Electrical stimulation for the treatment of Knee joint osteoarthritis

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Abstract 20 patients with osteoarthritis of the knee joint were treated by electrical stimulation in the form of 6 sessions every other day each sessions of diphase fixe (DF) for 4 minutes followed by rest for 4 minutes then treated with a monophase fixe (MF) for 2 minutes. By clinical & statistical analysis (P value < 0.05) we conclude that the electrical stimulation is effective as one method in the treatment of osteoarthritis.

Introduction

Osteoarthritis is the most common rheumatic disease(1) , it is characterized by progressive loss of articular cartilage and by reactive changes at the margins of the joints & in subchondral bone ,clinical manifestation include slowly developing joint pain, stiffness, & enlargement with limitation of motion. Associated secondary synovitis is common (2).

The occurrence of osteoarthritis is increased with age, and women developing osteoarthritis twice as frequently as men (3), the knee is affected by osteoarthritis more often than any other joint, the condition is particularly common in elderly fat women.

It is caused by wear & tear (4), but nearly always a factor is present that has caused the joint to wear out sooner than usual .Osteoarthritis may occur as primary idiopathic or a secondary disorder(5) although this distinction is not always clear.

Primary causes of osteoarthritis, without an obvious reason .there are a genetic predisposition to some forms of osteoarthritis, such as Heberdens nodes, which affect the distal interphalyngeal joints of the hand. Studies also implicate immunologic factors in the perpetuation &acceleration of the osteoarthritis change (6).The secondary causes:

1. Overweight is the commonest factor.
2. Secondary causes of osteoarthritis are:
    a. Previous fracture causing irregularity of the joint surfaces.
    b. Prior joint disease as rheumatoid arthritis , gout , septic arthritis or haemophilia.
    c. Metabolic or endocrine diseases chondrocalcinosis, haemochromatosis or acromegaly.
    d. Neuropathic joint in tabes dorsalis, syringomyelia or in diabetes mellitus.
    e. Late avascular necrosis following systemic lupus erythmatosis or sickle cell disease (7).

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Patients & methods

20 patients (7 male & 13 female) were included in this study. Their age > 50 years were referred to the physiotherapy department in Baghdad hospital, with osteoarthritis of the knee joint.

Table No. 1 show the clinical data of the patients

Those patients were diagnosed as osteoarthritis of the knee joint on clinical & radiological examination according to American rheumatism association (ARA)classification criteria for idiopathic osteoarthrosis of the knee joint (8) as following :-

Knee-pain with three of the following or knee joint osteophyte with one of the following .

a. age over 50 years.
b. joint stiffness less than 30 minutes.
c. crepitus.
d. bony tenderness.
e. bony enlargement.
f. no palpable warmth

These criteria provided 91% sensitivity & 86% specificity (9).

All patients fulfilling these criteria were included in the study. All the patients were assessed before & after treatment.

The assessment includes:-

1. Pain: type & severity of pain graded from 1-5 as following, (as the patient description) (10)
G 1 for no pain,G 1 l for slight pain on walking, G 11I for marked pain on walking , IV for mild pain at rest and G V for sever pain at rest.

2. Tenderness: the grade of localized knee joint tenderness was recorded according to the following grading system (11)
GO absent ,G 1 slight ,G 2 moderate ,G 3 wincing and G 4 with drawl of/or exclamation

3. Muscle power: the grade of muscle power was recorded according to the Lovett method (12)
0. no muscle contraction , 1 muscle flickering ,2 muscle contraction while there is elimination of gravity, 3 muscle contraction against gravity ,4 muscle contraction against resistant, and 5 for normal muscle.

4. Joint swelling**:** noting the presence of swelling confined to the limits of the synovial cavity & suprapatellar pouch,

5. Crepitus: placing the palm of the hand over the patella, while the thumb & index along the joint line, then flexing then extending the joint .The source of crepitation from damaged articular surfaces can then be detected .comparing the two sides (13)

X-ray of the knee joint for all the patients was done to see the narrowing & osteophtes.

Blood test: patients with elevated erythrocyte sedimentation rate (ESR) were excluded from the study.

All the patients with osteoarthritis of the knee joint have been treated with six sessions applied every other day of electrical stimulation (didynamic current).

The instrument used in this research is a M.A.S. , manufactured in United Kingdom.

The intensity was increased slowly until a definite vibration or pickling is felt, but without any pain or burning sensation, the current used is A.C. current with a 4 minutes diphasic current followed by 4 minutes rest then 2 minutes monophasic current., continuous muscle contraction

should not occur and the negative electrode is placed at the most painful side.
The physiological effects of this current include stimulation of the sensory nerves, increasing the blood supply, improving venous and lymphatic drainage and a local chemical effect (14) .

Results& discussion:
Table 2 showing the pain score before and after treatment
There is significant difference between pre & post treatment in pain score in osteoarthritis of the knee joint by using t-test at 5% level of significant.

Table 3 showing the tenderness score before and after treatment, and there is significant difference between pre & post treatment of tenderness score in osteoarthritis of the knee joint by using t-test at 5% level of significant.
Table 4 showing the muscle power grading score before and after treatment , and there is no significant difference between pre & post treatment of muscle power grade by using t –test with $p > 0.05$
Table 5 shows the presence of swelling , and there is significant difference between pre & post treatment regarding the presence of the swelling in osteoarthritis of the knee joint by using t-test at 5% level of significance.
Table 6 showing the presence of crepitus before and after treatment , and it shows a persists of crepitus after treatment.
Electrical stimulation is not the traditional method for the treatment of osteoarthritis, the usual method for treatment in rehabilitation centers is heat therapy & exercise.
By this study we use electrical stimulation & isometric exerciseevaluate its effect.
By the statistical analysis it was clearly obvious that there is an improvement in the clinical criteria for assessment of osteoarthritis of the knee joint with P. value < 0.05

Conclusions:

1- This study proves that electrical stimulation is effective in the treatment of osteoarthritis of the knee joint.
2- Osteoarthritis. of the knee joint more common in women than men.
3. Overweight plays an important role in O.A. of the knee joint. (70% of patients were over weight).
4. This program is just to delay the complication of osteoarthritis and to relieve pain in the knee joint.

Recommendation
1. Using electrical therapy for treatment of osteoarthritis of knee joint in the rehabilitation centers.
2. Further study to evaluate the effect of this program on osteoarthritis of other joint.

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استعمال التحفيزات الكهربائية لمعالجة سوفان الركبة

٢٠ مريضا بسوفان الركبة تمت معالجتهم باستعمال التحفيزات الكهربائية حيث اعطيت لهم ٦ حلسات (جلسة علاج بين يوم واخر) وكل جلسة تتضمن :

٤ دقائق من التحفيز ب diphase fixe (DF) متبوعة ب ٤ دقائق راحة.

دقيقتان من المعالجة ب monophase fixe (MF).

بمتابعة حالة المرضى سريريا وباستعمال الوسائل الاحصائيه تبين ان هنالك تحسنا ملحوظا بطريقة المعالجة باستعمال التحفيزات الكهربائية.

ان استعمال التحفيزات الكهربائية يعد طريقة مفيدة لمعالجة سوفان الركبة

Table No. 1 show the clinical data of the patients

Clinical data	
No. of patients	20
Sex male	7 (35%)
Female	13(65%)
Age range in years	51-65
(average)	(56)
Duration of symptoms in months	1-24
(average)	(8.8)
Weight range in kg	54-90
(average)	(76.7 kg)
Height range in cm	153-170
(average)	(164cm)
Over weight	70%
x-ray finding narrowing of the joint space	85%
osteophytes	100%

Table 2 showing the pain score before and after treatment

Number of patients before treatment					Number of patients after treatment				
G 1	G11	G 111	G 1V	G V	G 1	G 1l	G 111	G 1V	G V
-	3	8	6	3	6	12	2	-	-

Table 3 showing the tenderness score before and after treatment

Number of patients before treatment					Number of patients after treatment				
G O	G 1	G2	G 3	G4	G O	G l	G 2	G 3	G 4
-	-	17	3	-	6	11	3	-	-

Table 4 showing the muscle power grading score before and after treatment

Number of patients before treatment						Number of patients after treatment					
O	1	2	3	4	5	O	1	2	3	4	5
	-	-	8	12	-	-	-	-	-	11	9

Table 5 showing joint swelling before and after treatment

Number of patients before treatment	Number of patients after treatment
11(55%)	2(10%)

Table 6 showing the presence of crepitus before and after treatment

Number of patients before treatment	Number of patients after treatment
20(100%)	20(100%)