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Original Research Article

Yoga Therapy Langhana Breathing Practice for Chronic Pain Management

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Abstract

Chronic Pain is defined as an unpleasant and subjective sensorial and emotional experience that prevails further than the usual course of an acute injury or disease. People in pain are in an overwhelming state of continued suffering that progressively disrupts their sense of control and wellbeing. Apart from the pharmacological and psychological interventions currently applied, many researchers suggest that body-mind techniques are also helpful. Pranayama langhana breathing yoga therapy practice (PLBYP) is a particular selection, combination and adjustment of classical breathing techniques that promotes mind-body calmness and relaxation. The purpose of this paper is to evaluate PLBYTP in the management of chronic pain patients. Forty (40) patients were recruited from FLENI Interdisciplinary chronic pain outpatient program (FICPOP) and divided into 2 groups. Each group completed 10 sessions of PLBYTP and Pain Management Group with relaxation techniques (PMG). A battery of self-reported questionnaires estimating pulse rate, anxiety (state and trait) and quality of life were administered at the beginning and at the end of the treatment for objective outcome evaluation. Pain level and breaths per minute count were assessed at the beginning and the end of each session. Patients that completed both interventions showed positive results in pain management. PPLBYTP sessions showed significant improvements in reducing the number of breaths per minute. We think that the way of breathing may influence autonomic and pain processing.

Key words: Body-mind Techniques, Chronic Pain, Interdisciplinary Pain Program, Pranayama Langhana Breathing, Yoga Practice

INTRODUCTION

Chronic Pain is a complex sensory and emotional experience with an outstanding negative impact on the quality of life. People in pain experience depression, anxiety, fear, family conflicts and feelings of isolation and helplessness (Hassed, C., 2013; Sullivan et al., 2013; Herta Flor, 2012; Marienke van Middelkoop et al., 2011)

It is estimated that one from five people suffers from chronic pain, which has also an outstanding economic impact expressed in elevated work absenteeism and elevated health care resources sanitary resources destined to deal with it (Blyth, F et al., 2001; Bukila, D. et al., 2000; Bowsher D et al., 1991).

To understand and effectively treat chronic pain, it is important to adopt a multidimensional perspective that takes into account not only physical but also cognitive and emotional factors (Jensen et al., 2014; Reiner et al., 2013; Sullivan et al., 2013; Herta Flor, 2012; Marienke van Middelkoop et al., 2011).

Interdisciplinary chronic pain treatments that combine cognitive-behavioral and physical therapy proved to have

had best outcomes compared to unidimensional interventions (Waterschoot, F. et al., 2014; Stanos, 2012; Marienke van Middelkoop et al., 2011; Chow et al., 2009; Angst et al., 2006; Mc Cracken et al., 2002; Guzmán et al., 2001; Van Tulder et al., 2001; Fishbain et al., 1997; Flor et al., 1992) mainly because they highlight the important effect of neuromodulatory pathways linked to emotions, attention and thoughts.

Over the last few years, mind-body approaches are also becoming a field of growing interest. Studies have shown that integral mind-body approaches can be effective in various conditions associated with chronic pain (Manincor et al., 2015; Naji Esfahani H. et al., 2014; Hassed, C., 2013; Najafi Doulatabad et al., 2013; Reinier et al., 2013; Busch et al., 2012; Yadav R. et al., 2012; Marchand, W., 2012; Momsen et al 2012; Raj Kumar, Y., et al., 2012; Rasmussen et al., 2012; Marienke van Middelkoop et al., 2011; Rosenzweig et al., 2010; Samwel, H. et al., 2009; Arch, J. et al., 2006; Kakigi et al., 2004; Pragati et al., 2001; Dharma Singh Khalsa, 1999)

Among the mind-body approaches, yoga practice has proven effectiveness in randomized controlled trials on treating musculoskeletal disorders including osteoarthritis, carpal tunnel syndrome, neck and back pain as well as for relieving anxiety, depression, anger and insomnia (Cheung, C. et a, 2014; Naji Esfahani et al., 2014; Doulatabad et al., 2013; Rasmussen, Aw Li et al., 2012; L. et al., 2012; Yadav, R. et al., 2012; Pragati et al., 2011; Gaines, T and Barry L., 2008; Angst F. et al., 2006; Buskila et al., 2000)

Yoga is defined as a state in which the superficial-sensory mind silences, all the ordinary thoughts retract and a deeper level and state of mind-conscious overcomes creating a strong (focused), clear (“sees” with less interference of imagination and memory) and stable (not affected by emotional swinging or critical judgment) state of mind (citta).

In yoga, prana -as vital energy- can be engaged through different ways but mainly, through the breath. Pranayama is that area in yoga that controls and re-directs the prana in the body-mind system throughout breathing exercises that seek for balance and equanimity in the body and mind (Desikachar, TKV, 2014; 2005; 2001; 1999). Integral body-mind approaches have already well proven the importance of a stable and balanced mind framework to manage chronic pain (Wicksell, R. et al., 2015; Mazzola et al., 2014; Hassed, C.; 2013; Kaiser, U. et al., 2013; Marchand, 2012; Momsen et al 2012; Stanos, S., 2012; Marienke van Middelkoop et al., 2011; Samwel, H. et al., 2009; Angst et al., 2006; Guzmán et al., 2001).

Pranayama langhana breathing yoga therapy practice (PLBYTP) aims at achieving balance and equanimity by interacting with contraction and emptiness responses producing feelings of calmness, lightness and re-laxation that smooth any function of the body and mind.

The patient receives short and concise guided instructions that attempt to create a state of balance in the body and mind and promotes overall feelings of calmness capable to modify pain sensations.

The purpose of this study is to describe the effects of PLBYTP on chronic pain patients (CPP). For this, we compare the outcomes of two groups of patients: one treated with PLBYTP and other with pain management with relaxation techniques (PMG). Both groups were evaluated in the context of FLENI Chronic Pain Interdisciplinary Outpatient Program.

METHODS AND MATERIALS

From august to December 2014, a cohort of forty (29 women and 11 men) patients diagnosed with cervical (13) and back pain (27) between 32 and 84 years of age were admitted at CARF accredited Fleni Interdisciplinary outpatient pain rehabilitation Program (FIOPRP).

Participant selection required first ruling out any prior history of mental retardation, substance abuse or systematic disease affecting the central nervous system.

Detailed history and thorough clinical examination was obtained in all patients by a neurologist and chronic pain diagnosis was established following the International Association for the Study of Pain classification.

Patients were randomly divided into two groups: 23 patients followed PMG conducted by a licensed psychologist while 17 followed pranayama langhana breathing yoga therapy practice (PLBYTP) conducted by a licensed yoga therapist.

Thirty four (34) completed all 10 -twice a week hour-sessions. All interventions were performed mostly in groups of 6 to 8 patients.

Both group sessions were structured and focused on particular themes such as stress, anxiety or anger management, assertive communication, personal responsibility and relationships, among others.

PMG sessions used Jacobson progressive muscle relaxation and Schultz inductive autogenic training techniques that consisted on body scan exercises with alternation between contraction and relaxation techniques and focusing on feelings of heat and weight while relaxing.

Guided sensorial visualizations and emotional memories evocation were also used to elicit positive memories. Participants of this group had these same relaxation and visualization routines to be followed at home assisted by audio records provided.

Pranayama langhana breathing yoga therapy practice (PLBYTP) was done in a seated position following this sequence:

a) Sitali (rolled tongue breathing technic) in combination with *nyasam* (finger positions and placements of hands in different parts of the body).

b) Simple body movement (arm, leg, hand or feet depending on each patient) built up with accordingly breathing technic.
c) Engaging *ujjayi* (throat breathing technic in which you enlarge breathing ratio).
d) Enlarging progressively exhalation. Low abdominal (*apana* region) engagement while exhaling.
e) Establishing simple pause (2" maximum) after inhalation and exhalation.
f) Visualization and guided breathing to different parts of the body (body scan).
g) Rest: free breathing.
h) Hands and feet slow and progressive simple movement to come back to daily routine.
YT participants also had a customized set of langhana yoga therapy practices to follow regularly at home.
All participants gave written informed consent before baseline assessment and randomization.

Assessments

Both groups were assessed and compared through the following tests:

Short form Health Survey (SF-36) which evaluates Physical Functioning, the Role-Physical and Role-Emotional (work and daily activities domains as a result of physical health and emotional problems), Bodily Pain, Vitality, Social Functioning domain (effect of physical and emotional health on normal social activities) and Mental Health (happiness, nervousness and depression), General health (personal health and expectations of change in health).This was assessed at the beginning and at the end of the program.

The State-Trait Anxiety Inventory (STAI) divided into 20 items for assessing trait anxiety and 20 for state anxiety. State anxiety items include: "I am tense; I am worried" and "I feel calm; I feel secure." Trait anxiety items include: "I worry too much over something that really doesn't matter" and "I am content; I am a steady person." All items are rated on a 4-point scale (e.g., from "Almost Never" to "Almost Always"). Higher scores indicate greater anxiety. This was estimated at the beginning and at the end of the program.

Pulse rate: measured with Nellcor equipments (OxiMax N-560 model). This was assessed at the beginning and at the end of the 10 relaxation sessions.

Visual Analogue Scale (VAS). Participants rated current pain severity on a 10-cm horizontal or vertical line with the two endpoints intended to represent pain experience extremes labeled "no pain" and "worst pain", respectively. This was done at the beginning and at the end of each session.

Number of breaths-per-minute. This was self-measured by each patient guided and supervised by each course professional. It was done at the beginning and at the end of each session.

Statistical methods

Student t test for independent samples was used to compare variables between the two treatment groups when normality was reached. To compare categorical variables, like Gender, between the two groups, Fisher exact test was used. When repeated measures over time were compared, the mixed general linear model was applied. To assess measures of pain and breathing throughout the sessions, it was calculated, for each session, the variable improvement as scale value at the end of each session less the initial value of the session; and this was used as the dependent variable.

It was used the InfoStat software (Universidad Nacional de Córdoba, Version 2015) and SPSS 18.0 (Chicago, Illinois). It was considered significant all probability of type I error less than 0.05.

RESULTS

There are 26.1% of men (women 73.9 %) in the PMG and 29.4% of men (women 70.6 %) in the PLBYTP; the difference is not significant ($p > 0.9$).

No significant difference is detected in the average ages between the two groups: 54.3±15.5 years in PMG and 56.1±16.9 in PLBYTP; p- value = 0.720.

There was not found any dependence between age and treatment: both treatments evaluated patients with age categories not significantly different: 34.8% of patients older than 55 in PMG and 47.1% in PLBYTP: p-value > 0.40.

No significant difference was detected between the percentage of patients diagnosed with lumbar pain and cervical pain: 73.9% lumbar (and 26.1% cervical) in PMG versus 58.8% lumbar (and 41.2% cervical) in PLBYTP not differ significantly: p- value = 0.496.

The abandonment variable (which takes the value 1 for those who discontinued treatment before reaching the final) was evaluated. We wanted to assess whether there were differences between the two treatments, to avoid biases that could happen if one of the two treatments had significantly higher proportion of individuals left. No significant difference was detected between the two treatment groups in the proportions of patients who dropped out: 13% in the traditional treatment and 17.6 % in the treatment of yoga; p- value = 0.511.

We evaluated the difference in the number of treatment days because we wanted to see if there were patients who had longer treatment in one of the two treatment groups. No significant difference was found between the two treatments in the average number of days of treatment (44.2 ± 11.2) days PMG and 47.2 ± 14.6) days for PLBYTP; p- value = 0.465). (Table 1)

It was adjusted a model with repeated measures on time factor (baseline and end of treatment) and factors between subjects: Treatment (Traditional and Yoga),

Table 1. Demographic data

Variable	PMG (Relaxation technicques) (n=23)	PLBYTP (Pranayama langhana breathing yoga therapy practice) (n=17)	p-value
Gender (women)	73.9%	70.6%	>0.90
Age	54.3 (15.5)	56.1 (16.9)	0.72
Older tan 55 years	34.8%	47.1%	>0.40
Diagnosis (Lumbar pain)	73.9%	58.8%	0.496
Dropped out patients	13.0%	17.6%	0.511
Number of treatment days	44.2 (11.2)	47.2 (14.6)	0.465
Data showed as Mean (SD): Student-t test Data showed as percentage: Fisher exact test			

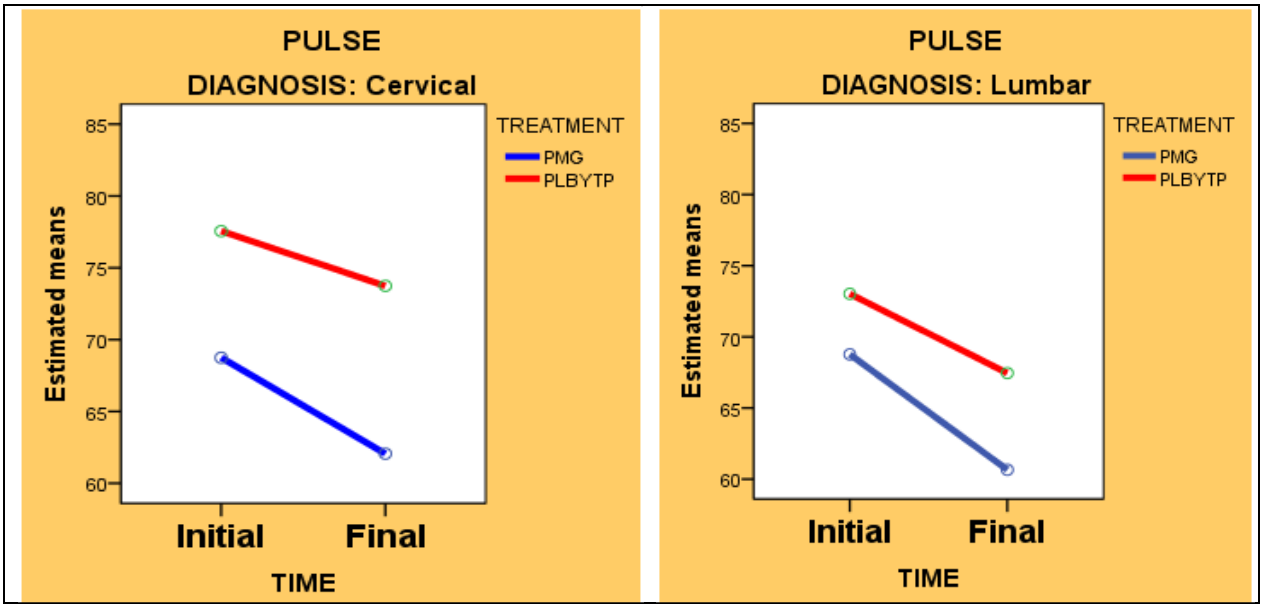

Figure 1 (ayb). Pulse by Treatment at each Diagnosis

Diagnostics (Cervical and Lumbar), Sex (Female and Male) and Age Group (under 55; over 55) and respective interactions between time, treatment and the other factors.

Pulse, STAI-trait, STAI-state and SF36 variables were analyzed at the beginning and at the end of the treatments.

Pulse

At the end of the treatment, patients diagnosed with cervical pain who received PMG had lower average pulse (p-value=0.048) than those receiving PLBYTP.

In patients with lumbar diagnosis, pulse decreased significantly towards the end of PMG (p-value=0.004). (Figure 1)

In age group under 55, both at the beginning and end of treatment PMG had lower average pulse than PLBYTP (p-value=0.004). (Figure 2)

STAI-anxiety-trait

Trait anxiety is not significantly modified by any factor and there wasn´t any difference at the beginning between treatment groups, between cervical or lumbar pain patients, and between under and older than 55.

STAI-anxiety-state

State anxiety is lower in patients under 55 versus older than 55, at the end of PMG (p-value=0.038). In this age group with PMG, decrease in state anxiety is significant (p-value=0.005).

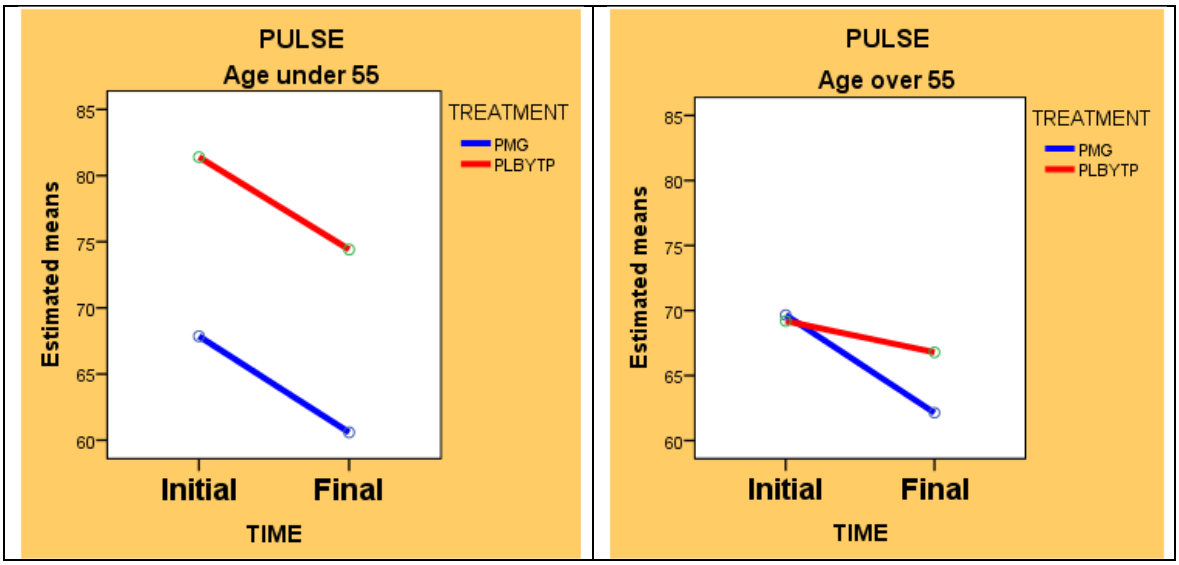

Figure 2 (ayb). Pulse by Treatment at each Age group

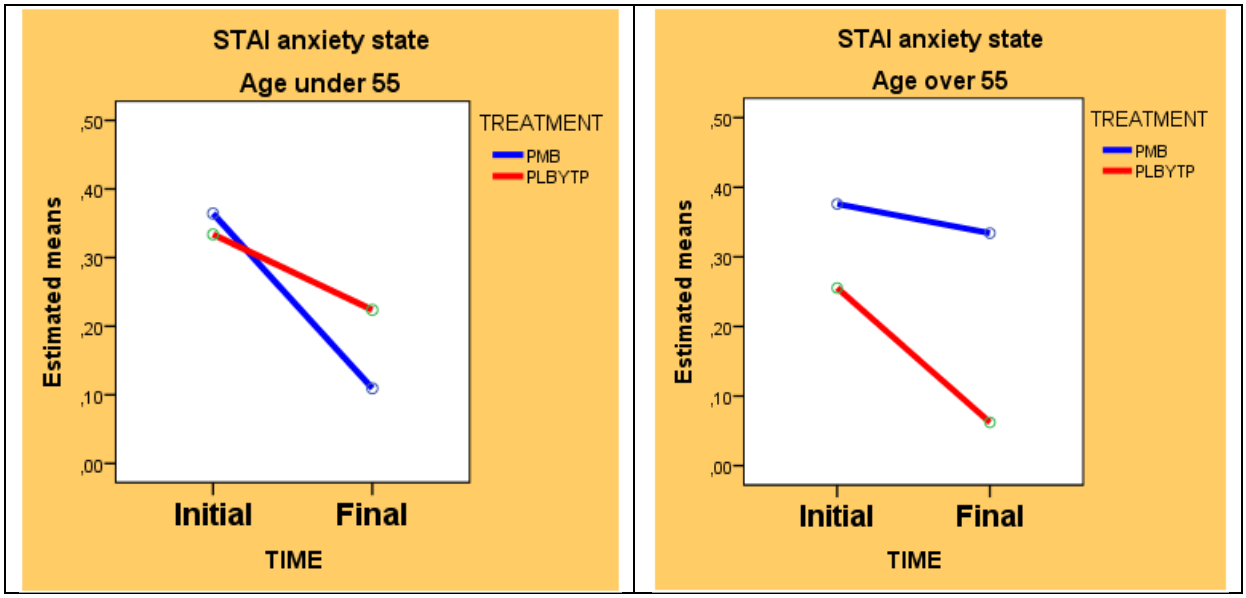

Figure 3 (ayb). STAI anxiety state by Treatment at each Age group

At the end of treatment, older than 55 with PLBYTP had lower anxiety-state than PMG (p-value=0.038). (Figure 3)

SF36-life quality

Patients who received PMG increased the quality of life between the beginning and end of the program: cervical (p=0.050) and lumbar (p=0.033). For patients who received PLBYTP, increased quality of life was significant in patients with lumbar pain (p=0.021), but was not significant in patients with cervical pain. (Figure 4)

In those receiving PMG, at first there was no difference between younger and older than 55; but at the end, quality of life was better in those under 55 (p=0.041). Patients older than 55 who received PLBYTP had better quality of life than younger, at the beginning (p=0.002) and at the end of treatment (p=0.026) (Figure 5)

Pain Perception and Breaths-per-minute count

Each patient was measured the level of pain Visual Analog Scale (VAS) at baseline and at the completion of each of the 10 sessions registering a decrease in the

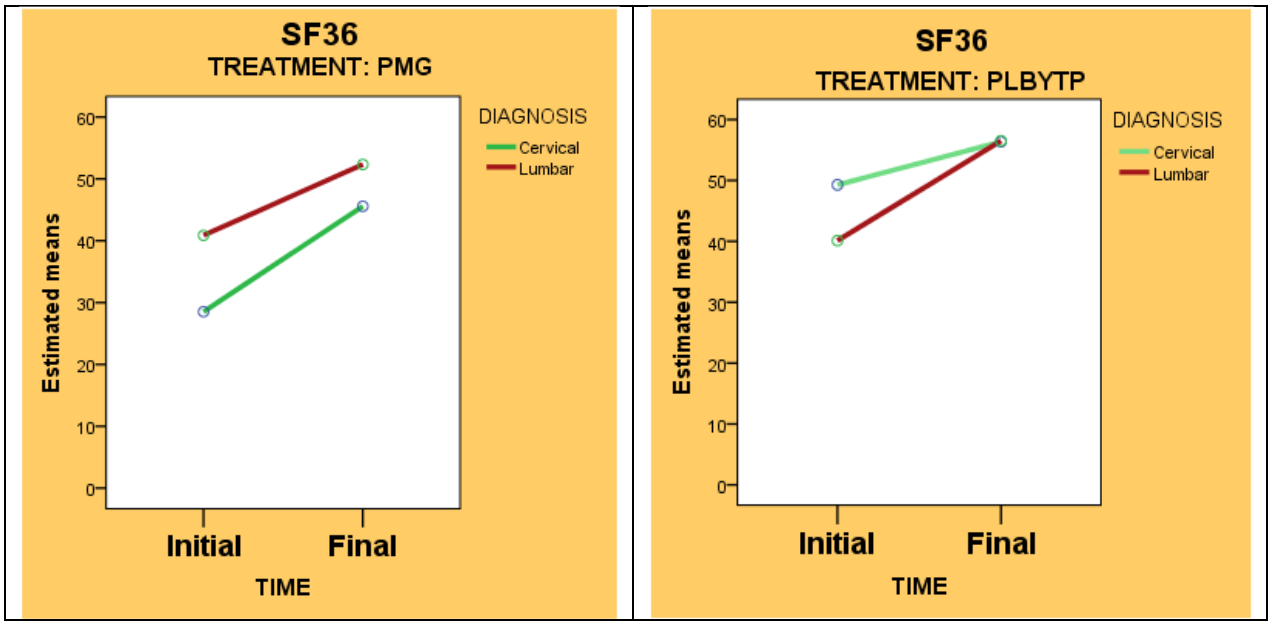

Figure 4 (ayb). SF36 by Diagnosis at each Treatment

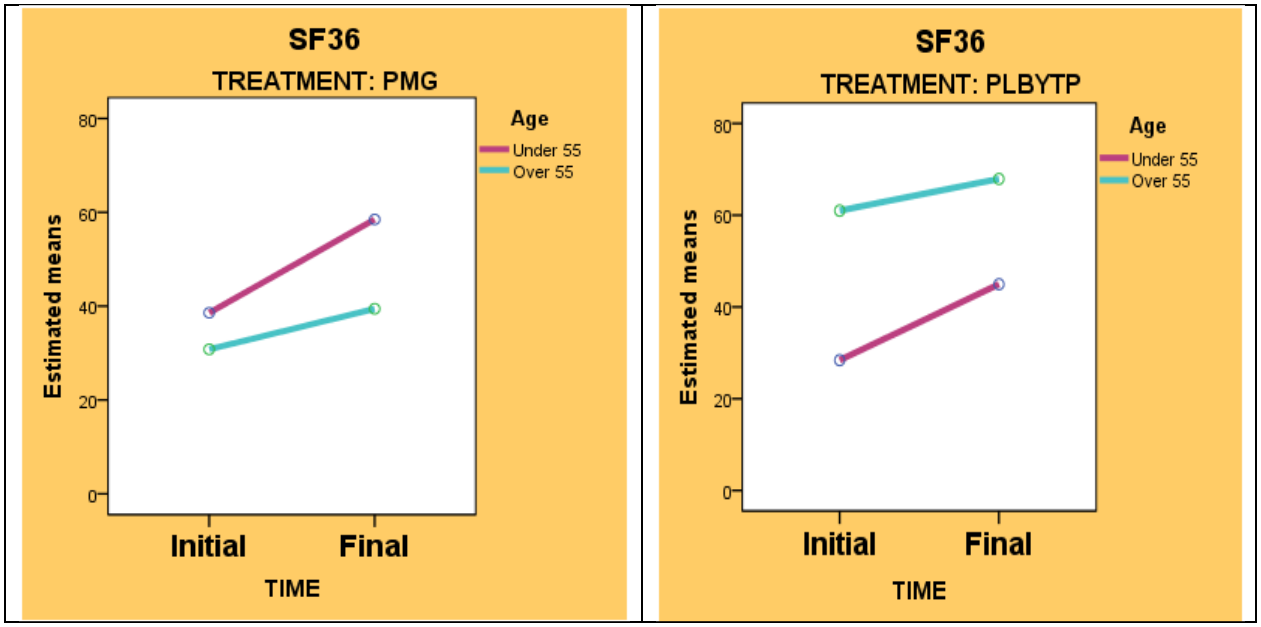

Figure 5 (ayb). SF36 by Age at each Treatment.

EVA (EVA.Dec) per session. Likewise, it was counted the number of breaths at the beginning and end of each session recording reduction (Br.N). The variables considered were, in addition to the treatment session (1-10), the diagnosis of each patient (cervical and lumbar pain), age group (up to 55 and over 55 years) and respective interactions. Linear mixed effects models with different covariance structures, properly combining residual correlation structures, heteroscedasticity and residual random effects were adjusted. In some of the models the random effect of the patient was considered. By penalized likelihood criteria (AIC and BIC) and likelihood ratio tests, there were chosen the models that best describe the data for the EVA and the number of breaths.

Once the appropriate model of covariance structure selected, there were made inferences about averages (treatment averages, effect of the session, to analyze whether the average profiles vary per session, etc.). All stockings inference was based on the selected model

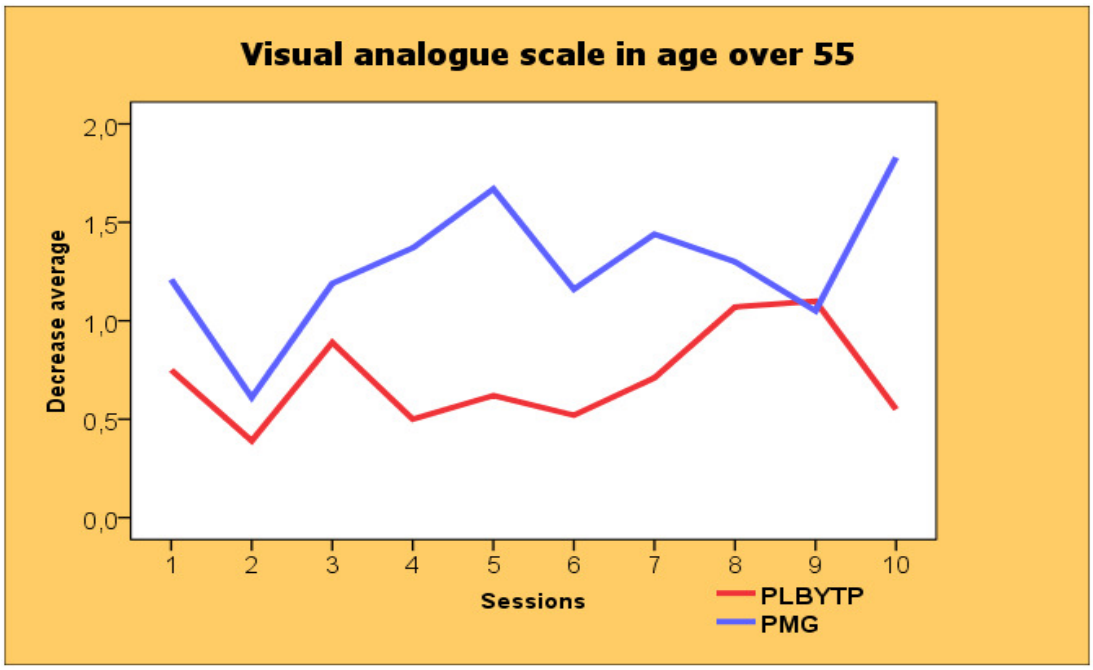

Figure 6. VAS by Time and Treatment in older 55.

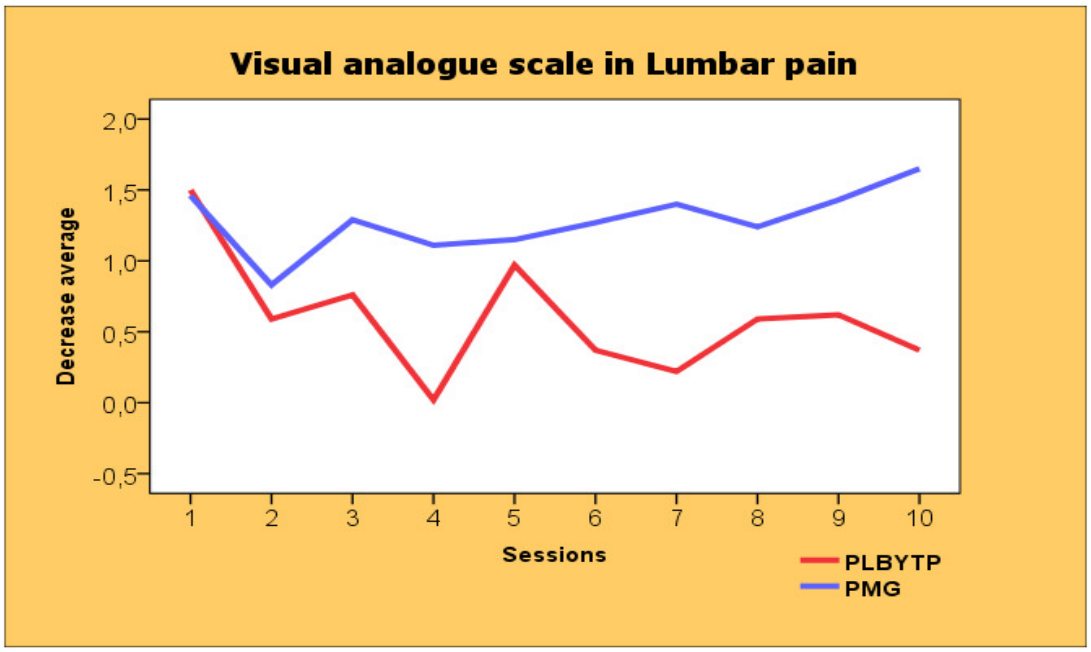

Figure 7. VAS by Time and Treatment in Lumbar pain.

of covariance structure.

Visual Analogue Scale (VAS)-pain perception

Regarding the decline in the level of pain perception, the two treatments differ significantly. In PMG, greater average decrease is achieved ($p<0.05$).

There was significant difference between the 2nd. and the remaining sessions. It is in the second session where main difference was observed.

There was significant difference between the two age categories, independent from the treatment. In age group over 55 years greater decrease average is obtained

(p<0,05).

There was significant difference between the two diagnoses considered. In cervical patients greater decrease average in pain level is obtained (p<0,05), independent from the treatment received.

In the PMG it is achieved a greater decrease average in all sessions except the first, compared to those treated with yoga and breathing technics (PLBYTP), regardless of age and the particular condition.

Age group under 55 years showed no significant difference between the two treatments (p>0,05), but when each session was considered, only in the first session PLBYTP had a greater decrease in pain than PMG. In age group over 55 years PMG achieves greater significant decrease in pain perception than PLBYTP only in sessions 5 and 10 (p<0.05). (Figure 6)

No significant difference between the two treatments in patients with cervical pain in any session (p>0.05). Lumbar patients had better average of pain level decreased with PMG in sessions 4, 6, 7 and 10, regardless of patient age. (Figure 7)

Breath-per-minute (BPM)

Regarding the decline in the number of breaths, there was significant difference between the two treatments considered. In PLBYTP group, greater decrease is obtained in the number of breaths per minute (p<0,05).

There is significant difference between the first session and the remaining. In the first session it is observed greater decrease in the number of breaths (p<0,05).

There is significant difference between the two age groups. In the over 55 group greater decrease in the number of breaths is obtained.

There is significant difference between the two diagnoses considered; lumbar patients obtaining a greater decrease in the number of breaths (p<0,05).

In langhana breathing yoga therapy technique (PLBYTP), a greater decrease average in breaths per minute is obtained in greater number of sessions (1, 4, 5, 6, 8, 9 and 10), regardless of the age of the patient and their condition.

In age group over 55 years there is no significant difference between the two treatments. However, in the category under 55 years PLBYTP achieves greater decrease and differs significantly from PMG**,** regardless of the session.

In both, lumbar patients and cervical patients, PLBYTP achieves major decrease and differs significantly from PMG, regardless of the session (p<0,05).

Age group up to 55 evolved more regularly, without significant differences between sessions, while age group over 55 obtained better declines in the first and intermediate sessions (1, 4 and 5), regardless of treatment received.

If we consider the treatment received, younger patients who practiced yoga, verified a greater decrease in all sessions, with significant differences respect PMG in sessions 3, 4, 5, 6, 8, 9 and 10. In the older age group (over 55), no significant differences were found in the reduction of number of breaths, between both treatments, except in sessions 2 and 3, where PMG exceeds PLBYTP. (Figure 8)

In cervical patients, the last sessions are where the best results are verified (there are significant differences between sessions 1, 4, 5, 6, 8, 9 and 10 and the remaining), being reversed in the lumbar pain patients, which achieve the highest decrease average in the initial sessions (1, 2, 3, 4, 5, 6, and 8 differ significantly from the remaining). This is independent of treatment received.

PMG in cervical patient showed very regular results in breath per minute, but without significant differences between sessions. PLBYTP, however, achieved the highest declines in the last sessions, but session 3 was the only one that significantly differed from the remaining. In cervical patients, the treatments differ significantly only in session 3. (Figure 9)

Both, PMG with described relaxation technics and PLBYTP, with described langhana breathing technic, obtained positive outcomes in marks related to pain level (VAS), anxiety (STAI-trait, pulse, breath per minute) and stress (pulse, breath per minute, SF36) within the context of FLENI Interdisciplinary Chronic Pain outpatient program.

The most significant difference between both treatments lies in pain level perception and breath per minute marks. While PMG obtains a regular decrease in pain level during the whole course, PLBYTP shows an appreciable reduction in number of breath per minute along almost all the sessions which is linked to a higher state of balance in the body and mind that in the long term may increase in pain thresholds (Bush, 2012; Chalaye, P et al., 2009). According to yoga, patients express their state of body, mind and emotions throughout breath. Anxiety, fear, anger, anguish, pain are related to short, brief, erratic patterns of breathing. Reduction in the number of breaths together with subtle smooth breathing is an expression of equanimity in the mind and develops an overall feeling of lightness and fluidity. This helps to create a stable and flexible mind therefore, a patient with less psychological distress and somatic symptoms increased mood acceptance levels, resilience and adaptative coping strategies. All these result key factors for pain processing and therapeutic enhancing (Wicksell, R. et al., 2015; Mazzola et al., 2014; Marchand, 2012; Momsen et al 2012; Marienke van Middelkoop et al., 2011; Rosenzweig, S. et al 2010; Samwel, H. et al., 2009; Jensen, M. et al., 2007).

Pulse decrease showed higher levels in PMG and in

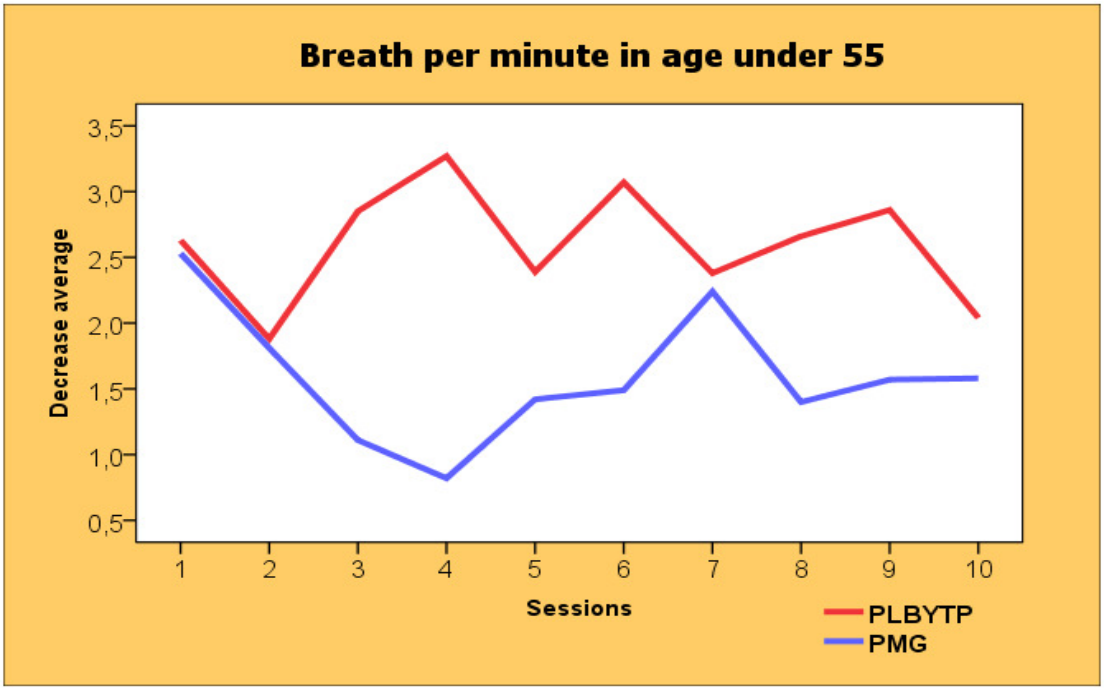

Figure 8. Breath/min by Time and Treatment in younger than 55.

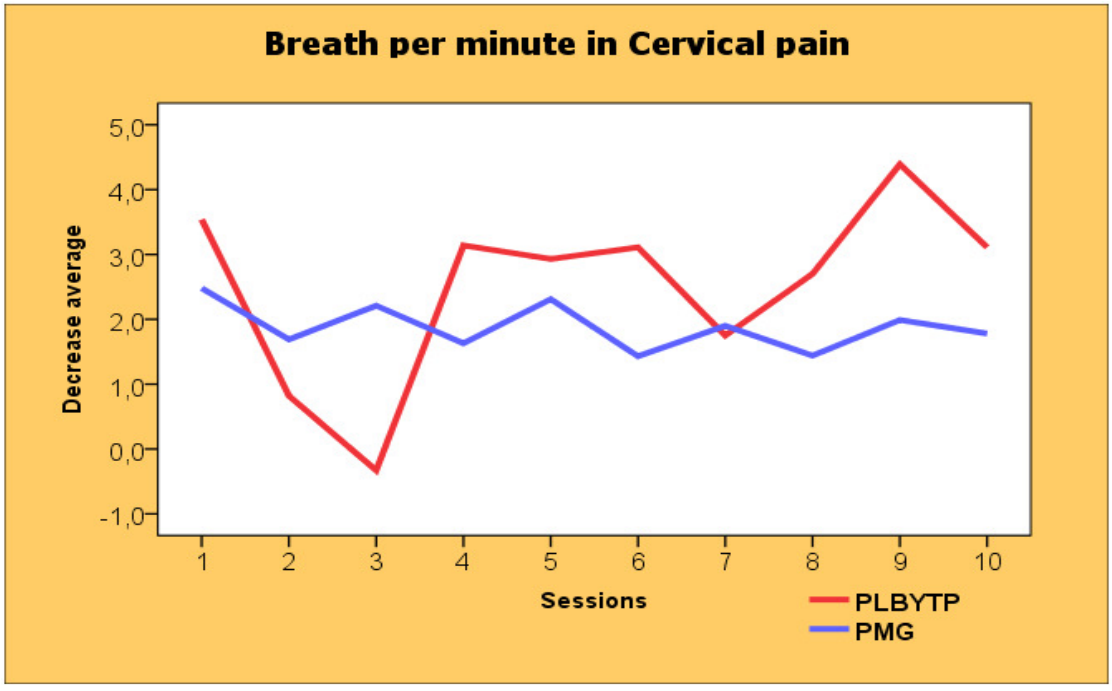

Figure 9. Breath/min by Time and Treatment in Cervical pain.

the lumbar patients, in particular.

There were slighter or erratic differences in quality of life and anxiety final traits between the two groups and among the gender, age group, time and diagnostic factors.

DISCUSSION

Different authors have demonstrated that chronic pain is greatly determined by learning-processes and plastic changes on multiple levels of the nervous-system (Herta

Flor, 2012; Curatolo, 2003; Rome and Rome (2002); Flor, H., 2002; Grachev, I., 2000; Elbert, 1995; Melzack, R; Jenkins, 1990).

In this sense, chronic pain can be understood as a learnt program where the original injury may have healed, but somehow the patient´s system cannot manage to stop to process painful stimuli (Sullivan et al., 2013; Flor,H). Within time, certain peripheral and central areas of the brain become more and more sensitive to nociceptive perceptions building the basis for recursive pain memories and aversive emotional responses. As chronic pain remains throughout the years it pervades every dimension of the patient´s life setting a consistent and unconscious mind framework (anxiety, anger, depression, etc) from which life is perceived (Mansour et al., 2014; May, A., 2008; Brooks et al., 2005; Flor, H., 2002). In this sense, chronic pain beyond the physical sensation can develop a number of related life-associated problems that builds a vicious circle where pain elicits anxiety, fear and self protective behaviours that lead to reduced circulation, increase muscle weakness, muscle spasms and inflammation, affecting flexibility and in some cases leading to muscle atrophy. This is also accompanied by a cluster of psychological and emotional features: ruminative thinking, negative thoughts, helplessness, fear and depression (Manincor et al., 2015; Nahi Esfahani H. et al., 2014; Doulatabad, S. et al., 2013; Sullivan M. et al., 2013; Yadav R. et al., 2012; Marchand, W., 2012; Momsen et al 2012; Marienke van Middelkoop et al., 2011; Zautra, A. et al., 2010; Samwel, H. et al., 2009; Lush, E. et al; 2009; Kakigi et al., 2004; McCaffrey, R. et al., 2003).

Interdisciplinary approaches that takes into consideration not only the physical but also the psychological factors that influence pain management (in particular, acceptance levels) have demonstrated beneficial effects in pain management (Wicksell, R. et al., 2015; Mazzola et al., 2014; Momsen, A. et al., 2012; Hassed, C.; 2013; Kaiser, U. et al., 2013; Marchand, 2012; Momsen et al 2012; Stanos, S., 2012; Marienke van Middelkoop et al., 2011; Samwel, H. et al., 2009; Angst et al., 2006; Guzmán, J. et al., 2001).

Much is written on the effectiveness of cognitive behavioural therapy (CBT), meditation and mindfulness techniques to reduce stress and anxiety related to pain, promote positive emotions and interrupt the stress-tension-pain vicious circle (Manincor et al., 2015; Naji Esfahani H. et al., 2014; Doulatabad, S. et al., 2013; Yadav R. et al., 2012; Marchand, W., 2012; Momsen et al 2012; Raj Kumar, Y., et al., 2012; Marienke van Middelkoop et al., 2011; Samwel, H. et al., 2009; Arch, J. et al., 2006; Kakigi et al., 2004). Also ancient breathing-centred techniques are being frequently used in a wide variety of emotional and somatic disorders and are also developing into a field of interesting research (Najafi Doulatabad, S. et al., 2013; Busch, V et al., 2012; Lush E. et al 2009; Gaines T. and Barry, L.; 2008; Zautra, A. et al., 2010; Arch, J. and Craske, M, 2006; Brown, R. et al., 2005)

Chalaye P. et al (2009) found that breathing techniques can reinstall physiologic and metabolic health and also enhance some disconnection of certain pain pathways making experiential pain more tolerable.

Bush, V. et al (2012) considers that the conscious use of the breath creates stillness of mind and significant increase in pain thresholds.

Other authors (Mansour et al., 2014; Villemure et al 2013; Marchand, 2012; Ming, 2011; Arne, M., 2008; Brooks, J et al., 2005 Ryusuke K. et al., 2005; Kakigi R. et al., 2005; Austin, J, 1996) demonstrated that meditation and breathing practices can modulate *specific pain* areas of the brain related to motivation and emotional state such as limbic related structures , SI and SII and dorsolateral prefrontal cortex and it was also suggested that the progressive use of breathing techniques can increase certain neurotransmitters or neuropeptides (serotonine, norepinephrine, endorphins, enkephalins and substance P) that can regulate pain perception, apart from affecting mood, anxiety and sleep (Yadav et al., 2012; Maj Gen, 2004; Mc Affrey, R et al., 2003).

Yoga breathing techniques highlight the importance of acceptance, training attention, meditation and relaxation as key factor in the management of any ailment, disease or suffering (Desikachar TKV, 2005; 1999). In yoga, the breath describes the state of the body, mind and emotions more than any other verbal description.

The fact of regulating the breath consciously implies a deep state of focus, cognition and awareness that settle the basis for a wider level of consciousness and the possibility to influence inner states creating a sense of control and *self-confidence* (Desikachar, TKV, 2014; 2005; 2001; 1999)**.**

Yoga langhana breathing technique consists on precise guided breathing instructions that exclude imaginary descriptions and narrative memories. It requires an active involvement and focus on the breath and the breathing pattern to create a state of balance in the body and mind. Langhana effect stands for reduction of any “excess” in the body and the mind (agitation, disturbance, confusion, over-excitement, etc.) which promotes feelings of lightness, relaxation of the body and reduction of mind activity (judging thoughts) (Chandrasekaran, NC., 2012; Mohan et al., 2004; Kraftsow, G., 1999; Desikachar TKV, 1999). With practice it is possible to achieve a truly mind-training experience towards a new and positive pattern of attention and self regulation that could set the basis to deal more efficiently with physical sensations and emotions.

With the chronic pain patients (CPP) selected for the PLBYTP group we worked along two main axes:

1.- Change of the breathing pattern. From a negative breathing pattern into a positive one which in the short term means: consciousness of the breath; subtler and

fluid inhalation and exhalation; a slight –at least- higher exhalation than inhalation and natural and fluid pauses between these components; reduction of the number of breaths per minute and feelings of lightness and calmness.

2.- Achieve a positive change in emotions and mood-states, reducing anxiety, fear and all kind of grasping (contracting, rigid) emotions.

Higher exhalation ratios are associated with relaxation of the physical body and mind set (Manincor, M. et al., 2015; Austin, 1996; Desikachar TKV, 2007, 2005).

The results showed that both objectives were fulfilled. The CPP treated with PLBYTP showed reduced pain perception and better management of anxiety and stress symptoms.

However, comparing with PMG group, CPP showed a higher reduction in pain perception and pulse that did not correlate with the correspondent reduction in number of breaths per minute.

Differently to PMG, PLBYTP demanded more focus on the different instructions to coordinate breath and movement, disposition of mouth or hands, awareness of sound and body scan, among others. All these could end resulting more activating, compared to the passive lying position required for relaxation and guided visualizations performed by PMG group. It looks like the attention focus and activation demanded by PLBYTP, even with a beneficial effect on gradual training of mind control and capacity of focus, could be less effective to reduce pulse rate and pain perception in the short term. However, we hypothesize that with regular practice along time, the possibility to control the breathing may create a state of balance in the body and mind and promote positive changes in mood, pain perception and wellbeing (Desikachar TKV et al., 2007; 2005).

CONCLUSIONS

Our research suggests that both, PMG with relaxation techniques and PLBYTP have showed beneficial effects for anxiety, depression and pain control.

We think that the regular practice of breathing techniques could contribute to improve pain management and quality of life of CPP and should be more regularly incorporated in interdisciplinary approaches.

The current study adds to a growing literature on the positive impact of breathing and relaxation techniques interventions for treating chronic pain.

Limitations

The patients included in this research do not represent the whole population of FLENI Chronic Pain patients.

The positive outcomes were obtained within the ongoing Interdisciplinary Chronic Pain Program where the results might have been related to the combination of the different treatment strategies applied. It would be interesting to perform further researches in other chronic pain settings

The outcomes might have been influenced by the analysis of multiple variables within a small sample of patients in a short period of time and practice.

Group sessions also restricted the potential of tailored and customized one-to-one interventions.

REFERENCES

Angst F, Brioschi R, Main C, Lehmann S, Aeschlimann A (2006). "Interdisciplinary Rehabilitation in Fibromyalgia and Chronic Back Pain: a prospective Outcome Study", The J. Pain, Vol. 7, No 11; pp.807-815, Nov.

Apkarian, A.V. Functional imaging of pain: new insights regarding the role of the Flor, H. (2002). Phantom-limb pain: characteristic, causes and treatment. The Lancet Neurology. Vol. 1, 182-189.

Arch J, Craske M (2006). "Mechanisms of mindfulness: emotion regulation following a focused breathing induction", Behaviour Research and Therapy 44 , 1849-1858

Arne M (2008). "Chronic Pain may change the structure of the brain", Pain 137; 7-15

Austin, James: *Zen and the Brain*, Massachusetts Institute of technology Press, 1996.

Aw, Li and Goldsmith CA, "The effects of yoga on anxiety and stress", Alternative Medicine Review, 17: 21-35, 2012.

Blyth FM, March LM, Brnabic AJM, Jorm LR, Williamson M, Cousins MJ (2001). "Chronic pain in Australia: a prevalence study". Pain; 89: 127 -34.

Bowsher D, Rigge M, Sopp L (1991). "Prevalence of chronic pain in the British population: a telephone survey of 1037 households". Pain Clinic; 44: 223-30.

Brooks J, Tracey I (2005). "From nociception to pain perception: imaging the spinal and supraspinal pathways" J Anat, 207; pp-19-33

Brown R, Gerbarg P (2005). "Sudarshan Kriya yogic breathing in the treatment of stress, anxiety and depression". The Journal of alternative and complementary medicine, vol. 11

Busch V, Magerl W, Kern U, Haas J, Hajak G, Eichhammer P (2012). "The effect of deep and slow breathing on pain perception, autonomic activity and mood processing-an experimental study", Pain Medicine; 13:215-228.

Buskila D, Abramov G, Biton A, Neumann L (2000). "The prevalence of pain complaints in a general population in Israel and its implications for utilization of health services". J Rheumatol; 27:1521-5.

Chalaye P, Goffaux P, Lafrenaye S, Marchand S (2009). "Respiratory effects on experimental heat pain and cardiac activity" Pain Med; 10:1334–40.

Cheung C, Wyman JF, Resnick B, Savik K (2014). "Yoga for managing knee osteoarthritis in older women: a pilot randomized controlled trial" Complement Altern Med. - May 18th.

Chou R, Atlas S, Stanos S, Rosenquist R (2009). "Nonsurgical Interventional Therapies for Low Back Pain. A Review of the evidence for an American Pain Society Clinical Practice Guideline" en Spine, Vol.34, Number 10; pp.1078-1093

Chou, R., Loeser, J.D., Owens, D.K., Rosenquist, R.W., Atlas, S.J., Baisden, J., Carragee, E.J., Grabois, M., Murphy, D.R., Resnick, D.K., Stanos, S.P., Shaffer, W.O., Wall, E.M (2009). "Interventional Therapies, Surgery, and Interdisciplinary Rehabilitation for Low Back Pain. An evidence-based clinical practice guideline from the American Pain Society", SPINE, vol. 34, Number 10, pp.1066-1077

Curatolo M, Arendndt-Nielsen L, Petersen-Felix S (2111). Central Hypersensitivity in Chronic Pain: Mechanisms and Clinical Implications. Phys Med Rehabil Clin, 17(2), 287-302.

Desikachar TKV (1998). *In search of mind*, Paperback, KYM

Desikachar TKV (1999). *The Heart of Yoga. Developing a personal practice*, Inner Traditions International, Vermont, 1995.

Desikachar TKV, Krusche Hellfried(2007). *Freud and Yoga. Two philosophies of mind compared*, North Point Press, 2014

Desikachar TKV, RH. Cravens (2005). *Health, Healing and Beyond*, Publisher

Desikachar, TKV, Martyn Neal (2001). *What are we seeking?,* KYM, Chennai

Dharma SK, Cameron S (2001). *Curar el Dolor*, Urano, Barcelona

Doulatabad S., Nooreyan K., Doulatabad N. and Mohebbi Z: "The effects of pranayama, Hatha Yoga and Raja Yoga on physical pain ant the quality of life of women with multiple sclerosis", Traditional Complementary Alternative Medicine, 10(1): 49-52, 2013

Dr. N. Chandrasekaram: *Principles and Practice of Yoga Therapy*, VHF Publications, Chennai, 2012.

Elbert, T., Pantev, C., Wiembruch, C., Rckstroh, B. & Taub, E. (1995) Increased cortical representation of the fingers of the left hand in string players. Science, 270, 305-307.

Flor, H. (2002). The modification of cortical reorganization and chronic pain by sensory feedback. Applied Psychophysiology and Biofeedback. Vol 27, N 3. 215-227.

Flor, H.; Birbaumer, N., Turk, D. (1990). The Psychobiology of chronic pain. Adv Behav Res. Ther., 12, 47-84.

Flor, Herta: "New developments in the understanding and management of persistent pain", Lippincott Williams &Wilkins, 0951-7367, 2012.

Flor, Herta: "Painful memories. Can we train chronic pain patients to "forget" their pain?", EMBO reports, vol 3; Nº4; 2002.

Flor, Herta; Turk Dennis (2012) .Chronic pain: an integrated biobehavioral approach. Seattle. Editorial IASP press.

Gaines T. and Barry L. "The effect of self- monitored relaxation breathing exercise on male adolescent aggressive behavior", ADOLESCENSE, Vol.43, Nº 170, 2008.

Guzmán J.; Esmail R.; Karjalainen K.; Malmivaara A.; Irvin E. and Bombardier Cl "Multidisciplinary rehabilitation for chronic low back pain: systematic review" en BMJ Volume 322, 23 june 2001.

Hassed, C.: "Mind-body therapies. Use in chronic pain management", Australian Family Physician, Vol.42, Nº 1/2, jan-feb.2013.

Jenkins, W., Merzenich, M., Ochs, M., Allard, T. & Guic-Tobles (1990) Functional reorganization of primary somatosensory cortex in adult owl monkeys after behaviorally controlled tactile stimulation. Journal of Neruophysiology, 63, 82-104.

Kaiser, U; Arnold, B; Pfingsten M; Nagel, B; Lutz, J; Sabatowski, R: Multidisciplinary pain management programs; Journal of Pain research, 2013.

Kakigi, R, Nakata H.; Inui K, Hiroe N, Nagata O, Honda M, Tanaka S. Sadato N, Kawakami M.: "Intracerebral pain processing in a yoga master who claims not to feel pain during meditation", European Journal of Pain, 2004.

Kovacs, Francisco; Moix Jenny (2009). Manual del dolor: tratamiento cognitivo conductual del dolor crónico. Barcelona. España. Editorial Paidos

Kraftsow, G. : "Yoga for Wellness: Healing with the Timeless Teachings of Viniyoga"; Penguin, 1999.

Krishnamacharya, T.: *Yoga Makaranda, The Nectar of Yoga* (translation of TKV Desikachar), Media Garuda, 2011 (1934).

Lewandowski, Wendy "Psychological factors in chronic pain: a worthwhile undertaking for nursing?" Archives of Psychiatric Nursing, Vol. XVIII; Nº3; pp.97-105; june 2004.

Lush E; Salmon, P.; Floyd A.; Studts J.; Weissbecker I.; Sephton, S.: "Mindfulness meditation for symptom reduction in fibromyalgia: psychophysiological correlates", J.Clin.Psychological Med Settings; 16:200-207; 2006.

Maj Gen GD Bakshi: *Kundalini. An Indian Paradigm of Creativity*, Pilgrims Publishing, Varanasi, 2004

Manincor M, Bensoussan A., Smith, C., Fahey, P. and Bourchier S. "Establishing key components of yoga interventions for reducing depression and anxiety, and improving well-being: a Delphi method study" in BMC Complement. Altern. Medicine 2015; 15:85

Mansour, AR., Farmer, MS, Baliki M.N and Apkarian V. "Chronic pain: the role of learning and brain plasticity" Restor Neurol Neurosci. 2014 Jan 1;32(1):129-39. doi: 10.3233/RNN-139003.

Marchand, W., "Mindfulness-based Stress Reduction, Mindfuldness-based Cognitive Therapy and Zen Meditation for Depression, Anxiety, Pain and Psychological Distress", Journal of Psychiatric Practice, Vol. 18, Nº 4, July 2012.

Marienke van Middelkoop et al., "A systematic review on the effectiveness of physical and rehabilitation interventions for chronic non-specific low back pain" en Eur spine 20; 19-39; 2011.

Mark P. Jensen, Melissa A. Day and Jordi Miró, "Neuromodulatory treatments for chronic pain: efficacy and mechanisms", Nat. Rev. Neurol; 10, 167-178, 2014.

May, A "chronic pain may change the structure of the brain", Pain, 137; 7-15, 2008.

Mazzola, A, Calcagno, M.L.; Goicochea M.T., Pueyrredón, H.; Leston J. y Salvat, F. "EMDR in the treatment of Chronic Pain", Journal of EMDR Practice and Research, Vol. 3, Nº2; 2009.

Mc Affrey, R; Frock, T; Garguilo, H. "Understanding Chronic Pain and the Mind-Body Connection", Florida Atlantic university; holistic Nursery Practices; 17 (6); 281-287; 2003.

Melzack, R. "Del Umbral a la neuromatriz", Rev. Soc. Esp. Dolor, Nº7, 149-156, 2000.

Ming Y, Haoilin Z (2011). "Nociceptive Memory in the Brain: cortical mechanisms of chronic Pain"; Journal Neuroscience;31(38):13343-5; Sept. 21;

Mohan AG, Mohan Indra (2004). *Yoga Therapy*, Shambala Public. Inc.

Moix J (2006). Cara a cara con tu dolor. Técnicas y estrategias para reducir el dolor crónico. Barcelona. España. Editorial Paidos.

Momsen, Anne-Mette; Rasmussen Jens Ole; Nielsen Claus Vinther; Iversen Maura Daly; Lund Hans (2012). "Multidisciplinary Team Care in rehabilitation and overview of reviews", Journal Rehabilitation Med; 44:901-912

Naji-Esfahani H, Zamani M, Marandi S, Shaygannejad V, Haghjooy S (2014). "Preventive effects of a three month yoga intervention on endothelial function in patients with migraine", International Journal of Preventive Medicine, 424-429; abril

Posadzki P, Ernst E, Rohini T, Myeong SL (2011). "Is yoga effective for pain? A systematic review of randomized clinical trials", Complementary Therapies in Medicine,19,281-287

Pragati O, Nagarathna R; Ebnezar J; Nagendra H "The effect of Add-On Yogic Prana Energization Technique (YPET) on healing Fresh Fractures: a Randomized Control Study", The Journal of Alternative and Complementary Medicine, Vol.17; Nº 3; pp.253-258; 2011.

Pueyrredón JH, Salvat F (2007). "Dolor Crónico: Evaluación Interdisciplinaria" en Archivos de Neurología, Neurocirugía y Neuropsiquiatría, Volumen 13; Número 1; pp.25-31

Rasmussen L, Mikkelsen K, Haugen M, Pripp A, Fields J, Forre O (2012). "Treatment of fibromyalgia at the Maharishi Ayurveda Health Centre in Norway II-a 24 month follow-up pilot study" Clinical Rheumatology; 31-821-827

Redondo Delgado, Ma Marta; Leon Mateos, Leticia (2015). El dolor. Psicología, bienestar y salud, 4. Universidad Complutense. Madrid. España.

Reiner K, Tibi L, Lipsitz J (2013). "Do mindfulness-based interventions reduce pain intensity? A critical review of the literature", Pain Medicine, 14; 230-242

Rome H, Rome J (2000). Limbycally Augmented Pain Syndrome (LAPS) Kindling, Corticolimbic Sensitization and the Convergence of Affective and Sensory Symptoms in chronic Pain disorders Pain Medicine. Vol. 1 7-23.

Rosenzweig S, Greeson J, Reibel D, Green J, Jasser S, Beasley D (2010). "Mindfulness-based stress reduction for chronic pain conditions: variation in treatment outcomes and role of home meditation practice", Journal of Psychosomatic research 68, pp.29-36

Ryusuke K,Hiroki N, Koji I, Nobuo H, Osamu N, Manabu H, Satoshi T, Norihiro S, Mitsumasa K (2005). "Intracerebral pain processing in a Yoga Master who claims not to feel pain during meditation", Eur. J. Pain 9; 581–589;

Sabatowski, Rainer: "Multidisciplinary pain management programs", J. Pain Res. 6; 355-358, 2013.

Samwel H, Kraaimaat F, Crul B, Van Dongen R, Evers A (2009). "Multidisciplinary allocation of chronic pain treatment: effects and cognitive-behavioral predictors of outcome", British Journal of Health Psychology, 14; 405-421

Schapiro F, Silk Forrest M (1997). *EMDR. Una terapia revolucionaria para superar la ansiedad, el estrés y los traumas*, Kairós, 2004

Sri Nathamuni (translation by TKV Desikachar): *Yogarahasya*, Vignesha Pri Yoga Therapy.

Stanos, Steven: "Focused Review of Interdisciplinary Pain Rehabilitation Programs for Chronic Pain Management", Current Pain Headache Rep, 16; 147-152, 2012.

Sullivan M, Cahana A, Derbyshire S, Loeser J (2013). "What does it mean to call chronic pain a brain disease?" The Journal of Pain, Vol 14, number 4, pp: 317-322, april

Svatmarama (2006). *Hatha Yoga Pradipika* (translated by Brahmananda); The Adyar Library and Research Centre, Chennai,.

Tang Y, Ma Y, Fan Y, Feng H, Wang J, Feng S, Lu Q, Hu B, Lin Y, Zhang Y, Wang Y, Zhou L, Fan M (2008). "Central and autonomic nervous system interaction is altered by short term meditation", PNAS, june 2; vol 106; nº 22.

Vania Apkarian, Marwan N. Baliki, Melissa A. Farmer (2013). "Predicting transition to chronic pain" en Lippincott Williams & Wilkins, Vol 26, N°4, august

Villemure C, Ceko M, Cotton V, Bushnell MC (2013). "Insular Cortex Mediates Increased Pain Tolerance in Yoga Practitioners", Cerebral Cortex Advance Access, published may, 21st.

Waterschoot F, Dijkstra P, Hollak N, De vries H, Geertzen J (2014). "Dose or content? Effectiveness of pain rehabilitation programs for patients with chronic low back pain: a systematic review", International Association for the study of pain, 179-189

Wicksell R, Vowles K (2015). "The role and function of acceptance and commitment therapy and behavioral flexibility in pain management" in Future Medicine

Yadav R, Magan D, Mehta N, Sharma N, Mahapatra S (2012). "Efficacy of a Short-Term Yoga-Based Lifestyle Intervention in Reducing Stress and Inflammation: Preliminary Results"; The Journal Of Alternative And Complementary Medicine; Volume 18, Number 7, pp. 662–667

Zautra A, Fasman R, Davis M, Craig A (2009). "the effects of slow breathing on affective responses to pain stimuli: an experimental study", PAIN 149 (2010) 12-18