UNIVERSIDADE DE BRASÍLIA-UnB
FACULDADE DE CEILÂNDIA-FCE
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DANIELLY NERY TOMAZ DA SILVA

INFLUENCE OF ELECTRICAL STIMULATION IN THE QUALITY OF LIFE OF INDIVIDUALS WITH KNEE OSTEOARTHRITIS: A SYSTEMATIC REVIEW

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Trabalho de Conclusão de Curso apresentado à Universidade de Brasília – UnB – Faculdade de Ceilândia como requisito parcial para obtenção do título de bacharel em Fisioterapia.
Orientador (a): Prof. Dr. João Luiz Quagliotti Durigan

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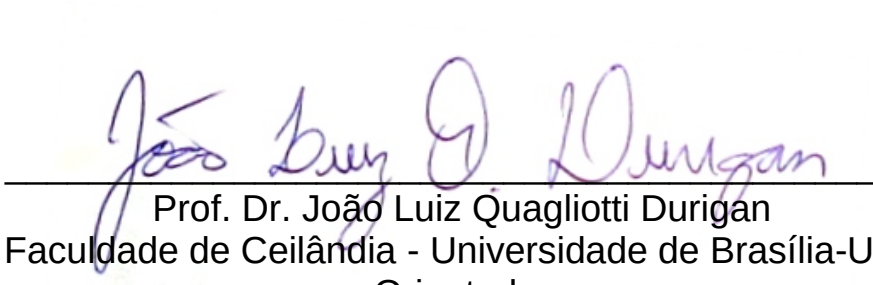
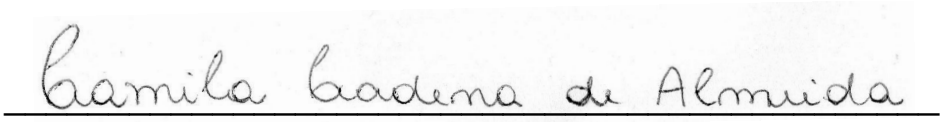
Brasília,02/05/2022

COMISSÃO EXAMINADORA



Prof. Dr. João Luiz Quagliotti Durigan
Faculdade de Ceilândia - Universidade de Brasília-UnB
Orientador



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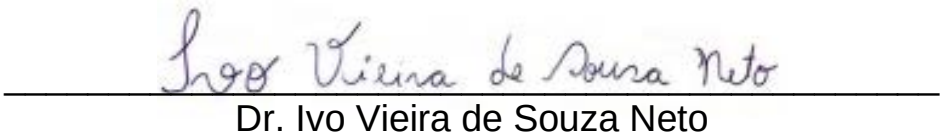

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E-lastic equipamentos e serviços de medição Ltda. – Brasília

Dedicatória

Este trabalho é dedicado à minha mãe, minha família e meus amigos que tanto me ajudaram nessa caminhada.

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Epígrafe

Portanto, quer comais quer bebais,
ou façais outra qualquer coisa,
fazei tudo para glória de Deus.

1 Coríntios 10:31

RESUMO

Introdução: Osteoartrite (OA) é uma doença articular degenerativa que atinge principalmente a população idosa, ela pode atingir diversas articulações, mais comumente em membros inferiores, e levam a diversas limitações funcionais e redução da qualidade de vida. Dessa forma, são necessárias estratégias para atenuar essas respostas prejudiciais. A eletroestimulação é um recurso comumente utilizada com fins terapêuticos, onde uma corrente elétrica altera padrões fisiológicos da área levando melhora ao tecido afetado. Qualidade de vida é um desfecho muito importante que busca avaliar a percepção do indivíduo quanto a diversos aspectos. Objetivo: O objetivo deste estudo foi identificar, a partir de uma revisão sistemática, se o uso da estimulação elétrica melhora efetivamente a qualidade de vida em indivíduos com OA de joelho em comparação com um grupo controle com tratamento padrão ou placebo, Métodos: estudos foram identificados em diversas bases de dados e pesquisados a partir de termos controlados buscados no MeSH. A qualidade metodológica dos estudos foi avaliada pela escala PEDro. Estudos que aplicaram eletroestimulação em participantes com OA de joelho e avaliaram qualidade de vida por meio de questionários verificados foram incluídos, estudos foram excluídos quando trataram outras doenças, ou quando usaram uma outra terapêutica. Resultados: Dentre 917 estudos, apenas 4 atendiam os critérios após a seleção. Os estudos incluídos tiveram uma média de 7,75 na PEDro. Os estudos utilizaram TENS com modulações de parâmetros semelhantes, aplicadas por aparelho portátil em casa e como comparação havia TENS placebo e terapia convencional. Amostra de 199 participantes. A partir do SF-36, três estudos publicaram resultados de melhora na qualidade de vida sem diferença estatisticamente significante, e uma publicação demonstrou efeito. três dos estudos demonstraram diferenças significativas na melhora da dor, enquanto um apresentou melhora, mas não estatisticamente significativa. Conclusão: o estudo não apresentou melhora estatisticamente significante na qualidade de vida desses participantes, no entanto é importante ressaltar que os estudos não utilizaram parâmetros baseados em evidência cientifica para aplicação nessa população, o que poderia levar a diferentes resultados.

Palavras chave: Osteoartrite; eletroestimulação; qualidade de vida.

ABSTRACT

Introduction: Osteoarthritis is a degenerative articular condition that primarily affects the elderly population, it can affect various joints, most commonly lower member, leading to functional limitations and lowering quality of life. Thus, strategies are needed to mitigate these harmful responses. Electrical stimulation is a widely used therapeutic resource in which an electrical current alters the physiology of the treated area leading to the tissue improvement. Quality of life is a new topic that evaluates one's perception of different aspects of life. Objective: The objective of this study is to identify, through a systematic review, if the use of electrical stimulation effectively improves quality of life in participants with knee OA in comparison with a control group. Method: Studies were identified from various databases, searched using keywords of MeSH. The methodological quality of the included studies was assessed using PEDro scale. Studies that used electrical stimulation in participants with knee OA and evaluated quality of life using verified questionnaires were included and studies were excluded when treating other diseases or using another therapeutic modality. Results: In 917 studies only 4 fit the criteria after selection. The studies had a 7,75 mean in PEDro Scale. Studies used TENS with similar parameter modulation applied with a portable device at home and as a control group they used TENS placebo or standard care. The sample was of 199 participants. Through SF-36 three studies showed improvement in quality of life but not statistically significant while one did. three of the studies showed significant improvement in pain relief while one wasn't significant. Conclusion: this study did not show statically significant improvement in quality of life of these participants, however it is important to highlight that the studies did not follow evidence-based parameters to these population which could have changed the results.

Key words: Osteoarthritis; Electric Stimulation; electrical Stimulation; Transcutaneous Electric Nerve Stimulation; Electric Stimulation Therapy; Quality of Life.

LISTA DE TABELAS E FIGURAS

LISTA DE ABREVIATURAS

APTA - American physical therapy association

BMI - Body Mass Index

DeCS - Descritores em Ciências da Saúde

LEFS - Lower Extremity Functional Scale

MCID - minimal clinically important difference

MCS - Mental Component Summary

MeSH - Medical Subject Headings

OA - Osteoarthritis

OAKHQOL - Osteoarthritis Knee and Hip Health-related Quality of Life

PCS - Physical Component Summary

PRISMA - Preferred Reporting Items for Systematic Reviews and Meta-Analyses

QOL - Quality of Life

SF-36 - Short Form Health Survey 36

TUGT - Timed up and go test

VAS - Visual Analogue Scale

WHO - World Health Organization

WHOQOL - World Health Organization Quality of Life

WOMAC - Western Ontario and McMaster Universities Osteoarthritis Index

SUMÁRIO

1. INTRODUCTION

Osteoarthritis (OA) is an inflammatory, biomechanical, and degenerative articular condition characterized by the articular cartilage deterioration, resulting in pain, stiffness, edema, and functional impairments[1]. It is most common in knee and hip[1]. The three most affected tissues are cartilage, bone, and the synovial fluid[2].

OA is a condition most commonly found in the elderly population, and its risk factors are age, gender – since women tend to develop the most severe form of the disease and be most affected by it[3] – trauma, obesity, metabolic illnesses in which the cause is unknown[1] the hypothesis is that within aging our metabolic rate decreases and when there is a release of normal enzymes in the tissue due to the metabolic imbalance it occurs the degeneration of the joint and all tissues affected by OA. According to Callahan et al[4] 15% of the population worldwide is affected by OA, being 32.5 million in the US alone.

The population affected with this condition has various functional limitations in daily activities such as walking, climbing stairs, sitting down, and others. These limitations are caused by symptoms of the condition namely swelling, loss of strength and range of movement and pain[5], culminating in a worsening of the physical health and quality of life[6].

Electrotherapy or electrical therapy uses energy to achieve a therapeutic goal[7]. It has and it has had different terms along the years. The American Physical Therapy Association[8] (APTA) has already published an Electrotherapeutic Terminology in Physical Therapy however, according to Cameron[9] it is not consistently respected. Electrotherapy consists in the use of the electrical current in which the charged particle flow when applied to a body induces physiological changes to achieve a therapeutic effect in the involved tissue.

The electrical stimulation has various goals, such as reducing pain, and increase strength. The electroanalgesia has the goal of reducing pain, and it is based on the gate control theory, and endogenous opioid release mechanisms, activation of delta opioid receptors and the strengthening electrical stimulation is obtained through the stimulation of a muscle contraction to gain strength of the muscle involved in the affected joint to reduce pain[10].

Quality of life (QOL) is also a term with many definitions, and none of them are consistently accepted[11]. In general, it is a synonym for health or general satisfaction in life, and it varies concept according to different areas of study. The World Health Organization (WHO) defines QOL as an individual's perception of their position in life in the context of the culture and value systems in which they live and concerning their goals, expectations, standards and concerns[12].

The QOL is evaluated through a questionnaire they are practical tools for physical therapists and clinicians because they are low-cost time effective and easy to interpret. There are different questionnaires to evaluate QOL like World Health Organization Quality of Life (WHOQOL) which is a WHO questionnaire with about 100 questions divided into 6 domains: physical, psychological, level of independence, social relationships, environment, and spirituality/ religion/ personal beliefs. The questionnaire Short Form Health Survey 36 (SF-36) is another method to evaluate QOL. It has 36 questions divided into 8 domains: physical functioning, role-physical, bodily pain, mental health, role-emotional, social functioning, vitality and general health. Taft et al divides them into two big domains[13] the Physical Component Summary (PCS) and the Mental Component Summary (MCS). Besides the general QOL questionnaires, some of them are specific to a condition like the Osteoarthritis

Knee and Hip Health-related Quality of Life (OAKHQOL)[14] that consist of 43 questions divided into 5 domains 3 independent items.

2. OBJECTIVE

The aim of this study is to verify if the use of electrical stimulation effectively improves quality of life in participants with knee OA compared to a control group with standard care or placebo.

3. METHOD

Protocol and Registration

This study is a systematic review. This study selection process included database search, checking for duplicates, screening of titles and abstract, evaluation of inclusion and exclusion criteria, and full-text reading were conducted based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). PROSPERO registration number: CRD42021260207.

Eligibility criteria

We included studies that applied electrical stimulation in participants with knee OA and evaluated QOL through a valid questionnaire. A secondary outcome was assessed: pain through valid scales, since this outcome is an important variant for this condition. There was no restriction on the language of the studies or year of publication or methodological quality also there was no restrictions as to age or gender due to the lack of studies in previous and the actual search.

Information Sources

The Search was conducted in January 2022 in the following databases: Pubmed, Pubmed Central, BVS, Web of Science, Scopus, EBSCO, Embase, Cochrane Central Register of Controlled Trials (CENTRAL).

Search strategies

The search strategy was selected initially through Descritores em Ciências da Saúde (DeCS) to obtain all the controlled vocabulary in English and later applied in the Medical Subject Headings (MeSH) to verify the controlled vocabulary and also to obtain synonyms to create a search strategy for the databases that do not recognize MESH. The search strategy used in the databases BVS, Pubmed, Pubmed Central, Scopus, EBSCO – Medline, Embase e Cochrane Central Register of Controlled Trials (CENTRAL) was Osteoarthritis AND (“Electric Stimulation” OR “Electric Stimulation Therapy” OR “Transcutaneous Electric Nerve Stimulation”) AND “Quality of Life” while in Web of Science for not recognizing the controlled vocabulary of MESH the search strategy used will be Osteoarthritis AND (“Electric Stimulation” OR “Electric Stimulation Therapy” OR “Electrical Stimulation” OR “Therapeutic Electrical Stimulation” OR “Transcutaneous Electric Stimulation” OR “Percutaneous Electric Nerve Stimulation” OR TENS OR Electroanalgesia OR “Analgesic Cutaneous Electrostimulation” OR “Transcutaneous Electrical Nerve Stimulation” OR “Transcutaneous Nerve Stimulation”) AND (“Quality of Life” OR “Life Quality” OR “Health-Related Quality Of Life” OR “Health Related Quality Of Life”).

Study selection

We exclude studies that treated or compared OA with other conditions or use other therapies, except when in the control group (conventional therapy). Within the end of the search process, one independent author selected the studies. In case of dispute, a second reviewer was consulted. If needed, a third one was also consulted.

Data collection process

Two authors independently assessed trials for inclusion, and evaluated the risk of bias with PEDro scale the authors will resolve any disagreement regarding the evaluation through discussion.

The following data were obtained in each study: age, gender, body mass index (BMI), type of current and parameters, the primary outcome (QOL), and a secondary outcome, pain, for being an essential factor in this condition.

Risk of bias in individual studies

To evaluate the methodological quality of the included studies two authors independently analyzed PEDro scale. This scale has 11 items to evaluate methodological quality of Clinical Trials. Each item must be given a point if present in the study.

Statistical analysis

The statistical analysis was conducted through mean differences and standard deviations. The Microsoft Excel software was used to fill out the spreadsheet and to do the data analysis.

4. RESULTS

Study selection

Nine hundred and seventeen studies were identified through the search in the previously mentioned databases. After removing all duplicates, there was eight hundred and eighty-four articles out of these. It was identified twenty-one through the screening of titles and abstract which seventeen were excluded for not fitting in the inclusion and exclusion criteria. Four studies[15,16,17,18] were selected. Most of the articles were excluded due to combined therapies or other treating other pathologies. The flow diagram is available in the picture 1. The study characteristics of all the included are available in Table 1.

Risk of bias

The PEDro scale as mentioned previously evaluates the methodological quality of the selected studies. The selected articles obtained a total score of 6 to 10 with mean of 7,75. Most of the studies did the allocation concealed (75%)[15,17,18].

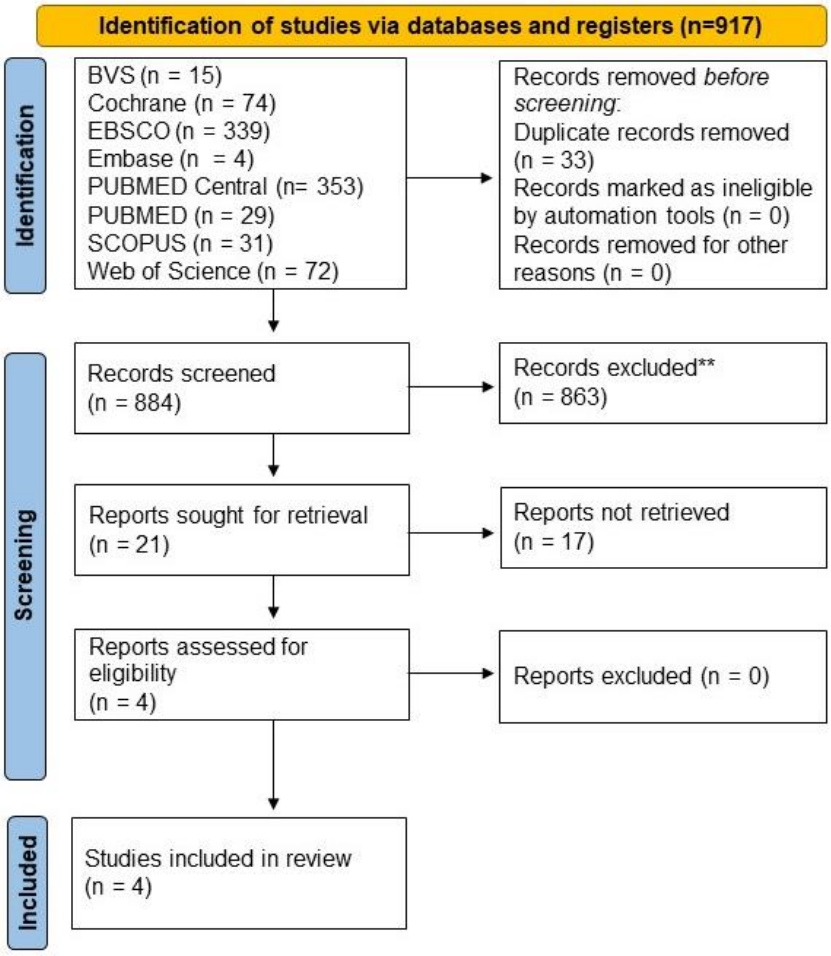

Figure 1: PRISMA Flow Diagram.

All the studies obtained points in random allocation, baseline similarities, less than 15% drop outs, intention to treat analysis, between group comparison reported and post intervention & variability measures. This scale is available in table 2.

Intervention

In all studies, the only type of electrical stimulation used was the eletroanalgesia

Title	Authors	Objectives	N	Intervention	Control Group	Results
Use of transcutaneous Eletrical Nerve Stimulation Device in Early Osteoarthritis of the Knee	Cherian, J et al.	Evaluate the effects of the application of TENS in patients in the initial stage of knee osteoarthritis (Kellgren-Lawrence grade 1 and 2) over the following factors: pain reduction, subjective functional improvements, objective functional improvements, QOL measure improvements and isokinetic strength.	23	TENS	Non operative therapy with self-directed exercise therapy and corticosteroid injections	TENS had significant improvements in Timed up and go test (TUGT) and objective Knee society score (KSS) when compared with the control group and had significant improvement in the physical component of their Lower Extremity Functional Scale (LEFS), SF-36, quadriceps strength and the timed stair climb.
Knee Osteoarthritis: Does Transcutaneous Electrical Nerve Stimulation Work?	Cherian, J et al.	Evaluate TENS device efficacy comparing to the standard treatment for Kellgren-Lawrence grade 3 and 4 of knee OA.	36	TENS	9 received nonoperative treatment involving corticosteroid injections and 9 received 6 weeks of physical therapy.	TENS group improved in Visual Analogue Scale (VAS) pain. TUGT, Timed stair climb, 2 minutes walk test, 5-repetition chair rise test, 6-inch step test, and passive flexion motion. However, the control group improved in the active range of motion.

Do the Effects of Transcutaneous Electrical Nerve Stimulation on Knee Osteoarthritis Pain and Function Last?	Cherian, J et al.	Compare TENS treatment with standard care. the study objective is to determinate the differences in: pain perception, subjective medication use, subjective functional abilities, QOL, dispositive use and TKA conversion between groups.	70	TENS	Standard care including corticosteroid injections and physical therapy exercises.	TENS lower scores in VAS and showed significant improvement in subjective and functional outcomes also patients in the TENS group reduced the amount of pain medication.
The Effectiveness of Pulse Electrical Stimulation in the Management of Osteoarthritis of the Knee	Fary, R et al.	Determine efficacy of subsensorial pulsed electrical stimulation (PES) in the management of symptoms of knee OA	70	TENS	TENS placebo: an identical device was used however the electrical pulse was turned off after 3 minutes.	There was no difference between groups on pain, function or stiffness scores in Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC); 56% achieved a clinically relevant 20-mm improvement in VAS pain score at 26 weeks compared with 44% of controls;

Table 1: study characteristics. N= sample.

obtained from Transcutaneous Electrical Nerve Stimulation (TENS).

In all studies the participants received a portable stimulator with pre modulated currents, in the three of the studies[15,16,17] they were meant to use the stimulator throughout the whole day except when in water activities with the following parameters: a pulsed

	Cherian et al (2015 v.28)	Cherian et al (2016 v.29)	Cherian et al (2016 v.39)	Fary et al (2011 v.63)
Eligibility criteria specified	✓	✓	✓	✓
Random allocation	1	1	1	1
Allocation concealed	1	0	1	1
Baseline similarity	1	1	1	1
Patient blinding	1	0	0	1
Physical therapist blinding	0	0	0	1
Assessor blinding	0	0	0	1
< 15% drop outs	1	1	1	1
Intention to treat analysis	1	1	1	1
Between group comparison reported	1	1	1	1
Post intervention point & variability measures	1	1	1	1
Total score	8/10	6/10	7/10	10/10

Notes: ✓ = Eligibility criteria satisfied (Not used in total score calculation); 1 = yes; 0 = no

Table 2: PEDro scale.

current with a simple asymmetrical wave, a pulse duration of 48 to 100 μs with intervals of 12 seconds, an alternating pulse frequency and the intensity was not mentioned, and the fourth study[18] they were meant to use the stimulator for 7 hours a day hours preferably during sleep hours, with the following parameters: a pulsed current with an asymmetrically biphasic wave, a pulse frequency of 100 Hz, a pulse duration of 4 ms

and the intensity was turned up until they felt pins and needles and after achieving it they were supposed to turn it down the intensity until they could no longer feel it.

As a control group, the studies choose either the placebo[18] characterized by the Transcutaneous electrical nerve stimulation (TENS) application but in a short duration of time or corticosteroid injections or a six weeks protocol of physical therapy[15,16,17] for strengthening and range of motion.

Sample

The sample analyzed was a total of 199, 50,75% being the control group and 49,25% electrical stimulation. All studies claim there was no significant difference in the sample when comparing age, gender, and body mass index (BMI) with one exception one of the studies did not have the BMI data. All the characteristics of the sample can be found in table 3.

		Cherian 2015 v. 28		Cherian 2016 v. 29		Cherian 2016 v. 39		Fary v. 63		Mean	
		ES	CG	ES	CG	ES	CG	ES	CG	ES	CG
Age		55	54	62	58	63	61	70,7	68,9	62,67	60,47
Gender	F	11	7	19	27	7	9	17	20	13,5	15,75
	M	2	3	14	10	11	9	17	16	11	9,5
BMI		32,5	34,8	N/A	N/A	33,1	34,3	29,4	26,8	23,75	23,97

Table 3: Characterization of the sample in age, gender and BMI. ES: electrical stimulation; CG: Control Group; F: female; M: male; N/A: not available.

The mean age of all participants in electrical stimulation as approximately 63 years old in a sample of 54 women and 44 men. In the control group was approximately 60 years old in a sample of 63 women and 38 men.

The mean BMI of those who explored this variant was 31,67 in electrical stimulation with a standard deviation of approximately 1,6. The mean in the control group was 31,97 with a standard deviation of approximately 3,7.

Electrical Stimulation																
Cherian 15				Cherian 16 v.29				Cherian 16 v.39				Fary			
SF-36 Physical		SF-36 Mental		SF-36 Physical		SF-36 Mental		SF-36 Physical		SF-36 Mental		SF-36 Physical		SF-36 Mental	
Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
28,13	39,53	50,46	54,52	29,2	41	48	52,6	Δ				37	36	52,7	51,5
Control Group															
Cherian 15				Cherian 16 v.29				Cherian 16 v.39				Fary			
SF-36 Physical		SF-36 Mental		SF-36 Physical		SF-36 Mental		SF-36 Physical		SF-36 Mental		SF-36 Physical		SF-36 Mental	
Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Δ				32,8	36,4	51,3	48,2	Δ				36,5	33,9	53,7	51,3

Table 4: Results of SF-36 in each study. Δ: Variation.

Quality of life

As mentioned previously quality of life is of each individual, and to evaluate it some questionnaires were developed for example, SF-36, WHOQOL, and others. All studies in this research used SF-36.

All of the included studies analyzed the SF-36 data through two domains, physical and mental. Three of the studies noticed an improvement in the physical and mental domain however the improvement was not statistically significant[16,17,18], while one of the studies affirm to have seen a statistically significant improvement in both domains[15]. Commonly in all studies the highest improvement was seen in the physical domain. The results of each study are available in table 4.

No other scale or questionnaire was used to evaluate the quality of life in none of the studies.

Pain

Pain is an important factor for patients with OA due to its incapacitating power. All studies included in this review address pain somehow. Although it is a sensorial and subjective experience, it is possible to quantify and or qualify through scales.

All studies used the visual analogue scale (VAS) as an evaluation method. In All studies used the visual analogue scale (VAS) as an evaluation method. In three of the studies there was an improvement statistically significant in the individual's pain, however, one of them did not show a significant difference. The analysis of pain can be found in table 5.

Electrical Stimulation							
Cherian 15		Cherian 16 v.29		Cherian 16 v.39		Fary	
VAS		VAS		VAS		VAS	
Pre	Post	Pre	Post	Pre	Post	Pre	Post
5	2,38	4,95	4,55		Δ	51	20
Control Group							
Cherian 15		Cherian 16 v.29		Cherian 16 v.39		Fary	
VAS		VAS		VAS		VAS	
Pre	Post	Pre	Post	Pre	Post	Pre	Post
	Δ	4,5	5,12		Δ	52	19

Table 5: Results of VAS in each study. Δ: Variation.

5. DISCUSSION

The primary outcome study in this review was found in all articles included, and so was the secondary outcome. The SF-36 questionnaire is valid in Australia[19] and in the United States of America[20] where the studies were developed. It is vast the use of electrical stimulation for the target population of this study. Several studies were conducted using electric stimulation for this population[10]. One of the most used currents was TENS[21] due to the pain relief capacities of this current, achieved based on the gate control theory and the mechanisms of endogenous opioid release. All the studies included in this review used TENS, but they did not follow modulation oriented through systematic review to decide the best parameters[22,23] this way, the results could have changed if applied the proper modulations based on evidence which are pulse frequency of 80Hz, pulse width of 140us, current intensity the highest tolerable by the participant in a sensorial level and the duration of 30 minutes[24].

Pain is one of the main incapacitating factors of OA. According to Cohen[25], pain is an unpleasant emotional and sensory experience associated with real or potential damage to the tissue. According to Capela[26], the quality of life of an individual has a strong correlation to pain especially in individuals with chronic pain[27] since they usually have the most intense symptoms of pain and have the worst quality of life thus these two variables have a negative correlation.

It is known that individuals with OA tend to have the functional capacity, functional limitation, and pain affected in the SF-36[28], and both of the first ones are strongly correlated to pain which usually increases with degeneration and age[29]. As mentioned before, the quality of life of an individual is highly affected by pain, studies[27,30] conducted on individuals with chronic and back pain affirm that those individuals have a reduced quality of life when compared to individuals who did not experience chronic pain, and this variable was independent of the gender of the sample.

Electrical stimulation is recommended for pain relief in other situations such as labor[31], post episiotomy[32], OA[24] it is related to the release of endogenous opioids and activation of descendant inhibitory pathways to reduce hyperalgesia. Individuals with intervertebral disc degeneration in low back[33] reported significant improvement on pain when using TENS, so did the individuals that went through colonoscopy[34] and did not use any sedation. This information corroborates that pain relief using electrical stimulation does not keep itself to few studies it has lots of possibilities of usage when we think about the intensity or the location or the condition appliable.

The usage of TENS to improve quality of life is also used in other pathologies such as low back pain[35], diabetic peripheral neuropathy and others[36]. A study conducted by one of the greatest references and electrical stimulation Kathleen Sluka[36]

demonstrated that reducing pain improves the quality of life of an individual in various pathologies.

Limitations

These studies conducted by Cherian et al[15] and Cherian et al[17] presented its results in a way that could interfere with the possible evaluation of the results. The study Cherian et al[15] show the results of the pre and post treatment only with the TENS group however it did not bring the same the results in the control group only the variation of the pre- and post-treatment results. The study Cherian et al[17] showed only the variation from pre- and post-intervention in both groups.

It can be said that the usage of electrical stimulation can be recommended due to the QOL correlation to pain, but there is not strong evidence to refute the application of the current. Without significant statical relevance we could indicate clinical improvement of the participants through the minimal clinically important difference (MCID). The MCIDs are obtained from a specific study to determine the scores of clinically significant improvement using the mean pre and post intervention scores but it is not applicable to this study because the Cherian et al[15] and Cherian et al[17] studies lack the data already mentioned. Searching the studies of MCID it was also noticed that there were very few studies on this approach on OA[37] one of the studies showed the clinically improvement scores on SF-36, the questionnaire outcome in this present study, individuals with osteoarthritis however, this study contemplates seven of the eight domains in SF-36 and also did not use the two domains (mental and physical) analysis making it unfeasible for this evaluation of the results in the present study. Other studies were found correlating to different situations like total knee arthroplasty[38] but it also analyzes the SF-36 in the format of eight domains not in two big ones.

The analysis of PEDro scale shows that one[18] of the studies executed a triple blind study one[15] of the other three did blinding of the participants. Studies that do not follow the blinding method tend to have better results and according to John P A Iodannidis[39] blind studies should be done to avoid biased results.

Also, another limitation is the lack of studies and this approach seen as we have only four studies included.

6. CONCLUSION

This study showed that there was no significant statistical improvement in QOL, evaluated through SF-36, in participants with osteoarthritis after the treatment with electrical stimulation. But it also showed that electrical stimulation promotes improvements in the physical domain which correlates to the pain relief provided by the electrical stimulation. It can be said that there is a significant statistically improvement in pain of these participants which can lead to improvement of the quality of life seeing as they have a strong correlation. The studies included did not follow the recommended parameters[24] which could have changed the results. Thus, electrical stimulation can be considered as a recommendation of a good resource in the rehabilitation of people with knee OA.

Therefore as the National Institute for Health and Clinical Excellence[40] recommends the usage of TENS in the treatment of people with knee OA for pain relief and improvement of the stiffness especially in the short-term treatment it is indicated the use of electrical stimulation with the following parameters: pulse frequency of 80Hz, pulse width of 140us, current intensity the highest tolerable by the participant in a sensorial level and the duration of 30 minutes[24] furthermore it can also be applied with other interventions as pain education for the participant and the family, physical

exercises for the reduction of mechanical factors on the joint with the goal of pain relief and improvement of quality of life.

Lastly, it is recommended the development of new studies on the subject so that we can have a higher power of evidence.

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