Pharmacophore

ISSN-2229-5402

Journal home page: http://www.pharmacophorejournal.com

Pharmacophore
an International Journal
ISSN 2229-5402

EVALUATING THE IMPACT OF LAUGHTER THERAPY ON HOPE, SELF-EFFICACY, AND PAIN CONTROL IN PATIENTS WITH CHRONIC LOW BACK PAIN

Shahabizade Fateme[1], Mohammad mehdi Hassanzadeh-Taheri[2], Samine sadat Fatemi [3] , Hesam Moodi [4]*, Mehran Hosseini [5], Asghar Akbari[6] , Mohammadreza Doostabadi[7]

1. Assistant professor, Department of psychology , Azad university, Birjand branch , Birjand, Iran
2. Associate professor, Department of Anatomy, Faculty of Medicine, Birjand University of Medical Sciences,Birjand,Iran
3.Social determinants of health research center ,Birjand University of Medical Sciences, MSC of psychology, Department of Psychology, Islamic Azad University, Birjand,Iran
4.Cardiovascular diseases research center, MSc, Student of anatomical sciences, Dept of Anatomy, Birjand University of Medical Sciences, Birjand, Iran
5.Cellular and Molecular Research Center, Birjand University of Medical Sciences,Birjand,Iran
6.Associate professor, Department of Physiotherapy, Zahedan University of Medical Sciences,Zahedan,Iran
7.MSc of Anatomical Sciences, Department of Anatomy, Faculty of Medicine, Birjand University of Medical Sciences, Birjand, Iran

ARTICLE INFO

Received:
03th Jun 2017
Accepted:
29th Nov 2017
Available online:
14th Dec 2017

Keywords: *laughter therapy, hope, self-efficacy, pain control, chronic lower back pain*

ABSTRACT

Background and objective: Lower back pain is a common skeletal-muscular disorder, so that nearly 80% of people experience it during their lives. The onset of this pain is gradual and it lasts for long time and often lasts for more than three months. Patient response to this therapy is limited. Its cause might be known well. It affects the self-efficacy and hope of patients. As taking drug is costly and has side effects, alternative therapies are always considered. Among these therapies, we can refer to emotional therapy of laughter therapy. In the current research, the researchers aim to evaluate the impact of laughter therapy on hope, self-efficacy, and pain control in patients with chronic low back pain.
Methods: The current research was a semi-experimental study conducted based on a pre-test-post-test design with one experiment group and one control group. To determine the sample size, convenient sampling method was used to assign the 30 patients, admitted to Ferdows Physiotherapy Centers, into experiment group (n=15) and control group (n=15). To collect the data, Miller Hope Questionnaire (1988), Nicholas Self-efficacy Questionnaire (1989), Pain Control Scale, which is 10-point scale, and laughter intervention approved by Package, were used. Finally, the collected data were analyzed using SPSS 22 and at 95% confidence level.
Findings: multivariate covariance analysis findings revealed that laughter therapy increased the post-test scores of hope and self-efficacy in the experimental group, reduced pain control scores, and improved the patients' health status (p 0.001), indicating the impact of laughter therapy on increasing the hope and self-efficacy and reducing the pain in the experimental group compared to control group (p ≤0.001).
Discussion and conclusion: This research revealed that laughter therapy can have a positive impact on hope, self-efficacy, and pain control of the patients, and laughter therapy can be used as a simple, low-cost, and non-invasive method in patients with chronic low back pain.

To Cite This Article: Shahabizade Fateme, Mohammad mehdi Hassanzadeh-Taheri, Samine sadat Fatemi, Hesam Moodi *, Mehran Hosseini [5], Asghar Akbari , Mohammadreza Doostabadi, (2017), "Evaluating the impact of laughter therapy on hope, self-efficacy, and pain control in patients with chronic low back pain", ***Pharmacophore, 8(6S),*** *e-1173662.*

Introduction

Chronic pain is considered as a common experience and a serious problem in elderly people. Its prevalence is high in the elderly people and increases by increased age (1). If this pain is not treated and controlled properly, it would cause reduced

Corresponding Author: Hesam Moodi,Cardiovascular diseases research center, MSc, Student of anatomical sciences, Dept of Anatomy, Birjand University of Medical Sciences, Birjand, Iran. Email: hesammoodi@yahoo.com

mobility, avoidance of activity, depression, anxiety, and sleep disorders in the elderly people. This can result in disability and imposing high costs for patients in the community (2). The health system's general policies should be in line with preventing chronic pain in the community to reduce the pain and its consequences in the community (3). Given great number of complications of this type of pain in patients and the health system, it should be managed and treated seriously to improve their health and quality of life (4). Lower back pain is one of the most important and most common lesions of the musculoskeletal system (5).

Low back pain is a painful pain, which prevents people to perform the everyday tasks and forces them to rest on the bed. Thus, prevention of low back pain has high importance in controlling the disorder and controlling treatment costs. It requires accurate, comprehensive, and complete evaluations in this regard. It noteworthy that pain management is more than reducing the pain, since it involves the ability to work and be productive in addition to improving the quality of life (6). Most of researchers have tried to identify the factors causing variation in the level of adaptation to chronic pain. These efforts have resulted in the development of multi-dimensional social, psychosocial, and biomedical models. It indicates that in addition to biomedical aspect of the pain (pain severity and duration), psychological factors such as factors related to pain and social, environment, and cultural factors play an important role in the way of adapting to pain (7). A research literature in the area of chronic low back pain emphasizes on self-efficacy and catastrophizing as two important cognitive variables (8). Self-efficacy is defined as one's level of confidence in his abilities to maintain the performance in spite of pain (9).

In their research on chronic pain patients, Conseil et al (1988) found that confidence in ability to perform certain activities has correlation with the subsequent performing of the activities (10). In the research conducted by Asghari and Nicholas (2001), a significant relationship was found between self-efficacy beliefs of pain, depression, and disability (11). Their research revealed that low self-efficacy of lower pain in a 9-month period could predict inability and depression. Additionally, it was found that self-efficacy beliefs are correlated with functional levels (12), physical inability, and depression in patients with chronic pain (13). In their research, Hunt (1992) indicated that the level of hope is lower than its usual level in chronic diseases. In addition, patients with chronic physical patients, such as cancer, realize that hope is an important and unconscious part of their thoughts and feelings (14).

Hope has been defined as an inner force, which could cause rich of life and enable patients to have a vision beyond their pain status. The lack of hope and having no goal in life result in reduced quality of life and development of frustrating beliefs (15). Future orientation, positive expectations, purposefulness, realism, goal setting, and inner communication are considered important characteristics of hope. In contrast, frustration is defined as endurance of a non-overcoming status, in which no goal is expected to be achieved, and it is correlated with depression, wish of death and suicide. Definitions suggest that hope include the people perceptions and attention to the future, assuming that positive results will increase the effort of patient (14). Moreover, self-efficacy and hope creates a new and positive attitude toward oneself, others, and the world around him, and as self-efficacy refers to one's own capabilities and skills, it can be said that high level of hope in an individual creates positive view of oneself to use his skills in performing the tasks (16).

All aspects of management of chronic pain are not considered at current to manage this chronic pain, such as low back pain, while using a comprehensive care program paying special attention to all factors facilitating this type of pain leads to effective management of chronic low back pain in people (17). People with chronic illness have various physiological, psychological, and emotional needs. Satisfying of these needs is considered a part of the therapy, so the most useful option, whether in the area of improving the disease or satisfying their needs, are the interventions, which consider psychological therapies in addition to physiological therapies (18).

Laughter therapy is considered as one of the therapies used in this regard, which affects both the body and mind of the patients. In examining the effect of laughter therapy on the hope of elderly women, Behzadi et al (2013) realized that laughter therapy increased the hope of the elderly people (19). Kim et al (2009) realized that laughter therapy reduced fatigue caused by cancer diseases (20). Laughter therapy exercises are a therapy focusing on joking and laughing, used with various methods for each person. This method reduces physical stresses, increases the health level and adaptability of the person (21). Regulating the immune system, laughter reduces the sleep disorders, stress, regulates the blood pressure, reduces pain, and enhances the quality of life, especially in patients with chronic pain (22).

As a result of laughter, the diaphragm goes up and down in the human body, leading to exchanges of oxygen-rich blood and cleaner heart blood. When the hormones caused by psychological stresses are continuously excreted excessively, the immune system would not be able to perform its function completely. For this reason, the conditions are provided for pain and various physical and mental problems, while laughter and happiness can be used a useful weapon to attack this unhealthy cycle of fear and psychological stress (23). Various factors are involved in the loss of self-efficacy and hope in patients, including family problems, poverty, health problems, being rejected by family, spouse death, and anxiety caused by disease. Conducted studies suggest that they can be considered both weaknesses and turning point at the current research. It seems that domestic and foreign studies have not examined the laughter therapy on the hope and self-efficacy of patients with chronic low back pain, so the researchers decided to evaluate the impact of laughter therapy on hope, self-efficacy, and pain control in patients with chronic low back pain.

Methods

The current research was a semi-experimental study based on a pre-test-post-test design conducted to evaluate the impact of laughter therapy on hope, self-efficacy, and pain control in patients with chronic low back pain. Research population included all 100 patients, admitted to Ferdows Physiotherapy Centers, which finally 30 of them were selected as sample size and they were assigned to into experiment group (n=15) and control group (n=15) using convenient sampling method after matching them in terms of age and gender. Inclusion criteria included age, duration of disease, having medical record in Ferdows Physiotherapy Center, having at least secondary level of education, lack of acute physical disease other than chronic low back pain, no history of surgery in the spinal cords. In addition, exclusion criteria of research included simultaneous use drugs affecting the person's performance, patient's dissatisfaction with the treatment sessions or certain person, disruption in the course of proper implementation of the sessions, and absences in two consecutive sessions. Miller Hope Questionnaire (1988), Nicholas Self-Efficacy Questionnaire (1989), and visual analog scale were used .Miller Hope Questionnaire includes two parts of the patient's individual characteristics and the main part of the questionnaire with 48 items, scored in a Likert scale from strongly disagree (score 1) to strongly agree (score 5). In the research conducted by Gholami and et al. (2009), reliability coefficients of Hope Questionnaire were calculated using Cronbach's alpha and split-half method, which they were obtained 0.95 and 0.94, respectively, for the whole scale. It indicates desirable reliability of the questionnaire. Additionally, two methods of Cronbach's alpha and split half methods were used to determine the reliability of the mentioned questionnaire, which coefficients were obtained 0.69 and 0.65 for the total tests. It suggests acceptable coefficients of the questionnaire (16).

Nicholas Self-efficacy Questionnaire includes two parts of the patient's individual characteristics and the main part, which is a 10-item self-reporting tool, in which each item measures the level of patient's ability to perform a group of activities, despite having the pain, based on a 7-point Likert scale (I cannot at all=0 and I can completely=1). The Cronbach's alpha coefficient was reported 0.92 for the Nicholas Self-efficacy Questionnaire (2001). Moreover, the split-half reliability of the questionnaire was reported high with a 3-month interval (11). This questionnaire was standardized by Asghari Moghadam (2009) in Iran (23). He reported the reliability of this questionnaire 0.81 using Cronbach's alpha coefficient, 0.78 using split-half method, and 0.77 using test-retest method, with 9-day interval.

The content of training sessions of laughter therapy

Talking about some cheerful issues briefly, clapping with tone of 1, 2, and 3, movement of hands, pronouncing short and simple sounds, coordinated movements: adding harmonious movements to increase the cheerfulness and happiness, broken and inaudible sounds, laughing exercises, clapping after laughter exercises, performing yoga exercises, positive suggestive sentences, and performing physical group activities.

Findings

The research sample included 30 examined studied in two groups of experiment and control, and they responded to questionnaires of self-efficacy, hope, and pain control. In this research, 17 (56.7%) of subjects were male and 13 (43.3%) of them were female.

Table 1 shows the descriptive statistics of the sample for the variables of hope, self-efficacy, and pain threshold, separately in terms of by pre-test and post-test.

Table 1: Descriptive statistics of the variables of self-efficacy, hope, and pain threshold

		Pre-test		Post-test	
		mean	SD	mean	SD
Hope	experiment	3.503	0.294	3.93	0.252
	Control	3.298	0.420	3.31	0.442
Self-efficacy	experiment	3.37	0.667	4.26	0.677
	Control	3.12	0.704	3.32	0.395
pain threshold	experiment	7.4	1.4	5.27	1.335
	Control	6.07	0.961	6.1	0.91

As shown, the mean in all cases in the pre-test was less than that in the post-test. This difference is significant for experimental group. Thus, it can be guessed that training has a positive impact on hope, self-efficacy, and pain threshold. In this regard, the research hypotheses were examined after confirming the required pre-assumptions.

The covariance analysis results in Table 2 show that the pre-test score of hope has significant impacts on post-test scores. Thus, the initial difference of the pre-test scores of the groups affects post-test scores, and after removing the effect of pre-test scores, findings show a difference between the mean of groups. Considering the Eta square, it can be stated that therapeutic sessions explain 59.6% of the variance of post-test scores of hope after moderating the mentioned effect.

Table 2: Covariance analysis and linearity of the effect of experimental groups on hope

Effect	squares	F	df	Significance level	Eta coefficient
Model	2.6	19.879	2	0.001	0.596
Fixed effect	0.353	5.382	1	0.028	0.166
Pre-test	1.86	28.33	1	0.001	0.512
Group	0.503	7.62	1	0.01	0.203
Error	1.773		27		
Total			30		

Then, these two groups were investigated in the model. The results of this investigation are shown in Table 3.

Table 3: Comparing different groups in terms of hope

Groups	Mean difference	Significance level	Test result
experimental and control groups	0.263	0.006	There is a significant difference between the two groups

The covariance analysis results in Table 6 show that the pre-test score of self-efficacy has a significant impact on post-test scores. Thus, the initial difference of the pre-test scores of the groups affects post-test scores, and after removing the effect of pre-test scores, results show a difference between the mean of groups. Considering the Eta square, it can be stated that therapeutic sessions explain 48.3% of the variance of post-test scores of self-efficacy after moderating the mentioned effect.

Table 4-Analysis of covariance and the linearity of the effect of experimental groups on self-efficacy

Effect	squares	F	df	Significance level	Eta coefficient
Model	5.699	12.625	2	0.001	0.483
Fixed effect	7.566	33.521	1	0.001	0.544
Pre-test	2.563	11.355	1	0.002	0.296
Group	2.07	9.173	1	0.005	0.254
Error	6.094		27		
Total	478.29		30		

Then, these two groups were investigated in the model. The results of this investigation are shown in Table 5.

Table 5: Comparing different groups in terms of self-efficacy

Groups	Mean difference	Significance level	Test result
Experimental and control groups	0.472	0.005	There is a significant difference between the two groups

The covariance analysis results in Table 6 show that the pre-test score of pain threshold has significant impact on post-test scores. Thus, the initial difference of the pre-test scores of the groups affects post-test scores, and after removing the effect of pre-test scores, findings show a difference between the mean of groups. Considering the Eta square, it can be stated that therapeutic sessions explain 49.1% of the variance of post-test scores of pain threshold after moderating the mentioned effect.

Table 6- Analysis of covariance and the linearity of the effect of experimental groups on pain threshold

Effect	squares	F	Df	Significance level	Eta coefficient
Model	22.68	13.041	2	0.001	0.491
Fixed effect	3.517	4.043	1	0.054	0.13
Pre-test	13.051	15.006	1	0.001	0.357
Group	20.158	23.177	1	0.001	0.462
Error	20.482		27		
Total	23.482		30		

Then, these two groups were investigated in the model. The results of this investigation are shown in Table 7.

Table 7: Comparing different groups in terms of pain threshold

Groups	Mean difference	Significance level	Test result
Experimental and control groups	1.89	0.001	There is a significant difference between the two groups

Discussion and conclusion

Many researchers have examined the impact of different therapies and mobility on reducing the chronic lower back pain, but a few studies have been conducted to compare the impacts of laughter therapy. Nowadays, researchers are looking for complementary therapies with the lowest cost and lowest therapeutic side effects, such as laughter therapy, for many reasons, including being costly and lack of inappropriate chemical drugs, and adverse side effects of them. This therapeutic method is used in various groups for treatment of diseases, including breast cancer (20) severe depression and sleep disorder (37), chronic respiratory diseases, (22) and dialysis patients (38).

Using laughter therapy techniques, the current research was conducted to examine its impact on hope, self-efficacy, and pain threshold in patients with chronic low back pain. Findings revealed significant impact of therapeutic sessions on the variables of this research. Findings of the current research are in line with findings of the research conducted by Firouzeh Moghadam et al (2014), Falkenberg et al (2011), Lu et al (2014), Miller et al (2006), who examined on the impact of laughter therapy on hope (25, 26 , 27.28). These studies suggest significant relationship between providing the conditions for happiness and cheerfulness of people and avoiding depression, loneliness, and hope. When patients had higher activity and tried to internalize the laughers and interpersonal pleasant states, they experienced higher cheerfulness. In explaining these findings, it could be stated as laughter yoga and physical movements result in strengthened nervous system of the patients, it would also improve the function of their central nervous system and adjust the degradation speed of the neurons and dendrites' strength (29).

Ripoll et al (2011) showed that performing the physical activities causes mood changes in the person, makes them more activated, and expands their hope due to cognitive changes, dopamine releasing, increasing the cardiovascular activity, increasing the blood flow, and activating more brain cells. Thus, as they feel less loneliness and their frustration would be reduced. In addition, as they become physically more active and their attitude to the life changes, they mood will also change and will feel higher level of happiness (30). Findings of the study conducted by Beckham (2007), Rajabi (2006), and Stujkovick (1998) with regard to impacts of laughter therapy on self-efficacy of people (31, 32, 33) were in line with the findings of the current research. In explaining this finding, it could be stated that self-efficacy has close correlation with different dimensions of patients' lives, such as their health and quality of life. It is clear that several factors are involved in reducing the self-efficacy of patients and paying attention to these factors is crucial. Limited personal and social activities might be considered as one of the most important factors involved in reducing the self-efficacy of patients with chronic pain. However, laughter therapy is plays major preventive factor in this regard, and due to adapting and coping with mental problems of the patients, it can increase the self-efficacy of the patients. Using laughter therapy, the ability to perform daily activities can be enhanced in order to increase the self-efficacy. Self-efficacy of patients is very important .The research conducted by Beckman (2007) suggests the impact of self-efficacy on the various dimensions of the patients' life. For example, it has been shown that self-efficacy is correlated with successful adaptation with the elderly people, quality of life, physical activities, major daily life activities, and self-care in the elderly people [31].

Murrell et al (2003) also concluded that due to increased physical problems, patients experienced more cognitive and physical disorders, reduced physical function, and increased dependence in performing the daily activities, which this issue affected their self-efficacy. All of these findings suggest the importance of coping strategies. Considering the positive impact of laughter therapy, it is hoped that the happiness and cheerfulness of the patients with chronic pain to be increased by constant use of laughter (34, 26). Laughter have numerous positive impacts, for example, it strengthens the immune system, affects the respiratory system, increases the brain endorphin, which is a type of natural morphine. In a study conducted by McGee on pain management by laughter (2004), he concluded that laughter plays significant role in managing and reducing the pain and it increases the pain tolerance of people (35).

In a research entitled "The impact of laughter on moderating the stress of women suffering from migraine", Shieldton (2012) concluded that the prevalence of this type of headache was reduced in these people (36). Lu (2014) also reported that laughter therapy could be useful in physical and mental health of each person, and reduces pain, blood pressure, and heart rate (37). In his research, Flekenberg et al (2011) concluded that laughter therapy and happiness training had a significant impact on pain coping strategies (27, 25). He also found that laughter had positive physiological and psychological messages, leading to improved mood, increased creativity, and reduced pain (27). Finally, it could be stated that during the pain, we can provide conditions for laughter so that the patient does not suffer from pain and he feels that he can good moments despite pain. Laughing also make the patient's thought to be deviated from pain.

Acknowledgment
Our sincere thanks to the authorities and the studious personnel of shfa Physiotherapy Center who helped us in performing this study.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

References

1. Reid MC, Eccleston CH, Pillemer K. Management of chronic pain in older adults. British Medical Journal 2015; 30 (7): 1- 10.
2. Mimi MY, Ho SS. Pain management for older persons living in nursing homes: a pilot study. Pain Management Nursing 2013; 14(2): 10-21.
3. 3-Croft P, Blyth FM, Van der windt D. The global occurrence of chronic pain: an introduction. Chronic pain epidemiology: from aetiology to public health. Oxford: Oxford University Press; 2010 30:p9-18.
4. Weiner DK. Office management of chronic pain in the elderly. The American Journal of Medicine2007; 120(4): 306-15.
5. Bogduk N, Management of chronic low back pain. Med J Aust 2004; 180: 79-83.
6. Darlene Hertling and Randolph M.Kessler. Management of Common Musculoskeletal Disorders: Physical Therapy Principles and Methods, Third Edition, J.B. Lippincott;1996,p:512-610
7. Turk DC, Okifuji A. Psychological factors in chronic pain: evolution and revolution. J Consult Clin Psychol 2002;70: 678-690.
8. Sarda J, Nicholas MK, Asghari A, Pimenta CA . The contribution of self-efficacy and depression to disability and work status in chronic pain patients: A comparison between Australian and Brazilian samples. Euro J Pain2009; 13: 189-195.
9. Nicholas MK . The pain self-efficacy questionnaire: taking pain into account. Eur J Pain2007; 11: 153-163.
10. Council JR, Ahern DK, Follick MJ, Kline CL. Expectancies and functional impairment in chronic low back pain patients. Pain. 1988; 33: 323-331.
11. Asghari A, Nicholas MK. Pain self-efficacy beliefs and pain behavior. A prospective study. Pain2001; 94: 85-100.
12. Geisser ME, Robinson ME, Miller QL, Bade SM . Psychosocial factors and functional capacity evaluation among persons with chronic pain. J Occup Rehabil2003; 13: 259-276.
13. Nicholas MK, Asghari A. Investigating acceptance and adjustment in chronic pain: is acceptance broader than we thought? Pain2006; 124: 269-279.
14. hunt R. Sources of hope in choronic illness. Oncol Nurs Forum. 1992; 19(3):443 - 448
15. Anthony JC. Health psychology. Tranlated by: mohammadi SH. Tehrn: virayesh ;2007.p.103-5 [persion]
16. Snyder, C. R. Hope Theory: Rainbows in the Mind ; Psychological Inquiry, 2002; Vol. 13, No. 4, pp. 249-275 **.**
17. McCarberg BH, Stanos S & Williams DA. Comprehensive chronic pain management: improving physical and psychological function (CME multimedia activity). The American Journal of Medicine2012; 125(6): 1.
18. Mihaly Csikszentmihalyi, Flow and the Foundations of Positive Psychology2014; Springer Netherlands, pp 279-298.
19. Behzadi A, Shahidi M, Farokhi NA, Jafari F. [The effectiveness of Kataria laughter therapy on increasing the level of General health]. J Counsel Res 2013; 12(47):21-5.
20. Kim SH, Kim YH, Kim HJ, Lee SH, Yu SO. The effect of laughter therapy on depression, anxiety, and stress in patients with breast cancer undergoing radiotherapy. J Korean Oncol Nurs. 2009; 9: 155-62.
21. Mora-Ripoll R. Potential health benefts of simulated laughter: a narrative review of the literature and recommendations for future research. Complement Ter Med. 2011;19(3):170-7.
22. Lebowitz KR, Suh S, Diaz PT, Emery CF.Effects of humor and laughter on psychological functioning, quality of life, health status, and pulmonary functioning among patients with chronic obstructive pulmonary disease: a preliminary investigation. Heart Lung 2011; 40:310-9.
23. Shahidi M, Mojtahed A, Modabbernia A, Mojtahed M, Shafabady A & Delavar A. Laughter yoga versus group exercise program in elderly depressed women: a randomized controlled trial. Int J Geriatr Psychiatry. 2011;26 (3):322-7.
24. Asghari A, Nicholas M. (2009). An Investigation of Pain Self-Efficacy Beliefs in Iranian Chronic Pain Patients: A Preliminary Validation of a Translated English-Language Scale. Pain; 10:619-632.
25. Firozeh Moghadam S, Borjali A, Sohrabi F. [The efficiency of happiness training to increase the hope in elderly people]. Iran J Age. 2014;8(4):67-72.

26. Falkenberg,I.Buchkremer, G.Bartels,M.Wild,Barbara.(2011).Implementation of a manual-based training of humor abilities in patients with depression:A pilot study. Psychiatry Research,Volume 186, Issues 2–3, Pages 454-457.
27. Low , L F.Goodenough, B.Fletcher , J.et al.(2014).The effects of humor therapy on nursing home residents measured using observational methods : the SMILE cluster randomized trial. Journal of the American Medical Directors Assosiation . 15:564-572.
28. Miller M et al. (2006). Impact of cinematic viewing on endothelial function. Heart, 92 (2) 261-262.
29. Yeon-Ja Ko, Mi-Yeul Hyun, Effects of Laughter Therapy on Pain, Depression, and Quality of Life of Elderly People with Osteoarthritis. 2013.J Korean Acad Psychiatr Ment Health Nurs. 22(4):359-367
30. Ripoll R. M.(2011).Potential health benefits of simulated laughter: A narrative review of the literature and recommendations for future research. Complementary Therapies in Medicine.Volume19,Issue 3,170-177 .
31. Heidi Beckman ,Nathan Regier,Judy Young, Effect of Workplace Laughter Groups on Personal Efficacy Beliefs, 2007, The Journal of Primary Prevention,Volume 28, Issue 2, pp 167–182
32. Rajabi M, Mojtahed A. (2006). Laughter yoga versus group exercise pro- gram in elderly depressed women: a randomized controlled trial. Int J Geriatr P sychiatry 26:322–7.
33. Stajkovic, A. D., & Luthans, F. (1998). Self-efficacy and work-related performance: A meta-analysis. Psychological Bulletin, 124, 240–261.
34. Murrell SA, Salsman NL, Meeks S. Educational attainment, positive psychological mediators, and resources for health and vitality in older adults. J Aging Health. 2003;15(4):591–615.
35. MC Ghee , paul.(2004).Humor and Health .Wilmington : corexcer .- Melzack , R .Wall , PD.(1965) .Pain mechanism : a new theory.15:971-979.
36. Shitole, Maheshwar D.G & Shitole, Maya Pai (2012). Laughter Is the Most Effective Geriatric Medicine. Online International Interdisciplinary Research Journal.2.71-78.
37. Hirsch RD, Junglas K, Konradt B, Jonitz MF2(010). Humor therapy in the depressed elderly: results of an empirical study. Z Gerontol Geriatr, 43:42–52.
38. Jackson D, (2007) Dialysis laughing. J Ren Nutr 17:220–1.