Effects Of 10 Minutes Short Wave Diathermy (SWD) On Osteoarthritis (OA) Knee; Compared To 20 Minutes Short Wave Diathermy (SWD)

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Abstract: *Osteoarthritis (OA) is a degenerative joint disease, occurring primarily in older individuals, characterized by erosion of the articular cartilage, hypertrophy of bone at the margins, subchondral sclerosis, and a range of biochemical and morphologic alterations of the synovial membrane and joint capsule.life expectancy of the population and increasing obesity throughout much of the world are major cause of OA. Osteoarthritis (OA) is a multifactorial disease caused inflammation and joint degeneration that results in the progressive loss of cartilage and usually is accompanied by subchondral bone sclerosis. Many varites from of treatment are used to management and treatment of OA now a days. Many drug ,hydrotherapy, footwear and walking aids, other rehabilitation measures, physical therapy (SWD, UST, TENS, exercises, etc are used to treat OA. In this study author evaluate the effectiveness and usefulness of SWD for OA patients. Group A (experimental) ,Group B (control). After experiment where patients in group A, right knee was involved in 35 (74.5%) and left in 12 (25.5%) and in group B, right knee was involved in 37 (78.7%) and left knee in 10 (21.3%) ,Mean (±SD) pain score of group A and group B patients where week 6 result was significant ;58.89±26.49 and 31.43±17.40 (significant at P<0.001) andphysical function score of patient in Group A and Group B where in week 6 both Group A and Group B mean physical function was quiet improved. After result and analysis the significant improvement was found in the group of patients who received 20 minutes SWD plus NSAIDs. So , it is almost clear that , 20 minutes SWD is more effective then 10 minutes of SWD.*
***Key Words:*** *Osteoarthritis, Hypertrophy, Subchondral bone sclerosis, SWD*

I   Introduction:

Osteoarthritis (OA) is by far the most common form of arthritis. It is strongly associated with ageing and is a major cause of pain and disability in older people.[1]This is likely to increase with the increasing life expectancy of the population and increasing obesity throughout much of the world .Osteoarthritis (OA) of the knee is a leading cause of disability in the elderly.It is more common in women than men . Prevalence of osteoarthritis (OA) knee is 7.5% rural,9.2% urban slum,10.6% urban affluent community.Osteoarthritis (OA) is a multifactorial disease characterized by inflammation and joint degeneration that results in the progressive loss of cartilage and usually is accompanied by subchondral bone sclerosis and, in many cases, formation of bone cysts and marginal osteophytes . Besides these intrinsic disorder of joints, other signs such as decreased range of motion, pain and joint effusion, crepitation, deformities, and functional loss often are present (Fukuda et al, 2011).There are many different form of treatment that can be of value for patients with OA knee such as – education about OA knee, hydrotherapy, footwear and walking aids, other rehabilitation measures, physical therapy (SWD, UST, TENS, exercises, etc). [2][3][4][5]
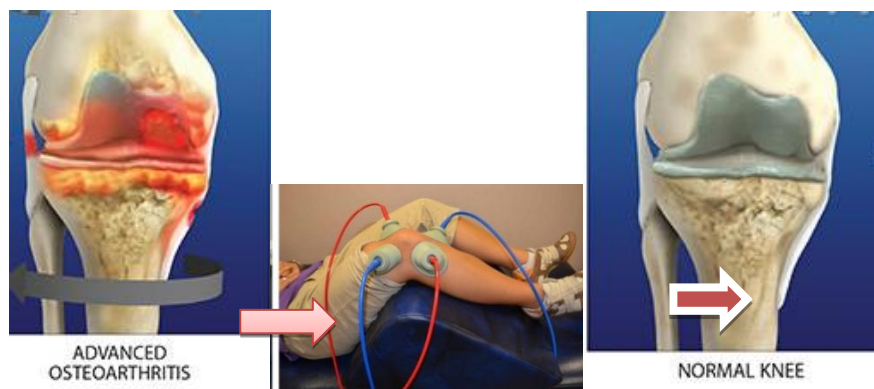
Figure 1a,1b, and 1c: Shows patient knee during Osteoarthritis and after treatment of Shortwave diathermy effect on OA[6]

Shortwave diathermy (SWD)is one of several physical therapy modalities and used predominantly as a pain reduction modality in the clinical practice. Ideal treatment time is 20-30 minutes .Some Institute in our country practice 10 minutes SWD in treatment of OA Knee, because of time accommodation and limited resources for huge rush of patients. So in this condition a question arise that, whether 10 minutes SWD in treatment of OA knee is as effective as 20 minutes SWD. With all possible searches no such study was found for evaluation of comparative effects of 10 minutes and 20 minutes SWD in treatment of osteoarthritis knee. This comparative study was done to see the effects of 10 minutes SWD and 20 minutes SWD on OA knee.[7]

II   Objective:

General Objective:
➢ To compare the effects of 10 minutes (experimental) over 20 minutes (control) SWD in treatment of OA knee by using WOMAC.
   Specific Objective:
➢ To observe the effects of 10 minutes SWD in treatment of OA Knee.
➢ To assess the disability of patient suffering from OA knee.

III   Methodology
➢ **Study Design:** This study based on Randomized Controlled trial.
➢ **Study place and period:** From February 2013 to January 2014 this study was performed in Department of Physical Medicine & Rehabilitation, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka.

➢ **Inclusion criteria:**
• Age group between 38 to 80 years.
• Primary OA of the knee joints.
• No evidence of malignancy or any other chronic debilitating illness and acute infection.

➢ **Exclusion criteria**
• Morning stiffness more than 30 minutes.
• Any evidence of loss of sensation over the knee joints.
• History of knee surgery or trauma.
• Bilateral involvement of knee OA.
• Duration of pain < 3 months.
➢ **Sampling Techniques:**In this study Simple Random sampling- subjects were selected randomly according to the availability of the patients who fulfilled the inclusion criteria.

➢ **Randomization:**
Immediately after the examination, the patients were randomly divided into two groups by drawing a lottery. Each patient has an equal chance of being allocated to any one of the assigned group.
Grouping & treatment assignment
Group A: NSAIDs + Exercise +ADL + 10 minutes SWD (Experimental)
Group B: NSAIDs + Exercise +ADL +10 minutes SWD (Control)

➢   **Sample size**:74 sample in each group, assuming 10% of subjects might refuse to repeat, so total sample were 164 , 82 Sample in each group. During this study period 94 patients were found **.**

➢   **Methods of the study:**For the study 94 patients were incluted during this study period, irrespective of sexes seeking treatment in the physical medicine & rehabilitation department, BSMMU, Dhaka who was referred from different departments of the hospital and from the general practitioners out side the hospital. After taking inform consent, details history of each patient were taken and recorded and a pretest data form were filled for every patient. Past history of diabetes, heart disease**,** trauma, infection or any systemic disease were inquired cautiously. The diagnosis of OA knee were confirmed by history, clinical examinations, laboratory, radiological study. The patients were selected on the basis of the inclusion and exclusion criteria. After That data was collected from patient and analysed.

➢   **Measurement of outcome variable:** are discussed and considered on basis of:

• Age
• Sex
• Socio-economic condition
• BMI
• Duration of knee pain
• Sided ness of involvement(Right/ Left).
• Pain, Stiffness, Physical Function (WOMAC scale Bangla validated verson)

IV   Result

During the study period a total 94 patients were enrolled and weekly follow-up for six weeks. Group A:

Total Patient 47. Male 46.8% and female 53.2%. At week 3 follow-up 1 patient drop, patients (n=46) and at week 4, 2 patients drop (n=44). They did not report for follow-up, and at week 6, Only 44 patients were available for follow-up at week 6. In Group B: Total Patient 47. Male 53.2% and female 46.8%. At week 2 follow-up 1 patient drop, patients (n=46) and at week 3, 6 patients drop (n=40). They did not report for follow-up, and at week 6, Only 40 patients were available for follow-up at week 6.

In Table I shows characteristics of the study patients. Age distribution of the patients between group A and B showed statistically no significant variation. In group A and group B,higest age range is respectively, 39 (83%) and 35 (74%) . Statistically the mean age difference was not significant.Sex distribution showed no significant variation. In group A, 22 (46.8%) patients were male and 25 (53.2%) female, and In group B, 25 (53.2%) patients were male and 22 (46.8%) female. In both group A and group B, most of the patients belonged to middle income group (income 10,000 20,000 Taka/month. BMI showed no significant difference between groups. Mean (±SD) BMI of group A patients was25.36±2.46 (range 21.25 33.06) and of group B patients was 24.53±2.70 (range 19.81 31.01) . The following table is given below:

Table -1: Baseline Characteristics of the study patients

Parameters	Group A (n=47) No. (%)	Group B (n=47) No. (%)	P value
Age (years) □ **40** **41-60** **61-80**	1 (2.1) 39 (83.0) 7 (14.9)	1 (2.1) 35 (74.5) 11 (23.4)	0.575^{ns}
Mean±SD **Range**	53.40±8.22 40.00-78.00	55.21±9.12 40.00-78.00	0.315^{ns}
Sex **Male** **Female**	22 (46.8) 25 (53.2)	25 (53.2) 22 (46.8)	0.536^{ns}
Socioeconomic status **Low** **Middle** **High**	5 (10.6) 40 (85.1) 2 (4.30)	10 (21.3) 35 (74.5) 2 (4.3)	0.368^{ns}
BMI (kg/m^2) **Normal** **Overt** **Obese**	29 (61.7) 16 (34.0) 2 (4.3)	34 (72.3) 12 (25.5) 2 (2.1)	0.522^{ns}
Mean±SD **Range**	25.36±2.46 21.25-33.06	24.53±2.70 19.81-31.01	0.122^{ns}

In figure 2 shows baseline characteristics of osteoarthritis knee, where In group A, right knee was involved in 35 (74.5%) and left in 12 (25.5%) and in group B, right knee was involved in 37 (78.7%) and left knee in 10 (21.3%) patients,. No significant variation was observed. The following figure is given below:
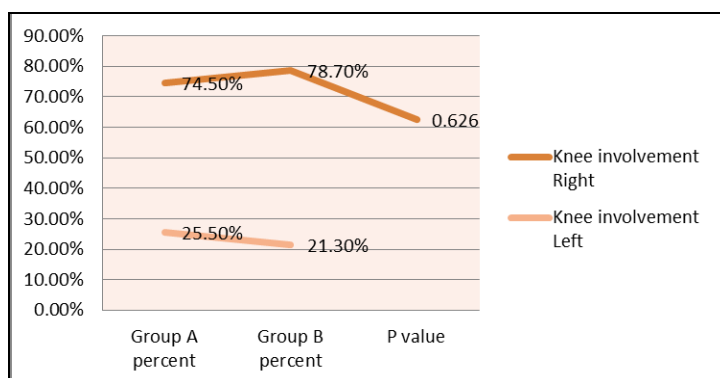

Figure 2: baseline characteristics of osteoarthritis knee

In table-2 shows characteristic of pain of group A and group B where in group A and group B highest percentage was in 91.5 and 97.9% and P value is 0.212. The following table is given below:

Table -2:Characteristic of pain

Characteristic of pain	Group A n=47 No.=%	Group B n=47 No.=%	P value
Constant	3 (6.4)	0	0.212
Intermittent	43 (91.5)	46 (97.9)	
Sharp	1 (2.1)	1 (2.1)	

In figure 3 shows duration of pain in Group A and Group B where >6-12 month duration pain was highest among all. The following figure is given below:
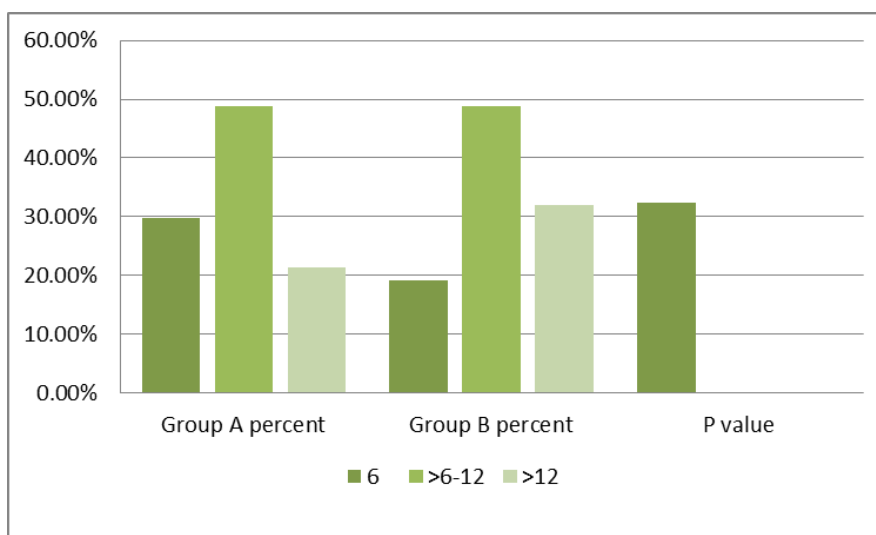
Figure 3: Duration of pain

In table -3 shows ,pain score of the patients in group A and Group B assessed by WOMAC. Mean (±SD) pain score of group A and group B patients where week 6 result was significant ;58.89±26.49 and 31.43±17.40 (significant at $P<0.001$).

**Table 3: Pain score of the patient assessed by WOMAC.**

Pain score by WOMAC	Group A Mean±SD	Group B Mean±SD	P value

Week 0	250.32±32.06 (n=47)	251.81±31.95 (n=47)	0.822[ns]
Week 1	239.21±34.30 (n=47)	235.85±37.16 (n=47)	0.650[ns]
Week 2	204.57±35.87 (n=46)	193.63±37.05 (n=46)	0.154[ns]
Week 3	165.43±37.65 (n=46)	144.53±31.48 (n=40)	0.007[**]
Week 4	127.61±37.39 (n=44)	99.63±33.42 (n=40)	0.001[**]
Week 5	92.86±34.69 (n=44)	62.00±24.63 (n=40)	0.0001[***]
Week 6	58.89±26.49 (n=44)	31.43±17.40 (n=40)	0.0001[***]

In figure 4 shows shiftness score from pretreatment to post treatment of patient in group A and Group B where week 6 siftness score of patient was in group A and b ;78.80% and 90.32% and it was significant result where P value I was <0.001
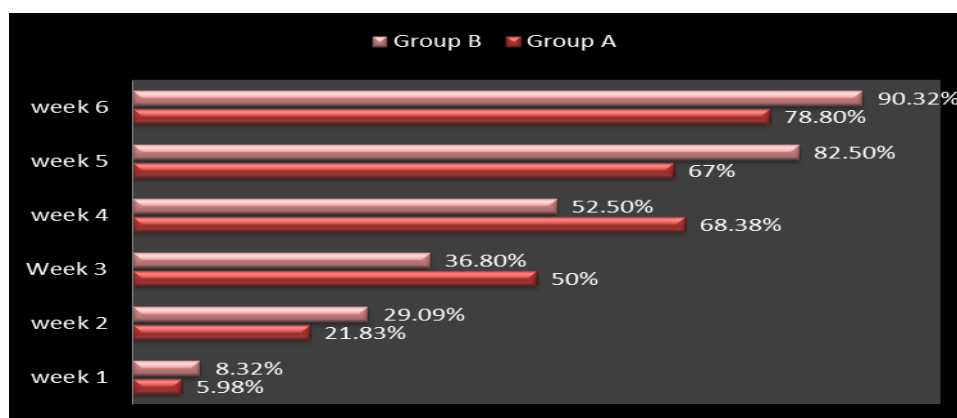
Figure 4: shiftness score from pretreatment to post treatment of patient in group A and Group B

In table 3 shows Physical function score of patient in Group A and Group B where in week 6 both Group A and Group B mean physical function was improved ;265.41±99.24(n=44) and175.75±56.31 (n=40). The following tables is given below:

Table 3:Physical function score of patient

Physical function score by WOMAC	Group A Mean±SD	Group B Mean±SD	P value
Week 0	1009.32±115.39 (n=47)	1011.81±93.95 (n=47)	0.909[ns]
Week 1	979.89±128.88 (n=47)	961.81±119.45 (n=47)	0.477[ns]
Week 2	838.37±117.91 (n=46)	800.00±113.39 (n=46)	0.115[ns]
Week 3	696.88±122.53 (n=46)	634.65±86.90 (n=40)	0.009[**]
Week 4	548.73±127.01 (n=44)	467.25±69.14 (n=40)	0.001[**]
Week 5	406.66±125.50 (n=44)	312.18±64.97 (n=40)	0.0001[***]
Week 6	265.41±99.24 (n=44)	175.75±56.31 (n=40)	0.0001[***]

V   Discussion

Short-wave therapy is a non-invasive treatment modality that typically employs electromagneticradiation at 27.12 MHz delivered either in a continuousor a pulse mode..Short-wave therapy has the possibility of becoming an attractive alternative or adjunct therapy to pharmacological-based pain therapies,even becoming a home-use pain therapy.[8]In the present study a total of 94 patients of OA knee were duly participated in the study. During study 10 patients dropped due to irregular follow-up. Out of them male 40 (47.61%) female 44 (52.38%), and male female ratio was 1:1.1. In a study at Dhaka Bangladesh by Azad et al (2011), found that 78(73.58%) were female and 28 (26.41%) were male. And male female ratio was 1:2.78. This is favor of this study. But another study found 61% of male and 39% female. Although men and woman are equally prone to development of OA. But more joint are affected in woman then men (Solomon et al 2001). In this study female (52.38%) preponderances may be due to more female attendance in the hospital than male because of excessive business in the office hour in the capital city like Dhaka , Bangladesh.In this study, the highest incidence were in the age group of 41-60 years 83.0% and 74.5% with a range from 40 - 78 years. The Mean ± SD were 53.40± 8.22 and 55.21± 9.12 years group A and B respectively. In 2003 Shakoor et al found highest incidence were 50-59 years of age group and mean ± SD age of the patient was 55.44± 7.4. This is to some extend same as the result found in the present series.In our study BMI normal 61.7% Group A, and Group B 72.3%. and overt 34% ,25.5% for Group A and B. Mean ± SD 25.36±2.46, 24.53 ± 2.70 Range 19.81-31.01, 21.25-33.06. A study was done Shows that adjusted risk of knee osteoarthritis was increased fourfold with current BMI 23 to <25 as compared to men with BMI<23 . This result suggest that a moderate increase in BMI within normal range was significantly related to knee OA.Regarding symptom shows baseline characteristics of osteoarthritis knee. In group A, right knee was involved in 35 (74.5%) and left in 12 (25.5%) and in group B, right knee was involved in37 (78.7%) and left knee in 10 (21.3%) patients,. No significant variation was observed.The outcome of current study is hopeful regarding improvement. The significant improvement of symptoms within both the groups began to appear at the end of first week. But, no significant difference of improvement was found to begin between the groups at this stage .At the end of 6th week significant improvement of symptoms of both the groups were found. And, in comparison between two groups, the significant improvement was found in the group of patients who received 20 minutes SWD plus NSAID. Other study found that 77.42% patient improved after treatment of SWD.Table I , Shows pain score assessed by WOMAC. Mean (±SD) pain score of group A and group B patients, respectively,at week 6 was 58.89±26.49 and 31.43±17.40 (significant at P<0.001)..At all the weekly follow-up, mean pain score significantly decreased in group B patients. Percentagewise, the improvement of pain score from week 0 (pretreatment) to all post treatment weekly follow-up was higher in group B. In figure 4 Shows stiffness score assessed by WOMAC. Mean (±SD) stiffness score of group A and group B patients, respectively,at week 6 was 265.41±99.24 and 175.75±56.31 (significant at P<0.001) and78.80% and 90.32% .also Percentagewise, the improvement of siftness score from week 0 (pretreatment) to all post treatment weekly follow-up was higher in group B.[9][10]

VI   Limitation

During analysis sample size was sample and follow up period was very short (only 6 weeks).

VII   Conclusion

From analysis and examination the significant improvement was found in the group of patients who received 20 minutes SWD plus NSAIDs.So , it is almost clear that , 20 minutes SWD is more effective then 10 minutes of SWD.

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