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Therapeutic Benefits of Laughter

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ABSTRACT

"Laughter is the tonic, the relief, the surcease for pain"- Charlie Chaplin. Laughter has a myriad of health benefits. Its complementary use is gaining acceptance as more research is proving its therapeutic potential in this era of evidence-based medicine. Besides being free and readily available, it practically has no side effects or contraindications. Its benefits have been well demonstrated not only in general medical care but also in the critically ill and dying patients. Health workers should consider using this 'happy' modality in their daily health care interactions.

1. INTRODUCTION

The Oxford University Press defines laughter as, "make the spontaneous sounds and movements of the face and body that are the instinctive expressions of lively amusement and sometimes also of derision". Laughter is an expression of humor. Martin wrote in 2001, "humor involves cognitive, emotional, behavioral, psycho-physiological and social aspects. Laughter is the most common expression of humorous experience. Humor and laughter are also typically associated with a pleasant emotional state." (Martin, 2001) The benefits of humor and laughter have been recorded since biblical times - PSALMS 126:2 'Then was our mouth filled with laughter, and our tongue with singing: they said they among the heathen, The Lord hath done great things for them'; PROVERBS 17:22 'A merry heart doeth good like a medicine: but a broken spirit drieth the bones.' Humor and laughter are finally receiving serious attention in the medical field. Lord Byron said "Always laugh when you can. It is cheap medicine." Dr. W. Fry wrote," Three to five minutes of intense laughter can double the heart rate-the aerobic equivalent of three strenuous minutes on a rowing machine." More recently, Cousins N. exposed the benefits of laughter in his book, "Anatomy of an Illness"

(Cousins, 1979). However, humor and laughter have been difficult to study. As Mark Twain once remarked, "Studying humour is like dissecting a frog--you may know a lot but you end up with a dead frog." In spite of the difficulties, many systematic and objective studies of this pleasant human emotion have recently garnered much needed serious attention. The result has been a plethora of scientific and clinical studies expounding the evidence based benefits of this free complementary therapeutic modality (Bennett et al. 2006). This article briefly reviews the role of humor and laughter, especially mirthful laughter, in the prevention and treatment of health disorders.

2. DISCUSSION

Laughter is ubiquitous in the human population. It has well established physiological, psychological, social and spiritual benefits. Emerging data also substantiates the role of humor and mirthful laughter in beneficially modulating health outcomes (Bennett et al. 2006; Bennett et al. 2007) Used therapeutically, it can help improve the quality of life of many patients.

2.1. Evolutionary and developmental history

Smiling and laughter functions appear to exist in premature forms in squirrel monkeys and juvenile chimpanzees (Van Hoof, 1972). Great apes such as infant and juvenile orangutans, chimpanzees, gorillas, and bonobos produce happy vocalizations when tickled. When analyzed with acoustic and phylo-genetically modalities, these vocalizations provide evidence of a common evolutionary origin for tickle induced laughter in humans (Ross et al. 2009). According to Darwin, laughter evolved in humans to express happiness, and this was associated with a significant survival advantage. (Darwin C, 1872) Smiling and laughter develop during infancy in the humans (Child, 1972; Sroufe et al. 1976). Smiling develops during the first 5 weeks of extrauterine life (Kraemer et al. 1999), while laughter emerges around the fourth month of life (Ruch et al. 2001). These early human emotions play a significant role in defining the infant mother relationship (Fogel et al. 1977).

2.2. Brain and neural correlates of laughter

The neural anatomy of laughter and humor has been studied extensively; however, the data is still somewhat inconsistent. Perception of humor appears to be associated with the frontal and temporal regions, facial reactions and laughter with the dorsal brainstem regions (Ozawa et al. 2000; Tanji, 1996). The ventral brainstem appears to be responsible for inhibiting these reactions (Wild et al. 2003).

2.3. Neurobiological effects of laughter

Laughter is associated with many bio-chemical reactions in the body. These include:

1. Relaxed muscle tone, (Paskind, 1932; Overeem et al. 2004) often lasting up to 45 minutes.
2. Activation of the sympathetic system (Averill, 1969)
3. Increased urinary epinephrine and norepineprine secretion (Levi, 1965)
4. Increased heart rate, respiratory rate and oxygen consumption (Fry, 1971; Fry 1977). A subsequent period of muscle relaxation is associated with a decrease in heart rate, respiratory rate and blood pressure.
5. Decreased anxiety (Yovetich et al. 1990)
6. Decrease in serum cortisol, growth hormone and plasma dopac (Berk et al. 1989).
7. Increased natural killer cell activity (Berk et al. 1989).
8. Increased salivary IgA (Lefcourt et al. 1990).
9. Increased beta-endorphins (Dunbar et al. 2012)

2.4. Medical Benefits of Laughter

The biochemical reactions emanating from laughter can be harnessed therapeutically. Evidence based data has substantiated that humor and laughter can play a strong complementary role in reducing stress, anxiety, depression, pain and improving immune system and the cardiovascular endothelium. Mirthful laughter also imparts limited, benefits of an aerobic workout. There is a dearth of data indicating that laughter plays a complementary therapeutic role in general patient care (Mallett, 1993). Benefits have also been noted in critical care (Leiber, 1976), geriatrics (Williams, 1986), hospice and home care (Hunter, 1997; Balzer, 1993), oncology (Erdman, 1991), terminal and palliative care (Dean, 1997; Herth, 1990), psychiatry (Gelkopf et al. 1993), rehabilitation (Basmajian, 1998), and rheumatology (Matsuzaki et al. 2006).

2.4.1. Stress, anxiety and depression

Laughter has a salutary effect on stress (Bennett et al. 2003). It can be an effective self help tool (Wooten, 1996). Stress related hormones such as cortisol, growth hormone and plasma dopac all show a decrease following the

exhibition of humorous movies (Berk et al. 1989). Anticipatory anxiety is lower in people with the highest sense of humor (Yovetich et al. 1990). Humor and laughter play a role in reducing stress and anxiety in gravely sick patients (Leiber, 1986; Ashworth, 1999). Laughter therapy also benefits patients with depression (Shahidi et al. 2011). Introduction of humor and laughter into high stress workplaces improves creativity, productivity, motivation and morale (Brown, 1991). Laughter also improves personal psychological well being (Huntley, 2009).

2.4.2. Aerobic Exercise

Mirthful laughter is associated with short term 'aerobic exercise' like effects, as evidenced by muscle contractions, sharply fast and sporadic deep breathing (Fry, 1977), increased heart-rate and oxygen consumption (Fry et al. 1988). Controlled studies in healthy students have demonstrated that laughter is associated with significant increases in stroke volume and cardiac output. There are associated decreases in arterio-venous oxygen difference and total peripheral resistance (Boone et al. 2000). Laughter also helps motivate the elderly to participate in physical activity and to adhere to exercise programs (Hirosaki et al. 2013).

2.4.3. Pain reduction

Incorporation of laughter lead to a significant reduction of pain in ankylosing spondylitis, as was documented by Normal Cousins (Cousins, 1979). Laughter raises discomfort thresholds, and the ability to tolerate pain is enhanced after exposure to humorous movies (Cogan et al. 1987; Dunbar et al. 2012). According to one study, there was a 61% decrease in requests for minor analgesics (eg, aspirin, minor tranquilizers) on the second day after surgery (Rotton et al. 1996).

2.4.4. Improved immunity

Several clinical and experimental studies have documented that humor and laughter results in an increase in salivary IgA, (Lefcourt et al. 1990) and an improved or increased NK activity (Bennett et al. 2003).

2.4.5. Reduction in blood pressure

Blood pressure increases with the onset of mirthful laughter but is then followed by a brief decrease following its cessation. In a study involving 200 individuals involved in a regular practice of mirthful laughter, there was a: 6.18 mm/Hg reduction in systolic blood pressure 3.82 mm/Hg reduction in diastolic blood pressure (Chaya et al. 2008). A reduction in blood pressure, as noted in this study, should result in clinical measurable reductions in major cardiovascular events.

2.4.6. Endothelial benefits

Positive emotions like laughter have salutary effects on the endothelium (Miller et al. 2009). When compared to mental stress, mirthful laughter increases flow mediated vasodilatation while the former reduces it (Miller et al. 2006). Blood vessels constricted by as much as 30% to 50% on watching the stressful opening scene of Saving Private Ryan. Vasodilation occurred in subjects watching comedies – 'There's something about Mary', 'Shallow Hall' and 'Kingpin' (Miller et al. 2011). This positive endothelial benefit may translate into reduced atherogenic vascular disease in the future.

2.5. Humor in medical practice

Health care workers using cautious humor find improved communication and a resultant increased patient satisfaction and decreased malpractice risks (Wender, 1996). It improved working relationships and morale (Cushner et al. 1989) and results in a more satisfying patient care (Beck, 1997). Humor is commonly used during medical presentations and in medical literature (Ziegler, 1998).

2.6. Laughter and adverse effects

Laughter can rarely trigger asthma (Liangas et al. 2004). Laughter induced syncope has been reported, though extremely rare (Haddad et al. 2013). Similarly laughter has rarely been associated with seizures (Mainali et al. 2013). Although laughter is almost always positive, laughing at someone or a misjudged humorous comment may cause an emotional harm.

2.7. Pathological laughter

Pathological laughter occurs without a stimulus and is inappropriate, unrestrained and usually uncontrollable (Black, 1982). It is rare and usually involves diseases such as pseudo-bulbar palsy, gelastic epilepsy, multiple sclerosis, tumors

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in the cerebello-pontine region or psychiatric illnesses (Parizi et al. 2001). Antidepressant and antimanic agents have some role in the treatment of disorders of laughter (Mendez et al. 1999).

3. CONCLUSIONS

Health care workers should consider laughter therapy as a effective complementary modality to help ease pain and suffering in all aspects of medical care. Evidence based data establishes that humor and mirthful laughter:

1. Improves several health parameters, including stress and anxiety, immunity, pain, and cardiovascular health. It improves the psychological, social and spiritual quality of life in patients. Overall, it improves patient care.
2. Improves physician patient communication.
3. Reduces stress in the healthcare giver.
4. Increases motivation and improves comprehension in medical education.
5. Keeps medical lectures and literature interesting.

And finally, it is free, always available, practically without any contraindications or side effects and is a pleasing experience. It is a universal language.

REFERENCES

1. Ashworth P. Humour--a critical faculty in critical care nursing?. *Intensive Crit Care Nurs*. 1999, 15(5), 245-6
2. Averill J. Autonomic response patterns during sadness and mirth. *Psychophysiology*, 1969, 5, 399-414
3. Balzer JW. Humor—a missing ingredient in collaborative practice. *Holist Nurs Pract*. 1993, 7(4), 28-35
4. Basmajian JV. The elixir of laughter in rehabilitation. *Arch Phys Med Rehabil*. 1998, 79(12), 1597
5. Beck CT. Humor in nursing: A phenomenological study. *Int J Nurs Study*, 1997, 34, 346-352
6. Bennett MP, Lengacher CA. Humor and laughter may influence health. I. History and background. *Evid Based Complement Alternat Med.* 2006, 3, 61-3
7. Bennett MP, Lengacher CA. Humor and laughter may influence health. II Complementary therapies and humor in a clinical population. *Evid Based Complement Alternat Med*. 2006, 3, 187–90
8. Bennett MP, Lengacher C. Humor and Laughter May Influence Health IV. Humor and Immune Function. Advance Access Publication 5, 12, 2007 and I, II, III
9. Bennett MP, Zeller JM, Rosenberg L, McCann J. The effect of mirthful laughter on stress and natural killer cell activity. *Altern Ther Health Med*. 2003, 9(2), 38-45
10. Berk LS, Tan SA, Fry WF, Napier BJ, Lee JW, Hubbard RW, Lewis JE, Eby WC. Neuroendocrine and stress hormone changes during mirthful laughter. *Am J Med Sci*. 1989, 298(6), 390-6
11. Berk L, Tan S, Napier B, Evy W. Eustress of mirthful laughter modifies natural killer cell activity. *Clin Res*. 1989, 37, 115A
12. Black DW. Pathological laughter. A review of the literature. *J Nerv Ment Dis*. 1982, 170(2), 67-71
13. Boone T, Hansen S, Erlandson A. Cardiovascular responses to laughter: a pilot project. *Appl Nurs Res*. 2000, 13(4), 204-8
14. Brown L. Laughter: the best medicine. *Can J Med Radiat Technol*. 1991, 22(3), 127-9
15. Chaya MS, Kataria M, Nagendra R, et al. American Society of Hypertension 2008 Annual Meeting; May 14, 2008; New Orleans, LA
16. Cogan R, Cogan D, Waltz W, McCue M. Effects of laughter and relaxation on discomfort thresholds. *J Behav Med*. 1987, 10, 139-144
17. Cousins N. Anatomy of an Illness as Perceived by the Patient: Reflections on Healing and Regeneration. New York, W.W. Norton, 1979
18. Cushner FD, Friedman RJ. Humor and the physician. *South Med J*. 1989, 82, 51-52
19. Darwin C. The expression of the emotions in man and animals. London: John Murray; 1872
20. Dean RA. Humor and laughter in palliative care. *J Palliat Care*, 1997, 13(1), 34-9
21. Pearce E, van Leeuwen EJC, Stow J, Partridge G, MacDonald I, Barra V, van Vugt M. Social laughter is correlated with an elevated pain threshold. *Proc Biol Sci*. 2012, 279(1731), 1161-7
22. Erdman L. Laughter therapy for patients with cancer. *Oncol Nurs Forum*, 1991, 18(8), 1359-63
23. Fogel A, Dickson KL, Hsu H, Messinger D, Nelson-Goens GC, Nwokah E. Communication of smiling and laughter in mother-infant play: research on emotion from a dynamic systems perspective. *New Dir Child Dev*. 1997, 77, 5-24
24. Fry W. Mirth and oxygen saturation levels of peripheral blood. *Psychother Psychosom*. 1971, 19, 76-84
25. Fry W. The respiratory components of mirthful laughter. *J Biol Psychol*. 1977, 19, 39-50
26. Fry W, Savin W. Mirthful laughter and blood pressure. *Humor: Int J Humor Res*. 1988, 1, 49-62
27. Gelkopf M, Kreitler S, Sigal M. Laughter in a psychiatric ward. Somatic, emotional, social, and clinical influences on schizophrenic patients. *J Nerv Ment Dis*. 1993, 181(5), 283-9
28. Haddad C, Haddad-Lacle JE. Laughter-induced syncope. *BMJ Case Rep*. 2013, pii: bcr2013010169. doi: 10.1136/bcr-2013-010169
29. Hirosaki M, Ohira T, Kajiura M, Kiyama M, Kitamura A, Sato S, Iso H. Effects of a laughter and exercise program on physiological and psychological health among community-dwelling elderly in Japan: randomized controlled trial. *Geriatr Gerontol Int.* 2013, 13(1), 152-60
30. Herth K. Contributions of humor as perceived by the terminally ill. *Am J Hosp Care*, 1990, 7(1), 36-40
31. Hunter P. Humor therapy in home care. *Caring*, 1997, 16(9), 56-7
32. Huntley MI. Take time for laughter. *Creat Nurs*. 2009, 15(1), 39-42
33. Kraemer M, Abrahamsson M, Sjostrom A. The neonatal development of the light flash visual evoked potential. *Doc Ophthalmol*. 1999, 99, 21–39
34. Lefcourt H, Davidson-Katz K, Kueneman K. Humor and immune-system functioning. *Humor: Int J Humor Res*. 1990, 3, 305-21
35. Leiber DB. Laughter and humor in critical care. *Dimens Crit Care Nurs*. 1976, 5, 162-70

Shashi K Agarwal,
Therapeutic Benefits of Laughter,
Medical Science, 2014, 12(46), 19-23,
http://www.discovery.org.in/md.htm

36. Levi L. The urinary output of adrenalin and noradrenalin during pleasant and unpleasant emotional states. *Psychosom Med*. 1965, 27, 403-19
37. Liangas G, Yates DH, Wu D, Henry RL, Thomas PS. Laughter-associated asthma. *J Asthma*. 2004, 41(2), 217-21
38. Mainali NR, Jalota L, Aryal MR, Schmidt TR, Badal M, Alweis R. Laugh-induced seizure: a case report. *J Med Case Rep*. 2013, 13, 7, 123
39. Mallett J. Use of humour and laughter in patient care. *Br J Nurs*. 1993, 2(3), 172-5
40. Martin R. Humor, laughter, and physical health: methodological issues and research findings. *Psychol Bull*. 2001, 127, 504–19
41. Matsuzaki T, Nakajima A, Ishigami S, Tanno M, Yoshino S. Mirthful laughter differentially affects serum pro- and anti-inflammatory cytokine levels depending on the level of disease activity in patients with rheumatoid arthritis. *Rheumatology (Oxford)*. 2006, 45(2), 182-6
42. Mendez MF, Nakawatase TV, Brown CV. Involuntary laughter and inappropriate hilarity. *J Neuropsychiatry Clin Neurosci*. 1999, 11(2), 253-8
43. Miller et al. Data presented at the European Society of Cardiology (ESC) Congress, 2011
44. Miller M, Fry WF. The effect of mirthful laughter on the human cardiovascular system. *Med Hypotheses*, 2009, 73(5), 636-9
45. Miller M, Mangano C, Park Y, Goel R, Plotnick GD, Vogel RA. Impact of cinematic viewing on endothelial function. *Heart*, 2006, 92, 261–262
46. Overeem S, Taal W, Ocal Gezici E, Lammers G, Van Dijk J. Is motor inhibition during laughter due to emotional or respiratory influences? *Psychophysiology*, 2004, 41, 254-8
47. Ozawa F, Matsuo K, Kato C, Nakai T, Isoda H, Takehara Y, Moriya T, Sakahara H. The effects of listening comprehension of various genres of literature on response in the linguistic area: an MRI study. *Neuroreport*. 2000, 11, 1141–3
48. Parvizi J, Anderson SW, Martin CO, Damasio H, Damasio AR. Pathological laughter and crying. A link to the cerebellum. *Brain*, 2001, 124(9), 1708-1719
49. Paskind J. Effects of laughter on muscle tone. *Arch Neurol Psychiatry*, 1932, 28, 623-8
50. Ross M, Owren MJ, Zimmermann E. Reconstructing the evolution of laughter in great apes and humans. *Curr Biol*. 2009, 19(13), 1106-11
51. Rotton J, Shats M. Effects of state humor, expectancies, and choice on postsurgical mood and self-medication: A field experiment. *J Applied Soc Psychol*. 1996, 26, 1775-1794
52. Ruch W, Ekman P. The expressive pattern of laughter. In: Kaszniak A, editor. Emotion, qualia and consciousness. Tokyo: World Scientific; 2001. p. 426–43
53. Shahidi M, Mojtahed A, Modabbernia A, Mojtahed M, Shafiabady A, Delavar A, Honari H. Laughter yoga versus group exercise program in elderly depressed women: a randomized controlled trial. *Int J Geriatr Psychiatry*, 2011, 26(3), 322-7
54. Sroufe LA, Waters E. The ontogenesis of smiling and laughter: a perspective on the organization of development in infancy. *Psychol Rev*. 1976, 83(3), 173-89
55. Sroufe LA, Wunsch JP. The development of laughter in the first year of life. *Child Dev*. 1972, 43(4), 1326-44
56. Tanji J. New concepts of the supplementary motor area. *Curr Opin. Neurobiol*. 1996, 6, 782–7
57. Van Hoof JA. A comparative approach to the phylogeny of laughter and smiling. In: Hinde RA, editor. Non-verbal communication. London: Cambridge University Press; 1972. p. 209-41
58. Wender RC. Humor in medicine. *Prim Care*, 1996, 23, 141-154
59. Wild B, Rodden FA, Grodd W, Ruch W. Neural correlates of laughter and humour. *Brain*, 2003, 126(Pt 10), 2121-38
60. Williams H. Humor and healing: therapeutic effects in geriatrics. *Gerontion*, 1986, 1(3), 14-7
61. Wooten P. Humor: an antidote for stress. *Holist Nurs Pract*. 1996, 10(2), 49-56
62. Yovetich N, Dale A, Hudak M. Benefits of humor in reduction of threat-induced anxiety. *Psychol Rep*, 1990, 66, 51-8
63. Ziegler JB. Use of humour in medical teaching. *Med Teach*. 1998, 20, 341-348