

Examination of some physiotherapy methods for treatment of Knee joint injury

Fatehiya F. Hasan MSc, PhD *, Elham Khald Ibrahim MSc**

Abstract:

Objective: This study investigates different range of motion of Knee joint, the effect of age, sex, regular, irregular patients treated with microwave, infrared, and paraffin wax have disorders in their knee.

Materials & Methods: Participants were 60 patients have injuries in their Knee joint, 20 of them treated with microwave, 20 treated with infrared and 20 patients treated with paraffin wax for 12 weeks, three times weekly. We take 120 measurements as a control and after 12 weeks of physiotherapy treatment we take 720 measurements, by using Goniometric measurements for Knee (flexion, extension,) joint every two weeks. The study was carried out in teaching hospitals in Erbil/ Physiotherapy Department and private centers of physiotherapy. Duration of the study was three months

Results: The final results show:

1. Microwave more effective than infrared and paraffin wax in treatment of Knee joint.
2. The patients who come early and regular in physiotherapy have increased in range of motion.
3. From data females have decreased range of motion than males.
4. The measurements of research should be taken by the same therapist on the same position to decrease error in measurements.

Key words: Knee joint movements, therapeutic (IR), (MW), paraffin wax, pain, injury.

Introduction:

Physiotherapy is a healthcare profession concerned with human function and movement and maximizing potential. It uses physical approaches to promote, maintain and restore physical, psychological and social well-being, taking account of variations in health status⁽¹⁾.

Physiotherapy is needed to all patients (including fracture, osteoporosis, replacement, stroke, surgery, diabetes, long-term-condition, cancer, chronic obstructive pulmonary disease, coronary heart disease^(2,3)).

More recently, reported that reliability of the measurement of knee flexion was greater when using a goniometer than when using visual estimation. Additionally, two studies in which the lead author was^(4,10) reported that the use of instruments to examine the ankle and the cervical spine resulted in more accurate measurements than did visual estimates.

Given that research has indicated that objective measurement is more accurate than visual examination for the measurement of joint range of motion, and that scientists, the government, and the public demand improved outcomes of patient intervention, accurate and standardized measurements are of utmost importance⁽⁵⁾ There are variable factors that can affect the range of motion in the joint, gender, age, and injury.

There is decreased in ROM in hip and knee joints with increasing ages from (60-74 years) and the largest change in hip abduction of lower extremity. In age 45 years there is decreased in flexion and extension of joints⁽⁶⁾

Passive exercise:

Movement within the unrestricted ROM for a segment that is produced entirely by an external force: there is no voluntary muscle contraction. The external force may be from gravity, a machine,

another individual, or another part of the individual's own body⁽⁵⁾

Active exercise:

Movement within the unrestricted ROM for a segment that is produced by an active contraction of the muscles crossing that joint^(7,11)

Active-Assistive exercise:

A type of active ROM in which assistance is provided by an outside force, either manually or mechanically, because the prime mover muscles need assistance to complete the motion^(2,12)

Types of physiotherapy:

- Infrared is one of effective penetration depth of the electromagnetic energy of 1 or 1.5 mm, and it's a superficial form of heating in it tissues the effect of pain relief is significant. Furthermore, it gives local increases of blood flow, which reduce pain by absorption of inflammatory metabolites, causing muscle spasm, increasing tissue repair by metabolic stimulation^(8,9,13)
- Microwave frequency for medical use, 2450 MHz is the most widely used to therapeutic muscle heating, it is electromagnetic radiation highly absorbed in tissues with high water like muscle and less absorbed in fatty tissues and bone, it is an effective of deep tissues heating especially for muscle underlying fat⁽¹¹⁾
- Wax therapy become less used, melted wax is applied to part treated, repeatedly dipped into wax around 45-50 degree, raised superficial tissues temperature by 3-4 degree⁽¹²⁾.

Patients and methods:

1-Tools of physiotherapy:

- microwave
- Infrared
- Paraffin Wax

2-Universal Goniometer

3-Survey paper of study

4. Patients

In our study we took 60 patients have disorders in their knee joints such as (fracture, arthritis, replacement, rheumatoid.). These patients grouped to 20 patients in every group, the first group treated with microwave therapy, the second group treated with infrared therapy and the third group treated with paraffin wax therapy. These patients No. of male 28 and No of female 32, with age from 15-75 years, they treated in physiotherapy department of Rizqary Hospital for three months , three times every week heating and exercises`

We took 120 measurements as a control and after 12 weeks of physiotherapy treatment we took 720 measurements, by using Goniometric measurements for Knee (flexion,

extension,) joint every two weeks., Data of study included 60 patients randomly distributed male and female with age between 15- 75 years.

Results:

Patients with limitation in Knee joint from different causes referred to physiotherapy rehabilitation center in Razqery hospital were from

different age groups (ranging from 15 to 75 years), were distributed in the three different groups in different age and sex distribution

The results in table 1 regarding the range of motion of knee joint flexion shows that flexion movement of joint after two weeks were significantly (P=0.0001) improved with microwave (67.7±21.00) than infrared (66.45±19.67) and then paraffin bath (73.75±11.84) (P=0.0001) from baseline range of movement (40±10). In twelfth week treatment with different type of physiotherapy, the same finding was observed from the previous two weeks interval with a better improvement in microwave (86.95±23.93) than infrared (86.25±18.30) and paraffin bath (82.40±13.46). But there was no significant difference between infrared and paraffin bath at each two weeks interval (Figure1). Each type of physiotherapy showed a significant improvement in general from base line measurement and from previous 2 weeks interval with a strong direct correlation as shown in figure1.

Table 1: The flexion movement of Knee joint in the three different types of physiotherapy at 2 weeks interval from base line measurements (40±10).

Flexion	Physiotherapy			P value		
	Infra-red (degree ⁰)	Micro-wave (degree ⁰)	Paraffin bath (degree ⁰)	Infra x Micro	Infra x Paraffin	Micro x Paraffin
2nd week	66.45±19.67	67.70±21.00	73.75±11.84	0.847	0.163	0.269
4 th week	70.95±18.41#	72.05±20.93#	75.50±12.09#	0.861	0.361	0.527
6 th week	75.10±17.10#	75.75±21.69#	77.30±12.43#	0.917	0.644	0.783
8 th week	78.35±17.31#	80.55±22.00#	79.00±12.56#	0.727	0.893	0.786
10 th week	81.95±17.49#	85.70±21.66#	80.60±13.10#	0.550	0.784	0.373
12 th week	86.25±18.30#	86.95±23.93#	82.40±13.46#	0.918	0.453	0.463

* Significant difference between means using t-test for two independent means at 0.05 level of significance.

Significant difference from first week (P=0.0001) using Paired-t-test for difference between two dependent means at 0.05 level of significance.

\$ Significant difference from previous week (P=0.0001) using Paired-t-test for difference between two dependent means at 0.05 level of significance.

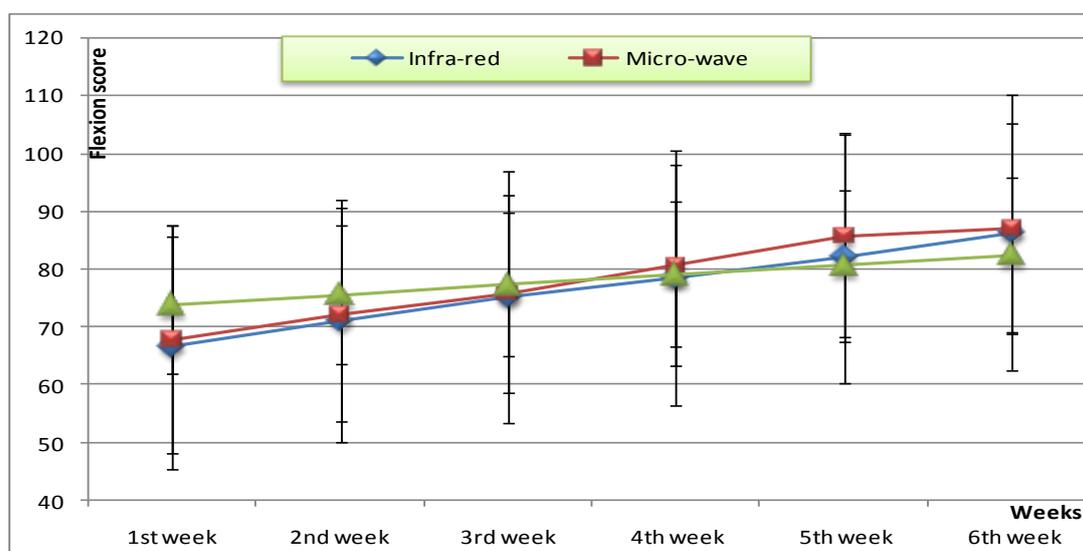


Figure (1): The flexion movement of knee joint in the three different types of physiotherapy at 2 weeks interval from base line measurements (40±10).

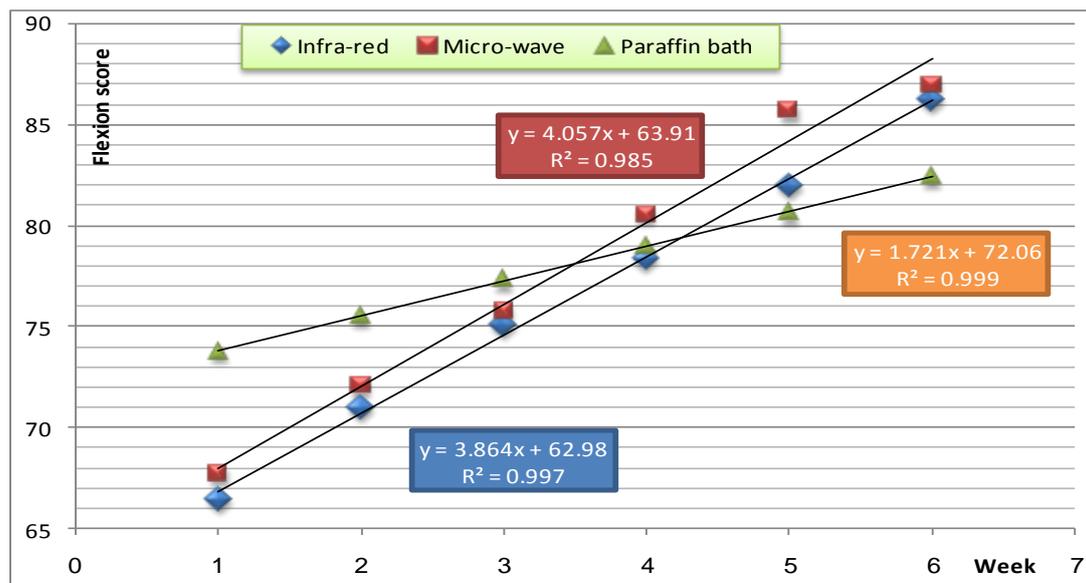


Figure (2): The correlation between flexion movement of knee joint in the three different types of physiotherapy and time (2 weeks interval).

The results in table 2 regarding the range of motion of knee joint extension shows that extension movement of joint after two weeks were significantly ($P=0.0001$) improved with microwave (71.35 ± 20.89) than infrared (72.80 ± 17.19) and than paraffin bath (77.20 ± 11.42) ($P=0.0001$) from baseline range of movement (40 ± 10). In twelfth week treatment with different type of physiotherapy, the same finding was observed from the previous

two weeks interval with a better improvement in microwave (89.20 ± 23.59) than infrared (92.20 ± 16.95) and paraffin bath (84.70 ± 14.40). But there was no significant difference between infrared and paraffin bath at each two weeks interval (Figure3). Each type of physiotherapy showed a significant improvement in general from base line measurement and from previous 2 weeks interval with a strong direct correlation as shown in figure 4.

Table 2: The extension movement of Knee joint in the three different types of physiotherapy at 2 weeks interval from base line measurements (40 ± 5).

Extension	Physiotherapy			P value		
	Infra-red (degree ⁰)	Micro-wave (degree ⁰)	Paraffin bath (degree ⁰)	Infra x Micro (degree ⁰)	Infra x Paraffin (degree ⁰)	Micro x Paraffin (degree ⁰)
2nd week	72.80±17.19	71.35±20.89	77.20±11.42	0.812	0.346	0.279
4th week	76.65±16.95#	75.00±20.87#	79.00±11.59#	0.785	0.612	0.458
6th week	81.05±16.78#	78.60±20.94#	80.50±11.93#	0.685	0.906	0.726
8th week	84.45±17.02#	82.35±22.33#	82.30±12.01#	0.740	0.647	0.993
10th week	88.55±16.05#	85.65±23.01#	84.00±12.30#	0.647	0.321	0.779
12th week	92.20±16.95#	89.20±23.59#	84.70±14.40#	0.647	0.140	0.471

*Significant difference between means using t-test for two independent means at 0.05 level of significance.
 # Significant difference from first week ($P=0.0001$) using Paired-t-test for difference between two dependent means at 0.05 level of significance.
 \$ Significant difference from previous week ($P=0.0001$) using Paired-t-test for difference between two dependent means at 0.05 level of significance.

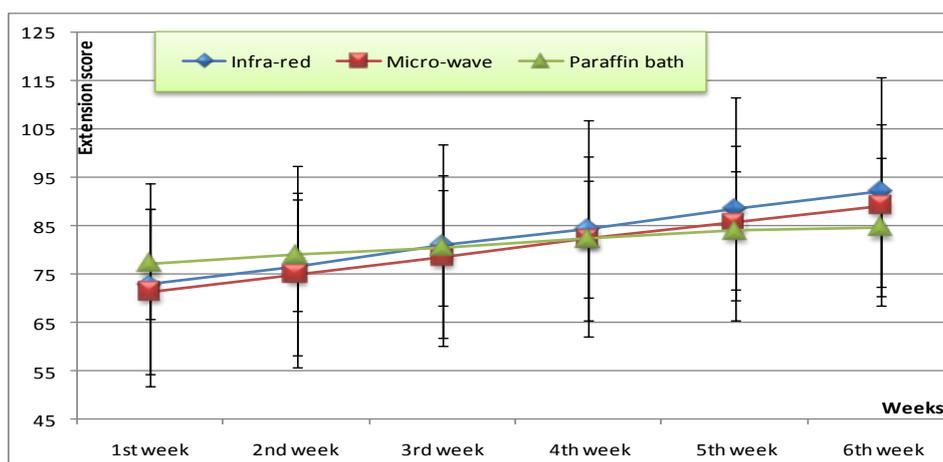


Figure (3): The extension movement of knee joint in the three different types of physiotherapy at 2 weeks interval from base line measurements (40±10).

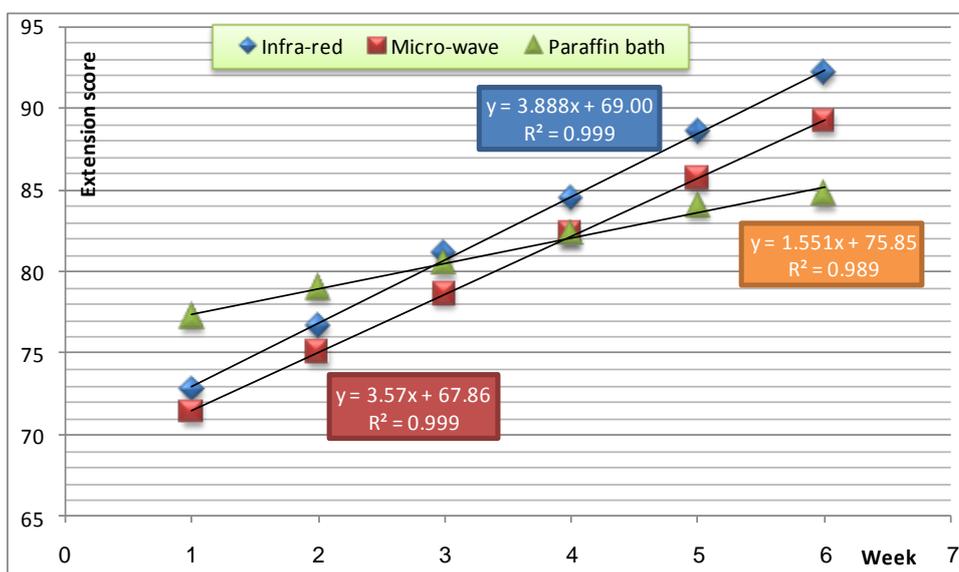


Figure (4): The correlation between extension movement of knee joint in the three different types of physiotherapy and time (2 weeks interval).

Discussion

Microwave therapy improved range of motion, for knee joint better than infrared and paraffin wax,

flexion of knee joint with microwave (92.95±23.93), with infrared (82.25±18.30), with paraffin wax (78.40±13.46), and extension with microwave (93.20±23.59), with infrared (83.20±16.95), with paraffin wax (71.70±14.40). There is highly significant difference of microwave than infrared and paraffin wax, but there are no significant differences between infrared and paraffin wax, because of the probability (P-value=0.05) that mean the difference between microwave, infrared and paraffin wax due to factor (physiotherapy) which is microwave treatment and not due to chance.

(Abdulla, 2005)⁽¹⁴⁾ was stated the rang of motion from age 15-75 years for male and female, his results more lower than previously reported, there is

a decrease in rang of motion for female than male adult (15-25) have more increased rang of motion at those whose age less than 45years, they get healing quickly than those whose age > 55 years, where the result of the work showed high range of motion than Abdulla result. This may be due to (the other parameters) that we used the exercise. There are many possibilities as to why there are much lower range of motion for patients than expected, some patients harder for them to move their joints in flexion if they wear tight fitting clothing, this constricted them and prevent them from moving their legs closer to their body, some had just recently been injured and that effected their movement, the other reason which effect the rang of motion the irregularity of patient with physiotherapy because of their poor educational health. The last difference that affects the results was that were not enough participants, some patients felt they had no time to participate or they just were not interested. If there

were more patients the result would have varied more than what they did.

Conclusion

1. By comparing the data from the second week till 12th week, by statistical investigation, the final result appear microwave radiation is best technique for increase the range of motion.
2. It is insufficient to measure only the range of movement occurring. The quality of movement should also be observed, along with limiting factors to the movements, like the pain, muscle spasm, weakness or stiffness that is limiting the movements. This is determined by noting the differences between active, passive and resisted movements.

Recommendation

1. Microwave radiation suitable for knee joint.
2. Further extend studies on large samples of patients is needed to study microwave effect in different doses with different wavelengths on different causes of joint disorders.
3. Paraffin bath and infrared although effective but need to be discontinued and replaced by microwave radiations or limited to few selected conditions like joints without wounds.
4. Infrared radiation of all kinds although accelerate wound healing it has a long history and have been particularly employed and found effective also.

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* Medical physics section, Physiology Dept. Howler
College of Medicine
physic2000@yahoo.comfatehiya64@yahoo.com
Mobile: 07504362869

** Mobile: 07504478545