The Effect of Laughter on Stress and Natural Killer Cell Activity

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Abstract
Aim: To find out the effect of laughter on stress and natural killer cell activity.

Background and reason: Stress is a well-known slow killer, is rampant in our society, which impact everyone differently, but the final results are easy to observe and explain. Laughter triggers the release of a cocktail of happy chemicals, including NK cells, endorphins, serotonin, and growth hormone that are produced each time we laugh that boosts the immune responses. Laughter stimulates circulation and helps muscle relaxation which is releasing stress. Effect of laughter on stress and natural killer cells are to be reviewed as laughter significantly can reduce stress as well as improve the natural killer cells activity. Thorough literature research performed with present inclusion and exclusion criteria.

Keywords: stress, natural killer cells, endorphins, apoptosis, enzymes

INTRODUCTION
Laughter is the best way to reduce stress in people live, and can aid us to deal and survival a stressful lifestyle. Since 20 years ago, it is frequently documented by psycho-neuro-immunological (PNI) research related to different types of stressors which lead to interactions among the neurological, endocrine, and immune systems that results in decrease of immune functioning and resistance towards disease (1-3). The research is however limited as to the interventions that are highly effective modify the effects of immune function stress. Instead, few interventions has been carried out and being published to the people without their effectiveness and action mechanisms data.

Many individuals have contributed to the modern therapeutic laughter history. In 1979, Norman Cousins, celebrated political writer published a book Anatomy of an Illness. In his book, he described a possible fatal disease he contracted in 1964. He discovered the advantages of humor and other positive emotions in fighting the disease. He found that a 10 minutes of mirthful laughter provided him two hours of pain-free sleep (4). His discovery baffled the science community and have encouraged a numerous of research projects afterwards.

In late 1960s, Dr. William F. Fry, a psychiatrist of Stanford University, California, started to examine the physiological effects of laughter. Due to this, he was well known as the father of ‘gelotology’ (the laughter science). He managed to prove that mirthful laughter gives good physical exercise and able to reduce the possible of respiratory infections. Dr. Fry has proven that endorphins which are natural painkillers is produced by the body when people laugh (5).

Dr. Lee Berk from Loma Linda University Medical Centre and his researcher team from the psycho-neuro-immunology (PNI) field began to study the mirthful laughter physical impact after getting inspired by Norman Cousins. In a study, a group of heart attack patients were separated into two smaller groups; the first group was situated under standard medical care whereas the second group watched humorous video for about 30 minutes per day. After a year, there were fewer arrhythmias in the ‘humor’ group, and thus needed lesser medication doses. The other group had two and a half times more recurrent heart attack compared to the humor group (50% vs. 20%) (6).

Dr. Annette Goodheart is a psychotherapist and she invented laughter therapy and laughter coaching. She has been using laughter to cure cancer, AIDS, depression and other diseases for 36 years (7).

Dr. Madan Kataria, a Mumbai, India medical doctor was writing an article Laughter-The Best Medicine for a health journal in March 1995. Particularly, he was impressed by the book Anatomy of an Illness written by Norman Cousins in 1979 and also the research done by Dr. Berk. Dr. Kataria found that our body cannot distinguish between acted and genuine laughter. Therefore, he created a several of laughter exercises including the role-play elements and other techniques. He is known as a creator of Laughter Yoga (8).

In September 2011, a research demonstrating that non-stop laughter significantly enhances people’s pain threshold up to 10% was published by the academics from Oxford University (9).

Thus this review is done to find out the effect of laughter on both stress and NK cells activity.

How laugh can be beneficial?
Based on the survey done on the cancer patients of rural Midwestern, almost 90% of the respondents were using minimum one complementary or additional intervention together with main field medical care (10). Prayer is the major intervention recorded followed by humor. Half of the respondents were currently using humor-intervention,
Humour is one of the well-known cognitive-behavioural interventions. However, more studies are required to show its efficiency in this field (11, 12). It has been shown that humor can be used to reduce stress, relieve pain or as an adjuvant (a substance that enhances the immune responses of body towards antigen) therapy to increase the life quality (13-15). Studies done by Bennet et al (16) illustrates the role of laughter as mood enhancer; psychological measures of stress reducer, and also acts in the reduction of perception of pain. Release of psychological tension, that acts as a buffer of stressful events on affect is involved in the mechanisms that underlie these effects.

It is also possible that physiological factors are involved in reducing stress. For instance, laughter can cause the alters in heart rate, temperature of the skin, blood pressure, pulmonary ventilation, skeletal muscle and brain activity, all of which may result in the improvement of overall well-being (17).

The prevention of production of stress hormone such as cortisol by laughter (18) may improve immune function (19). Laughter increases the secretion of immune-enhancers such as beta-endorphin which also improve the immune function (20-21).

Health may be influenced by the humor, as reported by PNI theory (22) and several humor studies (23), via the stress chemicals and immune enhancement moderation (24).

Increased levels of salivary immunoglobulin A (IgA) is an evidence of the exposure to a humorous stimulus (25). However, few investigators against the use of IgA as a measure of immune function due to differences in an individual salivary flow rate and the application of stimulated and non-stimulated samples in various studies (26, 27).

Therefore, natural killer, NK cell activity was used in this study instead of IgA as the immune function measure as it assays shows the clearest result in this research field (1, 28).

How NK cell activity affected by laugh?
Natural killer cells has an important role in the host-rejection of both tumors and infected cells that easily spread. They are cytotoxic, have cytoplasm which reside special proteins known as perforin and proteases, called as granymes. Perforin, as it releases close to a cell slated for killing, it produces pores. The formed pores in the target cell membrane allow the entering of granymes and other molecules, thus inducing apoptosis. Apoptosis can cause destruction of virus. The activation of NK cells are due to response of interferon. The immune response is adapted and clear the infection as it contains viral infection by releasing antigen-specific cytotoxic T cells (30). Thus, people with less or scant NK cells susceptible to herpes virus infection.

By laughing, the subjects showed the reduction of glucocorticoids levels. The glucocorticoids, as its level elevates, have shown that it could reduce the NK cell activity (31). Glucocorticoids is believable can affect the activity of NK cell. Furthermore, laughter reduce the levels of both epinephrine and norepinephrine, indicating lower stress levels (5).

There were four evidences shown that humorous stimulus could affect NK cell activity. Overall, all evidences showed that NK cell activity reduced significantly after watching. In the studies, all participants’ blood samples were taken and examined before and after watching the humorous and distressing videos. As expected, NK cell activity were decreased to those who watched humorous video in comparison to those who watched distressing video, which NK cell activity elevated (31).
Use of Humor as a Complementary Intervention to Reduce Stress

In the study done by Bennet et al (10) indicate that exposure to a humorous stimulus can considerably reduce self-reported stress levels. Increased mirthful laughter, as measured on the HRS, correlated with reduction in stress scores following the humorous video. The stress reduction following mirthful laughter found in this study is supported by other findings. A study of dental patients and stress found that patients who joked and laughed prior to dental surgery reported with less psychological stress (32). A study of the effects of mirthful laughter on physiological measures of stress found that cortisol decreased more quickly in persons who laughed compared with persons in the control group (33).

As evidenced by this study, it appears that a momentary period of mirthful laughter may reduce psychological and physiological measures of stress for an uncertain amount of time.

Stress and Immune Function

Less positive change in NK cell activity is determined in participants who participated in these researches. Only on male participants in addition to only small number that showed laugh affects the NK cell activity were done since 20 years ago. However, the research is still in the early phase. Besides, the evidences that showed laugh affects the NK cell activity were done only on male participants in addition to only small number of participants participated in these researches. Thus, further investigations should be conducted on various condition, upon healthy and to those whom suffering cancer such as breast cancer in woman.

CONCLUSION

Humor appeals to both non-healthcare professionals and health-care professionals in a similar manner. Laugh is believed can make someone feel better, thus can help them to recover. However, more research can be done to prove the effect of laugh or humor on healing. The studies done showed a positive NK cell activity for those having decreased stress levels and vice versa. Research on the effects of laughter on stress and immune function has been done since 20 years ago. However, the research is still in the early phase. Besides, the evidences that showed laugh affects the NK cell activity were done only on male participants in addition to only small number of participants participated in these researches. Thus, further investigations should be conducted on various condition, upon healthy and to those whom suffering cancer such as breast cancer in woman.

REFERENCES