Journal of Nurses & Midwives Pakistan

SHORT COMMUNICATION

Biofeedback intervention for Psychophysiological disorders in Healthcare Professional; A Pakistani Perspective

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DOI: XXXXXXXXXXXXXXXXXXXXXXXXX

Citation:
Sajid U, Ahmed S & Noushad S. Pakistan at a dearth of nurses: Biofeedback intervention for Psychophysiological disorders in Healthcare Professional; A Pakistani Perspective. JNMP. 2021;1(2): 45-52.

Corresponding Author Email:
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Funding:
The author(s) received no specific funding for this work.

Conflicts of Interests:
The authors have declared that no competing interests exist.

Received 02/10/2021
Accepted 10/11/2021
First Published 31/12/2021

Abstract

Biofeedback training is suggested to be an effective form of intervention to help individuals in public health reduce the level of stress, anxiety, depression, chronic back pain, and many other psychological and physiological disorders. All across the globe, it is observed that medical practitioners and students experience the worst anxiety and stress levels throughout their training and education programs, eventually giving rise to several different psychophysiological disorders. This short communication focuses on human studies on biofeedback treatment and psychological and physiological problems and conditions in healthcare workers for the last ten years. All the studies focusing on biofeedback intervention, stress, anxiety, depression, and back pain were included. It is suggested that Biofeedback interventions, training, and programs are indeed helpful and efficacious in reducing and managing stress, anxiety, and depression in healthcare workers. Moreover, chronic low back pain is also suggested to manage by using biofeedback. However, no interventional study has been conducted on the Pakistani population that can show the efficacy level of the biofeedback intervention in treating psychophysiological disorders.

Keywords

Biofeedback, Psychophysiological Disorders, Depression, Back Pain, Anxiety, Health Care Professionals

Introduction

Healthcare professionals, including nurses, midwives, and nursing students across the world, experience various psychophysiological problems, including stress and anxiety throughout their educational and training period[1,2,3]. Several different issues, including academic and clinical challenges, advancement of technology, interpersonal difficulties, financial and family problems, physical and mental health issues, inadequate support, and poor coping skills, can contribute to the individual psychological and physiological disorders[4]. Moreover, cultural adjustments, language barriers, social isolation, and discrimination are the additional stressors for health care professionals[4]. The distress level of healthcare workers and students increases as they start to apply the theoretical knowledge they gain to their clinical work in their patients. This stress level increases when they are being observed by their clinical instructors/trainers or peers[5,6].

Several interventions have been used to help healthcare professionals and students cope with psychophysiological disorders and problems[4]. In this regard, one possible and effective alternative is biofeedback intervention[7]. These biofeedback interventions effectively treat individuals with mental health issues[8,9]. Since the late 1960s, it has been in use. It is considered the self-regulatory process of mind and body that helps individuals improve their health and performance. Individuals using biofeedback equipment can become aware of their physiological function to learn to modify their feelings, thoughts, and behavior, which helps them make positive changes to the specific physiological function. Biofeedback interventions and training are suggested to be effective for individuals suffering from stress, depression, anxiety, and other related conditions[10].

Biofeedback training can be conducted using electroencephalograph (EEG), electromyography (EMG), electrocardiogram (ECG), electrodermograph (EDG), and heart rate variabilities (HRV)[7]. The current communication sought to determine whether the biofeedback intervention could be implemented and used to treat psychophysiological problems and disorders in healthcare professionals. Moreover, its prevalence in the healthcare workers, keeping in mind the Pakistani perspective, is also observed since no study has been conducted that uses the biofeedback intervention as a treatment for psychophysiological problems in the Pakistani healthcare setting.

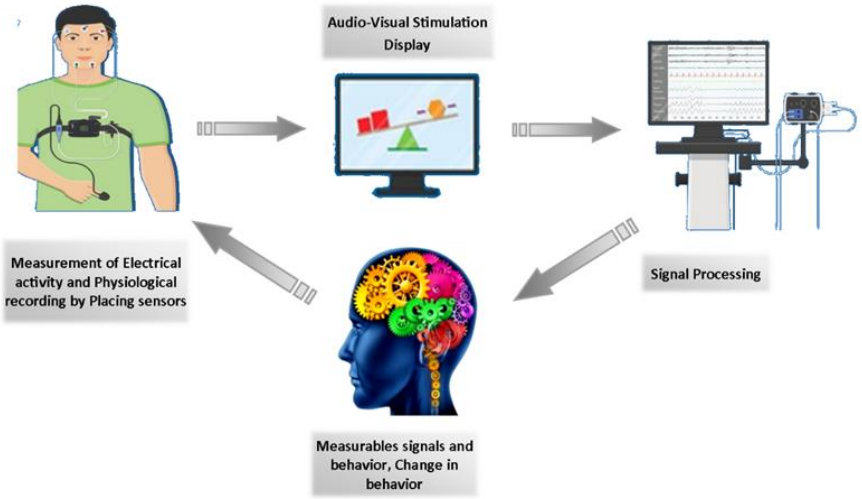

Figure 1: Flow diagram showing Biofeedback Loop.

Methodology

A search strategy was employed on electronic databases, including Google scholar, to determine whether the biofeedback intervention could be implemented and used to treat psychophysiological problems and disorders in healthcare professionals. Moreover, its prevalence in the healthcare workers, keeping in mind the Pakistani perspective, is also observed since no study has been conducted that uses the biofeedback intervention as a treatment for psychophysiological problems in the Pakistani healthcare setting. The terms such as Biofeedback Intervention, Healthcare workers, Nurses, Depression, Anxiety, Back pain, Psychophysiological disorders, and Pakistan were utilized for search. Human studies focusing on biofeedback treatment and psychological and physiological problems and conditions in the healthcare workers and graduate students of health science of last ten years were identified and included. However, in Pakistan, we found that no study has been conducted that suggests the use of biofeedback intervention to treat the psychophysiological problems in healthcare professionals and graduate students.

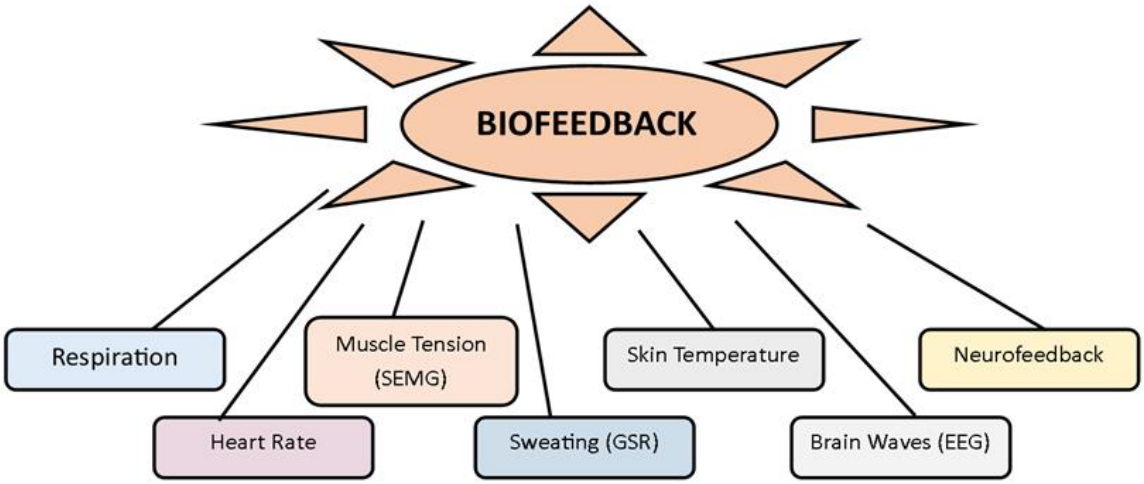

Figure 2: Different forms of Biofeedback Modalities

Anxiety and Healthcare Professionals

Biofeedback interventions help diagnose and treat many functional disorders, including irritable bowel syndrome, fibromyalgia, chronic fatigue syndrome, anxiety, depression, myofascial pain or non-cardiac chest pain, and more[11]. For healthcare workers, including nursing students and graduates, biofeedback training is suggested to be effective in dealing with stress levels, anxiety, and depression[12]. Healthcare workers, especially nurses and midwives, are advised to face several challenges, including personal and financial problems concerning other life stressors[13]. If reached its worst condition, unmanaged stress can lead to extreme anxiety and violent behavior, followed by incapacitation and depression, generating suicidal thoughts in an individual. All these symptoms of stress, depression and anxiety among healthcare workers and nursing students needed to be managed to stop their negative impact on their physical and mental health, relationships, academic and professional performances[12].

Recent research indicates that biofeedback, specifically mindfulness meditation, significantly reduces stress and anxiety levels in nurses, midwives, and nursing students despite several stressors and demands that they experience in their clinical practice and study period[14,15]. A study conducted to evaluate the effectiveness of brief mindfulness-based stress reduction intervention on after-degree nursing students' stress suggests that a meta-theme of self-awareness and more efficient and effective

detection and management of stress impacted the study participants positively[15]. Moreover, many forms of biofeedback interventions in the form of stress-management programs are also suggested to reduce the anxiety of nursing students[16]. Along with stress-management programs, interventional relaxation workshops have also been evaluated in managing levels of anxiety, depression, and stress[17]. Cognitive restructuring or modification used with biofeedback techniques is found efficacious for self-relaxation, which reduces the anxiety level in nurses and nursing students, since stress levels among the health professionals are the most current issue that merits interest[18,19]. For stress, problem-solving strategies have been suggested as the best in coping with stress, while coping strategies based on emotions have been the least effective[20].

Healthcare workers with depression

Most psychiatric disorders are suggested to be treated by non-invasive and efficacious psychophysiological biofeedback interventions. It is estimated that 74% of individuals suffering from mental health problems globally do not receive pharmaceutical psychological treatment[21]. Therefore, cognitive and behavioral strategies that are innovative and easy have been introduced to treat depression and other related mental disorders. It is suggested that any general physician or healthcare worker can easily implement these strategies[21]. Biofeedback-based cognitive and behavioral therapy and treatment are recommended to help young one's deal with their stress-related medical conditions to learn and control their physiological reactions over time[22]. Biofeedback intervention is considered a cost-effective tool that allows healthcare workers and graduate students in nursing to help treat their stress, depression, and anxiety[23].

In the current situation of the COVID-19 pandemic, most healthcare workers and professionals are afraid of getting infected and infecting other individuals and their loved ones. This fear generally generates the feeling of being responsible for the mental and physical well-being of the patients and other difficult situations that the frontline healthcare professionals have to face[24]. Current research on healthcare workers in China suggests that 50% of the staff suffer from depression, 34% deal with insomnia, while 71% of the workers have to deal with general distress[24]. It is believed that healthcare professionals dealing with high stress have harmful physiological adaptations that are likely to be associated with increased activation of the sympathetic nervous system (SNS)[25]. The biofeedback approach based on heart rate variability aims to stimulate respiratory sinus arrhythmia and the exercise's repetition. This results in increased flexibility of the individual and elevates the capacity to recover the cardiovascular system from stress and depressed state[25,26].

Biofeedback and Back Pain in Healthcare Professionals

Lower back pain is one of the most common conditions healthcare professionals have to deal with globally. However, this physiological condition is suggested to be one of the costly conditions globally[27]. To minimize the burden of this condition, several different interventions have been suggested to be beneficial for lower back pain management[28]. Biofeedback intervention, including interdisciplinary rehabilitation, exercise, acupuncture, and cognitive-behavioral therapy, are considered the cost-effective management treatment for chronic low back pain[29].

Since the 1980s, motion-sensor biofeedback systems have been used with some promising results to manage low back pain. However, earlier than these interventions were mainly restricted to the laboratory settings since the equipment used was not considered portable[30]. With the advancement in research, patients can now use biofeedback to monitor their regular daily activity. On the other hand, the clinician can also receive a detailed log of the patient's movement throughout the day. The clinician or the trainer then using the ambulatory session data can remind the individual of optimal movement and posture based on the patient's condition[31].

Biofeedback Intervention for Functional Disorders

On a historical basis, individuals labeled as hypochondriasis or diagnosed with different functional disorders, including irritable bowel syndrome, chronic fatigues syndrome, myofascial pain, and more, are suggested to be heavily medical consumers. Since most of the patients with the diagnosis mentioned above do not meet the diagnostic criteria of DSM, psychophysiological models with psychological processes are now being used to explain the functional changes in the physiological symptoms of these disorders[32]. In this regard, researchers have now developed a mechanism between the Gut and brain to understand the physiological process of irritable bowel syndrome[32]. Moreover, with development and more research, trigger points have been suggested to have a sympathetic innervation in maintaining emotional and psychological factors[32]. With panic disorders, many researchers have pointed out the instability of the autonomic and respiratory factors as the primary causative issue of the disorder[33].

Regarding the chronobiological disorders, including fibromyalgia and chronic fatigue syndrome, 24hr rhythms have been characterized as disordered, summarized by endocrine, CNS, and immune data. All this can generate pain, fatigue, cognitive impairment, etc[34]. All the evidence mentioned above from studies has demonstrated that biofeedback interventions can be submerged into the primary health care settings for the treatment of functional disorders. By integrating the biofeedback treatment in the primary setting, one can change the attribution of etiology of the patient to bio-psycho-social or psychophysiological mechanism from the classic biomedical or psychiatric mechanism. Thus, biofeedback is considered a useful component in the treatment protocol of functional disorders[11].

Along with irritable bowel syndrome and cognitive fatigue syndrome, biofeedback techniques in the last years have also been evaluated to be efficacious in treating fecal incontinence and pelvic floor dysynergia constipation[35,36]. However, findings from the Cochrane review on biofeedback and pelvic floor exercise for fecal incontinence evaluate that there is insufficient evidence to assess whether or not biofeedback is helpful for fecal incontinence or not36. Studies suggest that conservative medical management alongside biofeedback is shown to be effective in improving symptoms of functional fecal incontinence and constipation in patients[37].

Discussion

All over the world, the only self-regulatory approach that has gained acceptance and is spread widely in the medical community is biofeedback. It is suggested that biofeedback is now practiced in almost all major hospitals and medical centers in different countries[38]. However, no study has been identified that demonstrates the use and practice of biofeedback intervention and technique in the Pakistani healthcare setting. The aim of the current review was to determine whether the biofeedback intervention could be implemented and used to treat psychophysiological problems and disorders in health care professionals. Moreover, its prevalence in the health care workers, keeping in mind the Pakistani perspective, was also observed. Healthcare professionals and workers, including nursing and undergraduate students, are suggested to have generally higher stress levels that could lead to several alterations in normal physiological functioning and a generation of mental and physical health problems. Among these psychological and physiological disorders and concerns, the majority of healthcare staff is observed to be affected by anxiety, depression, and back pain[12]. Several studies have suggested biofeedback treatment to be efficacious in reducing the level of stress, anxiety, and depression among the health sciences graduate students or those workers who recently have stepped into the professional life of their carrier[8,12]. Moreover, the results of studies have also confirmed the use of biofeedback intervention in reducing stress and anxiety and is shown to significantly impact individual depression[7].

The worst scenario observed in the individual undergoing stress, anxiety, or depression in the observed studies in this review includes violent

behavior, incapacitation, severe depression that could lead to the development of suicidal thoughts in the individuals[13]. However, besides these stressors and environmental demands and conditions, biofeedback training and mindfulness meditation is observed to be highly efficacious and supportive in assisting healthcare workers and nursing students in dealing with their depression and stress[14].

Biofeedback for chronic low back pain is one of the oldest interventions that show the beneficial management of this process. However, besides biofeedback training, other approaches and options are also considered, including the spinal surgery that comes under substantial healthcare providers[27]. In this regard, biofeedback is suggested to be used on the healthcare workers in order to help control the patients control their physiological domains and increase their awareness. Surface electromyography (SEMG) biofeedback is mostly suggested to be used in order to down-train the elevated muscle activity or, in other situations, to up-train and inhibit the week or paretic muscle. This suggests that behavioral or cognitive therapy and other biofeedback modalities are also used with recently developed facts and evidence to manage chronic pain and for physical rehabilitation[39].

The limitation or drawback of the current review is that in Pakistan, no study to date has been conducted that suggests the use of biofeedback intervention to treat the psychophysiological problems in healthcare professionals and graduate students. To overcome this drawback, we need to conduct more advanced research in the future that shows the efficacy level of biofeedback training programs and interventions in Pakistani healthcare settings.

Conclusion

It is concluded that biofeedback interventions, training, and programs are indeed helpful and efficacious in reducing and managing the levels of stress, anxiety, and depression in healthcare workers. Moreover, chronic low back pain is also suggested to be able to manage by using biofeedback in the form of SEMG or optimal conditioning in graduate students of nursing and public health. However, to date, no interventional study has been conducted on the Pakistani population that can be considered to show the efficacy level of the biofeedback intervention in treating psychophysiological disorders.

Acknowledgment

The authors would like to extend their gratitude to all the researchers for their valuable contributions in this field.

References

1. Cook LJ. Inviting teaching behaviors of clinical faculty and nursing students' anxiety. J Nurs Educ. 2005; 44(4): 156-161.
2. Junious DL, Malecha A, Tart K, Young A. Stress and perceived faculty support among foreign-born baccalaureate nursing students. J Nurs Educ. 2010; 49(5): 261-270.
3. Ratanasiripong P, Wang CC. Psychological well-being of Thai nursing students. Nurse Educ Today. 2011; 31(4): 412-416.
4. Ratanasiripong P, Ratanasiripong N, Kathalae D. Biofeedback intervention for stress and anxiety among nursing students: a randomized controlled trial. Int Scholarly Res Notices. 2012;2012(2012): 827972.
5. Chan CK, So WK, Fong DY. Hong Kong baccalaureate nursing students' stress and their coping strategies in clinical practice. J Prof Nurs. 2009; 25(5): 307-313.
6. Gorostidi XZ, Egilegor XH, Erice MJ, Iturriotz MJ, Garate IE, Lasa MB, Cascante XS. Stress sources in nursing practice. Evolution during nursing training. Nurse Education Today. 2007; 27(7): 777-787.
7. Ratanasiripong P, Ratanasiripong N, Kathalae D. Biofeedback intervention for stress and anxiety among nursing students: a randomized controlled trial. International Scholarly Research Notices. 2012;2012(2012): 827972.
8. Henriques G, Keffer S, Abrahamson C, Horst SJ. Exploring the effectiveness of a computer-based heart rate variability biofeedback program in reducing anxiety in college students. Appl Psychophysiol Biofeedback. 2011; 36(2): 101-112.
9. Ratanasiripong P, Sverduk K, Prince J, Hayashino D. Biofeedback and counseling for stress and anxiety

among college students. J Coll Stud Dev. 2012; 53(5): 742-749.
10. Yucha C, Montgomery D. Evidence-based practice in biofeedback and neurofeedback. Wheat Ridge, CO: AAPB; 2008;2018: 809b9d2c.
11. Ryan M, Gevirtz R. Biofeedback-based psychophysiological treatment in a primary care setting: an initial feasibility study. Appl Psychophysiol Biofeedback. 2004; 29(2): 79-93.
12. Ratanasiripong P, Kaewboonchoo O, Ratanasiripong N, Hanklang S, Chumchai P. Biofeedback intervention for stress, anxiety, and depression among graduate students in public health nursing. Nurs Res Practice. 2015; 2015: 160746.
13. Velana M, Barbouni A, Merakou K, Koutis C, Kremastinou T. Research of quality of life in students of programs of postgraduate studies in Public Health. Arch Hellenic Med/Arheia Ellenikes Iatrikes. 2012; 29(2):195-201.
14. Ratanasiripong P, Park JF, Ratanasiripong N, Kathalae D. Stress and anxiety management in nursing students: Biofeedback and mindfulness meditation. J Nurs Educ. 2015; 54(9): 520-524.
15. Marthiensen R, Sedgwick M, Crowder R. Effects of a brief mindfulness intervention on after-degree nursing student stress. J Nurs Educ. 2019; 58(3): 165-168.
16. Murdock C, Naber J, Perlow M. Stress level and stress management skills of admitted baccalaureate nursing students. Kentucky Nurse. 2010; 58(2): 8.
17. Jones MC, Johnston DW. Evaluating the impact of a worksite stress management program for distressed student nurses: a randomized controlled trial. Psycho Health. 2000; 15(5): 689-706.
18. Onieva-Zafra MD, Fernández-Muñoz JJ, Fernández-Martínez E, García-Sánchez FJ, Abreu-Sánchez A, Parra-Fernández ML. Anxiety, perceived stress and coping strategies in nursing students: a cross-sectional, correlational, descriptive study. BMC Med Education. 2020; 20(1): 1-9.
19. Thimmapuram J, Pargament R, Sibliss K, Grim R, Risques R, Toorens E. Effect of heartfulness meditation on burnout, emotional wellness, and telomere length in health care professionals. J Community Hosp Intern Med Perspect. 2017; 7(1): 21–7.
20. Labrague LJ, McEnroe-Petitte DM, Gloe D, Thomas L, Papathanasiou IV, Tsaras K. A literature review on stress and coping strategies in nursing students. J Ment Health. 2017; 26(5): 471–80.
21. Group LG. Scale-up services for mental disorders: a call for action. Lancet. 2007; 370(9594): 1241-1252.
22. Culbert TP, Banez GA. Pediatric applications other than headache. Schwartz MS, Andrasik F. (eds), Biofeedback: a practitioner's guide (3e) Guilford Press: New York, pp. 2003:696-726.
23. Ratanasiripong P, Sverduk K, Hayashino D, Prince J. Setting up the next generation biofeedback program for stress and anxiety management for college students: A simple and cost-effective approach. College Student Journal. 2010; 44(1): 97-100.
24. Liu Q, Luo D, Haase JE, Guo Q, Wang XQ, Liu S, Xia L, Liu Z, Yang J, Yang BX. The experiences of healthcare providers during the COVID-19 crisis in China: a qualitative study. Lancet Glob Health. 2020; 8(6): e790-e798.
25. Central sympathetic overactivity: maladies and mechanisms. Fisher JP, Young CN, Fadel PJ Auton Neurosci. 2009; 148(1-2): 5-15.
26. Richard Gevirtz PhD BC. The promise of heart rate variability biofeedback: Evidence-based applications. Biofeedback (Online). 2013; 41(3): 110-120.
27. Haines T, Bowles KA. Cost-effectiveness of using a motion-sensor biofeedback treatment approach for the management of sub-acute or chronic low back pain: economic evaluation alongside a randomised trial. BMC Musculoskelet Disord. 2017; 18(1): 1-10.
28. Maas E, Juch J, Groeneweg J, Ostelo R, Koes B, Verhagen A, et al. Cost-effectiveness of minimal interventional procedures for chronic mechanical low back pain: design of four randomised controlled trials with an economic evaluation. BMC Musculoskelet Disord. 2012; 13: 260.
29. Lin CW, Haas M, Maher CG, Machado LA, van Tulder MW. Cost-effectiveness of guideline-endorsed treatments for low back pain: a systematic review. Eur Spine J. 2011; 20(7): 1024–1038.
30. Jones AL, Wolf SL. Treating chronic low back pain. EMG biofeedback training during movement. Phys Ther. 1980; 60(1): 58–63.
31. Kent P, Laird R, Haines T. The effect of changing movement and posture using motion-sensor biofeedback, versus guidelines-based care, on the clinical outcomes of people with sub-acute or chronic low back pain-a multicentre, cluster-

randomised, placebo-controlled, pilot trial. BMC Musculoskelet Disord. 2015; 16: 131.
32. 3Mayer EA, Derbyshire S, Naliboff BD. Cerebral activation in irritable bowel syndrome. Gastroenterology. 2000; 119(5): 1418-1419.
33. Massana J, Risueño JL, Masana G, Marcos T, Gonzalez L, Otero A. Subtyping of panic disorder patients with bradycardia. Eur Psychiatry. 2001; 16(2): 109-114.
34. Korszun A. Sleep and circadian rhythm disorders in fibromyalgia. Curr Rheumatol Rep. 2000; 2(2): 124-130.
35. Palsson OS, Heymen S, Whitehead WE. Biofeedback treatment for functional anorectal disorders: a comprehensive efficacy review. Appl Psychophysiol Biofeedback. 2004; 29(3): 153-174.
36. Norton C, Hosker G, Brazzelli M. Biofeedback and/or sphincter exercises for the treatment of faecal incontinence in adults (Cochrane Review). The Cochrane Library. 2003;7.
37. Whitehead WE, Wald A, Norton NJ. Treatment options for fecal incontinence. Dis Colon Rectum 2001; 44(1): 131-142.
38. Sandweiss JH. Biofeedback and sports science. Springer, Boston, MA. In Biofeedback Sports Sci. 1985:1-31.
39. 39. Neblett R. Surface electromyographic (SEMG) biofeedback for chronic low back pain. healthcare. 2016;4(2):27.