Usefulness of Shortwave Diathermy in Acute Rhinosinusitis

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Abstract

Background: Rhinosinusitis prophylaxis can be done by routine intake of liquids, exercise and a healthy diet. To prevent Rhinosinusitis, it is instructed that events like exposure to passive smoking or smoking can be abstained as much as possible. There is also a multiple range of substitute treatment for sinusitis like normal saline solutions, acupuncture, Ayurveda etc. The short wave diathermy is an effective treatment for rhinosinusitis when applied properly. They are exposed in to the nasal cavity through its lateral wall. Where, the clinical symptoms are present 4 weeks or less. It can be caused by either a viral or a bacterial infection. In our study we evaluated the usefulness of short wave diathermy in acute Rhinosinusitis.

Methods: It is a Prospective comparative cross-sectional study. The research was done during January 2018 to September 2019. Seventy patients were included in this study on the basis of criteria. The age group studied was 20 to 50 years. An organized consultation was primed consisting of clinical examination and regular investigations. Each patient received informed consent and acceptance for the study was done. Patients were randomly divided in two groups. Study was conducted on 60 cases diagnosed as rhinosinusitis.

Results: Group A, the mean pre-treatment score was 48.87 ± 9.80 and the post-treatment score was 37.15 ± 8.75, the difference mean was found to be 11.72. In Group B, the mean pre-treatment score was 54.42 ± 10.23 and the post-treatment score was 41.26 ± 9.58, the difference mean was found to be 13.16.

Conclusion: In our study there was a very good relief in cases of acute rhinosinusitis. So we concluded both short wave and medication has good effect, however SWD can be one of the modality of choice in Physical therapy for the treatment of rhinosinusitis. But the combination of SWD and Medicine gives more beneficial therapeutic effect for the patients.

Keywords

SWD (Short Wave Diathermy), Acute, Rhinosinusitis

Introduction

Acute rhinosinusitis is a suggestive inflammation of the mucosal layer of the nasal opening and paranasal sinuses, i.e. frontal, maxillary, sphenoidal and ethmoidal sinuses. These are air-filled spaces present within bones around the nasal cavities. They are exposed in to the nasal cavity through its lateral wall. The most frequently infected sinuses are maxillary sinuses, due to its adjacent vicinity to teeth and insufficient drainage since the ostium is at upper level. The less frequently affected sinuses are frontal and ethmoidal, however sphenoidal sinuses are rarely infected. Dental infections, Nasal infections, fungal infections, neighboring infections (tonsillitis), trauma, blood-borne infections, lowered resistance, chill and atmospheric pollution from the predisposing features to sinusitis. Viral infection is the most common cause of acute sinusitis. Roughly 0.5% to 13% of viral upper respiratory tract infections develop to acute bacterial sinusitis. The three utmost prevalent bacteria Haemophilus influenzae (22% to 35% of cases), are Streptococcus pneumoniae (20% to 43% of cases), and Moraxella catarrhalis (2% to 10% of cases). Moraxella catarrhalis is not much prevalent in the adult inhabitants. Antibiotic resistance can be determined by the geographic location. Thus knowledge of local antibiotic defiance patterns is essential.

Numerous symptoms such as nasal discharge which may or may not foul smell, nasal resonance, dry cough, pain, epistaxis, malaise, headache and increased body
One of the treatments of physical therapy for sinusitis is SWD application to the affected sinuses. Which is a non-ionizing radiation from the radio frequency portion of the electromagnetic spectrum? Since last few years SWD has continued advancement and upgraded to the place where it may begin to accomplish a very essential and significant place in the conventional therapy of sinus infection, in that it ensures to grant respite and accelerates the treatment in maximum of cases without harming or terrifying the patient.

The claim of Leichner and Schmidt (1937) is engrained fact that SWD causes vasodilatation of the capillaries which remains for a substantial time duration succeeding therapy because of creation of warmth [2]. The amplified extent of local warmth, composed with the amplified circulation and dilatation of the capillaries positively produces a better convinced outcome than any alternative mode of management.

A shortwave diathermy current frequency commonly used for medical purpose has a frequency of 27.12 MHz and sets up radio waves with a wavelength of 11m. It is a deep heating modality. Its principle effect on the body tissues is heat production and other effects result from the escalation in temperature. Escalation in temperature leads to vasodilatation of the blood vessels thus increasing the blood supply to the damaged tissue, which also increases white blood cells, antibodies other nutritive resources which further help in the temperature may be detected. Generally medical treatment of sinusitis comprises of decongestants, antibiotics, nasal sprays etc. In risky cases i.e. alarming cases where recurrent sinusitis occurs, surgical choices are FESS (Functional Endoscopic Sinus Surgery) and balloon sinuplasty which may be tried for the treatment. Due to extensive use of medicines high recurrence rates are seen, because of development of resistance to medicines. Frequent manifestation of symptoms cause more harm and disables the patient to carry out activities of daily living efficiently. Types of Rhinosinusitis and its features are shown in Table 1.

Hence it becomes essential to control the symptoms and prevent progression of resistance to medications at the initial stage of sinusitis so to prevent more damage and also to control reappearance rates. The management of acute and chronic sinusitis has burdened the capital of Oto-Rhino-Laryngologists for several years. Some of the standard measures generally work well in a small number of patients; however in the bulk cases, particularly where antral lavage is repetitive, patients promptly progress to dislike the therapy, since uneasiness arises from the procedure.

Schliephake (1932) should be complimented for their experiments and investigation regarding the influence of short wave diathermy on bacteria. He concluded that the exposure to lower temperatures than hot-water bath with short wave can kill bacteria [1].

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depreciation of the inflammation. The vasodilatation of capillaries escalates the fluid exudation in the tissues, which increases absorption and helps in the elimination of waste products, in succession this response helps in infection resolution.

Pain relief is one more outcome of SWD, exact mechanism remains idiopathic but it is expected that pain relief occurs due to the sedative effect of SWD on sensory nerves, counter-irritation by heat, and resolution in inflammation and therefore relief of underlying muscle spasm. And it is more beneficial when it penetrates deep in the tissue up to 5 cms. It covers large parts of the body and without heating the superficial tissues it can heat the deeper tissues. Accessibility of various medical preferences has improved but so has the frequency of resistance.

Limitations are confronted in the treatment of sinusitis owing to lack of adequate evidence on the other management modalities like SWD. There are no current and advanced literature is available on the usefulness of SWD in acute cases of Rhinosinusitis. There by emerging an instantaneous and strong requisite for this study to be conducted. Therefore this study is focused to evaluate the usefulness of shortwave diathermy in acute Rhinosinusitis through a randomized controlled trial.

Purpose of Study

The initiation of short wave diathermy on the beneficial prospect in the past decade has conveyed assertions about its effectiveness. These have refreshed its undiscriminating use by the medical professionals in physiotherapy, time and again on requirement. Rhinosinusitis prophylaxis can be done by routine intake of liquids, exercise and a healthy diet. To prevent rhinosinusitis, it is instructed that events like exposure to passive smoking or smoking can be abstained as much as possible. There is also a multiple range of substitute treatment for sinusitis like normal saline solutions, acupuncture, Ayurveda etc. Eucalyptus and Barberry are famous and efficient herbs containing alkaloids and strong anti-bacterial effects which fight against infection. The regular treatment like antibiotics, decongestants and more medications.

The purpose of our study is to demonstrate the implications and benefits for this progressively prominent mode of Physiotherapy treatment that is SWD in intra-nasal disease.

Aims and Objectives of the Study

To determine the usefulness of SWD:

1. Treatment of Rhinosinusitis as a single mode.
2. Treatment of Rhinosinusitis as an adjunct mode.
3. Symptomatic relief of nasal obstruction and headache/pain in Rhinosinusitis.

Material and Methods

Study design

It is a prospective comparative cross-sectional study.

Study period

The research was done during January 2018 to September 2019.

Ethical approval

The study was approved by Research Ethics Committee, Taibah University, Madinah, Kingdom of Saudi Arabia (Approval #CMR-RT-2018-06).

Patients signed informed consent

Each patient received informed consent and the technique of Short Wave Diathermy was explicated to the patients, and a written acceptance for the study was obtained from all patients.

Study settings

This study was exclusively carried out at the Department of Ear, Nose, Throat and Physical therapy, Al Dar Hospital and Saudi German Hospital, Madinah, KSA.

Study population

ENT surgeon has referred 80 patients diagnosed as acute Rhinosinusitis. Out of which 70 patients accepted to take part in the research.

Criteria

Inclusion criteria

• Female and Male
• Diagnosed acute Rhinosinusitis
• Patient age group of 20 to 50 years.
• Patient’s acceptance to take part in the study.

Exclusion criteria

• Pregnant women, Hypertension, Diabetes
• Malignant growths, heart disease, Tuberculosis
• Hypotension, Dizziness
• Metal Implants
• Cardiac Pacemaker

Study tool

An organized consultation was primed consisting of clinical examination and regular investigations. Patients were randomly divided in two groups. Study was conducted on 60 cases diagnosed as Rhinosinusitis:

Group A: Consists of 30 patients and were treated with SWD.

Group B: Consists of 30 patients and were treated with SWD and regular medical treatment.
Outcome measures

To check the effect for both groups signs like nasal discharge, sinus tenderness, Nasal congestion and symptoms Nasal discharge, Head ache, Fever, nasal obstruction were recorded for resolution, while the pain was measured with VAS. The signs were measured on day 1, day 2, day 3, day 4 and day 5 for the effects. The symptoms were checked immediately, 6 hours, 12 hours and after 24 hours and the pain was measured pre and post-treatment.

Results

The pre-treatment and post-treatment of Group A and Group B scores were analyzed statistically by SPSS 21, measures such as mean, standard deviation and dependent t test with test significance.

Table 2 and Figure 1 show the resolution of signs and symptoms of rhinosinusitis from day 1 to day 5 for both groups. Table 3 and Figure 2 show the resolution of signs and symptoms immediately after treatment and till 48 hours. Table 4 and Figure 3 show the percentage of difference in pain from day 1 to day 5 for both groups.

In Table 5 Group A, the mean pre-treatment score was 48.87 ± 9.80 and the post-treatment score was

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Procedure/Intervention

Patients were re-evaluated in the department of physiotherapy. While providing S.W.D. treatment Patients were made relaxed in supine position on couch. Butterfly electrode was placed on face and other electrode was placed under cervical/thoracic spine. All safety measures were taken while providing the treatment, duration and intensity has been set to appropriate level. Treatment usually lasts for fifteen to twenty minutes. Some authors recommend starting from ten minutes to half an hour. Our treatment duration was for twenty minutes as per the recommended dosage. Intensity was set according to the tolerance of the patient which produces only minimal heating of the sinuses. Five sessions of treatment will usually clear up the regular acute maxillary or frontal sinusitis. A thick toweling/padding is placed between the face and the electrode. It prevents the moisture to come in contact with electrode and absorb it. The Perspiration must be cautiously observed, as it acts as a condenser plate and the patient is apt to get burns. The documentation was done for all patients to compare the effect of treatment.

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Table 2: Resolution of Signs and Symptoms: Nasal Discharge, Sinus tenderness, nasal congestion, sore throat, cough, fever and headache.

<table>
<thead>
<tr>
<th>Groups/Days</th>
<th>1 Count (%)</th>
<th>2 Count (%)</th>
<th>3 Count (%)</th>
<th>4 Count (%)</th>
<th>5 Count (%)</th>
<th>No Effect Count (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A’</td>
<td>7 (20)</td>
<td>6 (17)</td>
<td>9 (26)</td>
<td>8 (23)</td>
<td>3 (9)</td>
<td>2 (5)</td>
</tr>
<tr>
<td>B’</td>
<td>4 (11)</td>
<td>5 (14)</td>
<td>10 (29)</td>
<td>11 (31)</td>
<td>4 (12)</td>
<td>1 (3)</td>
</tr>
</tbody>
</table>

Group A’ with SWD; Group B’ SWD and Medication.

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Table 3: Resolution of Signs and Symptoms (24-48 hrs): Headache, Fever, Nasal Discharge, and Nasal Obstruction.

<table>
<thead>
<tr>
<th>Groups/Hours</th>
<th>Immediate Count (%)</th>
<th>24 hrs Count (%)</th>
<th>48 hrs Count (%)</th>
<th>No Effect Count (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A’</td>
<td>17 (49)</td>
<td>10 (29)</td>
<td>4 (11)</td>
<td>4 (11)</td>
</tr>
<tr>
<td>B’</td>
<td>20 (57)</td>
<td>13 (37)</td>
<td>0 (0)</td>
<td>2 (6)</td>
</tr>
</tbody>
</table>

Group A’ with SWD; Group B’ SWD and Medication.
towards its efficiency. This has reinvigorated its extensive usage by the professionals of medicine [3, 4].

It has been helpful in subsiding the inflammation process as well as reducing symptoms and signs of rhinosinusitis. Which will do the reduction of inflammation and stimulate the vasodilatory process? Limited number of studies has been done to find the effect of SWD on sinusitis. Thus our study focused on the usefulness of same and we got worthy outcome. The comparison of our study results were done with many studies on SWD as a treatment of acute Rhinosinusitis. Peterson, et al. (1940) used the treatment of SWD for acute and subacute patients, which has shown improvement after the treatment. They had treated this condition for the period of 3 years on 126 patients, out of which 96 patients improved and were pretty passionate about the treatment. Subsequently during the treatment of SWD in their personal practice they found no patient required anteral lavage as an addiction treatment which in certain portion of patients they had done earlier [5]. Table 2 and Table 3 shows the Resolution of Signs and Symptoms of Rhinosinusitis from day 1 to day 5 for both groups. Peterson, et al. (1940) also found that there was a great reduction in pain besides the signs and symptoms [5]. They found that the patients improved much earlier than prior types of treatment from their illness, which economically reduced the burden of expenditure on treatment [1, 6]. As per our study the results were same. Both the groups showed improvement, the improvement of Group A was significant and for Group B was highly significant. Table 4 shows the overall outcome of our study with the Mean ± SD measurement in Group A Pre-treatment was 48.87 ± 9.80 and post-treatment was 37.15 ± 8.75 (P value 0.042) significant and for Group B Pre-treatment was 54.42 ± 10.23 and post-treatment

<table>
<thead>
<tr>
<th>Groups/Days</th>
<th>1 Count (%)</th>
<th>2 Count (%)</th>
<th>3 Count (%)</th>
<th>4 Count (%)</th>
<th>5 Count (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A’/N = 35</td>
<td>12 (34)</td>
<td>9 (26)</td>
<td>14 (40)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>B’/N = 35</td>
<td>15 (43)</td>
<td>16 (46)</td>
<td>4 (11)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
</tbody>
</table>

Table 5: Comparison between the groups in Dependent t-test.

<table>
<thead>
<tr>
<th>Groups Treatment</th>
<th>Mean ± SD</th>
<th>Mean Diff.</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Pre</td>
<td>48.87 ± 9.80</td>
<td>11.72</td>
<td>25.20</td>
<td>0.042</td>
</tr>
<tr>
<td>Post</td>
<td>37.15 ± 8.75</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B Pre</td>
<td>54.42 ± 10.23</td>
<td>13.16</td>
<td>23.22</td>
<td>0.002</td>
</tr>
<tr>
<td>Post</td>
<td>41.26 ± 9.58</td>
<td></td>
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</table>

37.15 ± 8.75, the difference mean was found to be 11.72. The dependent t-test value measured as 25.20 with p value of 0.042 (at 5% of p value is 0.05). It is significant in Group A.

In Group B, the mean pre-treatment score was 54.42 ± 10.23 and the post-treatment score was 41.26 ± 9.58, the difference mean was found to be 13.16. The dependent t-test value measured as 23.22 with p value of 0.002 (at 5% of p value is 0.05). It is highly significant in Group B.

Discussion

In our study we evaluated the usefulness of short wave diathermy in acute Rhinosinusitis. Seventy patients were included in this study on the basis of criteria. The age group studied was 20 to 50 years. The short wave diathermy is an effective treatment for rhinosinusitis when applied properly. Its application is on the basis of heat to the sinuses and works like a radio transmitter. The outcome is gives is incredible while it has been used by the expert professionals. The initiation of therapeutic perspective of short wave diathermy has brought new dawn in the recent decade and set forth steep inclina-
was 41.26 ± 9.58 (P value 0.002) highly significant. The outcome results of our study correspond to Goats (1989) for the pain, signs and symptoms [2,7].

The earlier revealed studies remained more contrast among various treatment approaches for rhinosinusitis. There have been only a small number of studies done on usefulness of short wave diathermy in rhinosinusitis and just limited inscriptions about the amalgamation of the management approach. In Group B the treatment with SWD and medication coincides with the study by Hopkins, et al. (2009) where in their study suggested that SWD along with medication is more effective than SWD alone and very less or no recurrence of sinusitis [8,9].

There is a well-known datum that capillaries dilate after the treatment with SWD that continues for a significant time period. However improved circulation has added further imperative influence. The temperature rising to such a degree is not essential, so that it will abolish the organisms. The local impact of raised temperature along with improved circulation and capillary dilatation definitely cause additional outcome in the treatment than any other approach [10,11].

The treatment of rhinosinusitis has been more productive by using pad electrodes especially butterfly electrodes. The electromagnetic radiation wave lines pass through the soft tissue and thus cause structural heating. SWD heats both the superficial and deep tissue layers, although there is marked development of redness by superficial heating in the skin and subcutaneous tissues. The ciliary movement is improved which promotes reduction in sinus congestion. Relieving of sinus from congestion reduces internal pressure inside sinuses and thus in turn there is pain reduction. On the other hand the cutaneous the rmo receptors gets stimulated due to heat thus adequately block the pain transmission as it penetrates the spinal cord through the peripheral nerves by increasing conduction velocity and promote the pain gate mechanism. The relief of pain by heating promotes vasodilatation and efflux from the afflicted tissues of chemicals involved as mediators of pain e.g. prostaglandin, serotonin and the bradykinin [2,8,12].

Therefore it is suggested that treatment of rhinosinusitis by cost effective non-invasive method of SWD can be done to the patients with more comfort [13].

**Conclusion**

In our study there was a very good relief in cases of acute rhinosinusitis. So we concluded both short wave and medication has good effect, however SWD can be one of the modality of choice in physical therapy for the treatment of rhinosinusitis. But the combination of SWD and medicine gives more beneficial therapeutic effect for the patients.

**References**