age range was from 13 to 19 years. A further research can be conducted on pre-teenagers and post teenagers. This investigation emphasis more on depression similar studies can also be conducted on other clinical aspects such as alleviating anxiety, pains, stress, habits, obesity, etc. This study was done on teenagers. Further research can be conducted on different stages of life like adulthood, old age etc.

Conclusions

Mind technology opens up new possibilities for human achievement. These state change tools can be *labour savers* by helping people quickly to get out of inhibiting states and into empowering states, and to change from unwanted behaviors to desired behaviour-something that might have taken hours or days or months before the development of mind technology. The scores for depression shows that there was a significant difference between the post test scores of experimental groups and Control group. All the three treatments were at par. In relation to depression it was observed that there was no significant difference between males and females and early and later teenagers before and after giving interventions.So this path of Light-Sound stimulation seems to be the best for the teenagers for leading a quality life.

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