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### RESEARCH ARTICLE

#### MODUS OPERANDI FOR THE TREATMENT OF FROZEN SHOULDER: A NOVEL APPROACH

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##### Manuscript History

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#### Abstract

**Introduction:** Frozen shoulder is a self-limiting condition which can sometimes last for up to 2 years. The objective of this study was to show the result of combined use of oral corticosteroids, vitamin C, analgesics, glycaemic control and physiotherapy (AAROM) and compare the results with intraarticular injection of corticosteroids.

**Methods:** 70 patients aged 28 to 63 years were chosen at the beginning of the study. They had been suffering from frozen shoulder from 2 weeks to 1 year (mean 5.7 months) and 12 patients had diabetes. They were managed with strict glycaemic control and Vit. C tablets twice a day for 1 week along with adequate anti-inflammatory treatment. Out of the 54 patients, 18 were given 15 mg Prednisolone BD was given for 2 weeks aided by Vit. C and anti-inflammatory drugs, 18 were given oral prednisolone (0.5mg/kg/day) alone and the remaining were treated with intraarticular injections. Physiotherapy was started after 1 week in everyone and continued till pain relief was achieved or till 10 weeks. 4 patients were lost to follow up. The ROM, the duration of the pain and the severity of the pain (assessed with VAS and McGill Pain Questionnaire) were the main parameters used.

**Results:** The outcomes of combined therapy for frozen shoulder were better if the patients were subjected to physiotherapy after 1 week of starting oral steroids compared to intraarticular injection/oral use of corticosteroids alone. However, in diabetic patients, the outcomes were better with the use of intraarticular injection of corticosteroids and glycaemic control was required for pain relief and improving ROM.

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#### Introduction:-

Frozen shoulder, also known as adhesive capsulitis, is a condition characterized by pain and restricted movement in the shoulder joint<sup>1</sup>. While the exact cause of frozen shoulder is not fully understood, studies have shown that there may be a relationship between blood sugar levels and the development of frozen shoulder<sup>2</sup>. It is more common in individuals over 40 years of age and affects women more than men<sup>3</sup>. While the exact cause of frozen shoulder is unknown, it is believed to be associated with several conditions, including diabetes.

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Diabetes is a chronic metabolic disorder that affects the body's ability to produce or use insulin, a hormone that regulates blood sugar levels. Research has shown that individuals with diabetes are at a higher risk of developing frozen shoulder compared to the general population<sup>4</sup>. In fact, up to 20% of individuals with diabetes may develop frozen shoulder at some point in their lives<sup>5</sup>.

The exact mechanism by which diabetes contributes to frozen shoulder is not fully understood, but there are several theories. One theory is that high blood sugar levels in diabetes can cause damage to the shoulder joint, leading to inflammation and stiffness<sup>6</sup>. Additionally, individuals with diabetes may have reduced blood flow to the shoulder joint, which can contribute to the development of frozen shoulder<sup>7</sup>.

Another theory suggests that diabetes-related changes in collagen metabolism may play a role in the development of frozen shoulder<sup>7</sup>. Collagen is a protein that is essential for the structure and function of connective tissue, including the shoulder joint capsule. In individuals with diabetes, changes in collagen metabolism can result in the accumulation of advanced glycation end products (AGEs) in the joint capsule, leading to stiffness and reduced range of motion<sup>8</sup>.

Treatment for frozen shoulder in individuals with diabetes is similar to that for individuals without diabetes and typically includes physical therapy and pain management<sup>9</sup>. However, it is important for individuals with diabetes to closely monitor their blood sugar levels during treatment, as physical therapy and pain medications may affect blood sugar levels. Frozen shoulder is a self-limiting condition which can sometimes last for up to 2 years

Combining a multimodal approach for the treatment consisting of combined use of oral corticosteroids, vitamin C, analgesics, glycaemic control and physiotherapy (AAROM) can therefore be useful in conservative management of the pain and decrease the necessity of intra articular injections

### **Materials and Methods:-**

The objective of this study was to show the result of combined use of oral corticosteroids, vitamin C, analgesics, glycaemic control and physiotherapy (AAROM) and compare the results with intraarticular injection of corticosteroids. 70 patients aged 28 to 63 years were chosen at the beginning of the study. They had been suffering from frozen shoulder from 2 weeks to 1 year (mean 5.7 months) and 12 patients had diabetes. They were managed with strict glycaemic control and Vit. C tablets twice a day for 1 week along with adequate anti-inflammatory treatment. Out of the 54 patients, 18 were given 15 mg Prednisolone BD was given for 2 weeks aided by Vit. C and anti-inflammatory drugs, 18 were given oral prednisolone (0.5mg/kg/day) alone and the remaining were treated with intraarticular injections. Physiotherapy was started after 1 week in everyone and continued till pain relief was achieved or till 10 weeks. 4 patients were lost to follow up. The ROM, the duration of the pain and the severity of the pain (assessed with VAS and McGill Pain Questionnaire) were the main parameters used.

### **Results:-**

The outcomes of combined therapy for frozen shoulder were better if the patients were subjected to physiotherapy after 1 week of starting oral steroids compared to intraarticular injection/oral use of corticosteroids alone. However, in diabetic patients, the outcomes were better with the use of intraarticular injection of corticosteroids and glycaemic control was required for pain relief and improving ROM.

### **Discussion:-**

In a study published in the Journal of Shoulder and Elbow Surgery, researchers found that individuals with diabetes were more likely to develop frozen shoulder than those without diabetes<sup>9</sup>. The study also found that higher blood sugar levels were associated with an increased risk of frozen shoulder, independent of the presence of diabetes. Another study published in the Journal of Bone and Joint Surgery found that individuals with higher HbA1c levels, a measure of average blood sugar levels over the past 2-3 months, were more likely to develop frozen shoulder than those with lower HbA1c levels<sup>10</sup>.

The exact mechanism by which high blood sugar levels contribute to the development of frozen shoulder is not clear, but it is thought to involve the accumulation of advanced glycation end products (AGEs) in the joint capsule<sup>11</sup>. AGEs are proteins or lipids that become glycated as a result of exposure to high levels of glucose. Accumulation of AGEs in the joint capsule can lead to inflammation and fibrosis, which can result in the symptoms of frozen

shoulder. Prevention of frozen shoulder in individuals with diabetes includes maintaining good glycemic control and engaging in regular physical activity to improve blood flow and reduce inflammation<sup>12</sup>. In addition, early diagnosis and treatment of frozen shoulder can help prevent long-term complications and improve outcomes.

In conclusion, frozen shoulder is a common condition that is often associated with diabetes. While the exact mechanism by which diabetes contributes to frozen shoulder is not fully understood, several theories have been proposed. It is important for individuals with diabetes to be aware of shoulder and to take steps to prevent and manage the condition. Close monitoring of blood sugar levels and regular physical activity can help reduce the risk of developing frozen shoulder and improve outcomes in individuals with diabetes

In conclusion, there appears to be a relationship between blood sugar levels and the development of frozen shoulder, with higher levels of blood sugar and HbA1c being associated with an increased risk of developing the condition. Further research is needed to better understand the underlying mechanisms and to develop effective prevention and treatment strategies for this condition.

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