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## DIABETES AND SHOULDER ADHESIVE CAPSULITIS

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## ABSTRACT

**Background:** Adhesive capsulitis (AC) of shoulder is a common condition encountered by physical therapists in their routine outpatient care services; AC of shoulder is as by itself being a self limiting disorder lasts from months to years causing pain and discomfort to the patients. The condition is commonly associated with Diabetes mellitus or other co morbidities. The incidence of AC is high among diabetic individuals and it becomes mandatory on the part of physical therapists and other health professionals to approach this issue on a holistic manner. This paper deals with the importance of a physiotherapist role in prevention and dealing with the causative factors of AC and not merely its symptom.

**Methods:** Extensive literature review was done from the electronic data bases, Systematic reviews and critical reviews from Pub med indexed journals and other peer reviewed publications across the globe.

**Results:** It was not the type of diabetes but the duration of the disease and the glycemic index, marking the causative factor for adhesive capsulitis of shoulder.

**Conclusion:** It may be concluded that physiotherapist play a vital role in identifying the pre-diabetic or a diabetic state of an individual reporting in a multi disciplinary set up with a AC of shoulder, and also has a role in the prevention of AC by helping the individual to maintain a good glycemic control with a holistic approach which includes aerobic exercises, General Flexibility exercises, Weight management and Yoga therapy.

**Keywords:** Shoulder Adhesive capsulitis, Type-II Diabetes, pain, Irritability, Exercises, Yogasanas

Received 22<sup>nd</sup> June 2016, revised 29<sup>th</sup> July 2016, accepted 02<sup>nd</sup> August 2016



www.ijphy.org

10.15621/ijphy/2016/v3i4/111046

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## INTRODUCTION

Neveiser renamed frozen shoulder as Adhesive capsulitis in 1946 twelve years after being introduced by Codman in 1934. This term was based on radiographic findings of capsular adhesion causing a joint space reduction with global mobility restriction of shoulder joint.

**Impact:** Many irreversible organic and systemic changes occur in Diabetes [1]. Soft tissue, bony and cartilaginous damage are some of the common rheumatologic manifestation that are more common in type1 Diabetes [2]. Conditions like neuroarthropathy, joint stiffness and hyperostosis are often associated with diabetic mellitus. The epidemiology show relations with pathogenic mechanisms and the observed rate of occurrence of adhesive capsulitis, Dupuytren's disease and tenosynovitis of flexor tendons are four times more frequent in diabetics than non diabetics

## ISSUES

**Burden of peri arthritis:** Incidence and prevalence of musculoskeletal disorders are found more in diabetics. A 71.5% of type II diabetic population with a poor glycemic control and HbA1C of 9% showed higher incidence of adhesive capsulitis. Though the presenting condition have clinical significance, 51.9% of patients revealed denying tested positive for pre-diabetes or diabetic mellitus based on American diabetic Association (ADA) criteria [3]. Adhesive capsulitis may be a symptom for a pre diabetic status by 32.95% or an undiagnosed diabetes by 38.6% [4]. Majority of population presenting with adhesive capsulitis were 77% females in their post menopausal period of life. With the fact that there is a 71.5% of diabetic or a pre- diabetic status associated with adhesive capsulitis, it becomes vital in screening and monitoring patient's general health as the impact of the condition have a role on the resolution of adhesive capsulitis [4].

## CURRENT SCENARIO

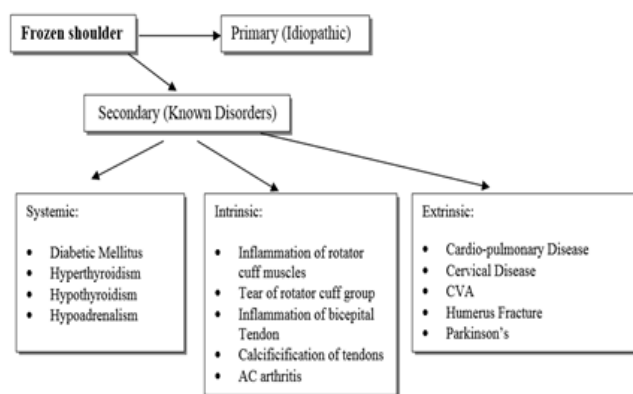
**Incidence:** The estimated prevalence of peri arthritis shoulder in diabetic patients is 11–30% and in non diabetics is 2–10% [5]. Adhesive capsulitis associates with the duration of diabetes condition and age [5]. Inability to reach overhead, behind head, out to the side, and behind back together with a Classical sign of nocturnal pain [6] are the common complaints experienced by any individual diagnosed to be peri arthritis of shoulder and will have difficulty in functional activities, limited ability to sustain repetitive activities due to pain. Adhesive capsulitis affects 2% of general population and is two to four times higher in diabetic population which is around 11%. There is a 38.6% of prevalence of diabetes in patients with adhesive capsulitis, but a 71.5% of total prevalence of a diabetic condition in patients presenting with adhesive capsulitis. Shoulder capsulitis is common both in type I and type II diabetic patients, however the age is more associated with both type I and II diabetic patients and the duration of diabetes in type I diabetic patients. Furthermore it is found that non-dominant limb is more affected and sedentary workers are at more risk. It is reported that around 10%

to 38% of patients with diabetes and thyroid diseases are affected with adhesive capsulitis and patients commonly between 40 to 65 years old present with primary frozen shoulder [7], and the female population is at higher risk compared to male [8].

## CLINICAL FEATURES

According to Lundberg frozen shoulder is classified into Primary(Non-Traumatic) and secondary (Traumatic). While Reeves classified it in to three stages viz Stage of Pain(10-36 weeks), Stage of Stiffness(4-12 months) and the Stage of Recovery(5 mths- 2 years). Zuckerman proposed a classification in which a primary frozen shoulder and idiopathic adhesive capsulitis were considered identical un-associated with any systemic condition or a traumatic cause while in a secondary frozen shoulder subcategories like systemic, extrinsic, and intrinsic were defined. Pain, range of motion, and extent of disability determine the irritability grades [9]. With no specific diagnostic criteria, insidious onset, a progressive increase in pain, and gradual loss of motion characterise primary and secondary frozen shoulder. Pain, specifically nocturnal pain, drives the patient to seek medical help.

**Chart 1:** Zuckerman's Classification of Frozen Shoulder:



**Table 1:** Clinical symptoms based on stage of disease [10]

Stages (Months)	Pain	Mobility	Examination Under Anaesthesia	Arthroscopic findings	Pathological findings
I. (Initial 3 months)	Sharp in both Active and Passive Mobility	Global pain limiting restriction	Global restriction noted in the initial Range	Antero superior capsule synovitis.	Hypertrophied and hyper vascular synovitis, normal capsule
II. (3 <sup>rd</sup> to 9 <sup>th</sup> month)	Dull and continuous pain in both active and passive Mobility	Significant global restriction	Restriction similar to the range when the patient is conscious	Synovitis with peduncles	Hypertrophied and hyper vascular synovitis with scar formation, fibroplasias with scar formation in the capsule
III. (9 <sup>th</sup> to 15 <sup>th</sup> month)	Nominal pain at extremes	Global restriction with firm end feel	Similar restriction noted as in conscious state	Fibrosed synovium with a thick capsule.	"Burned-out" synovitis Formation of dense scar around the capsule
IV. (15 <sup>th</sup> month to two years)	Least pain	Gradual return of mobility	unavailable	Unavailable	Nil Data

## INVESTIGATIONS

A plain radiograph of frozen shoulder which is reported a normal, may show peri-articular osteopenic changes due to disuse [11]. An early accurate diagnosis of adhesive capsulitis can be provided by ultra Sonography assessing the hypo echoic vascular soft tissue of the rotator interval [12].

MRI can be an effective non-invasive means of diagnosing suspecting cases and also providing information in assisting the clinician in differentiating between the early and late stages. A greater correlation with clinical stage of adhesive capsulitis is demonstrated by the capsular and synovial thickness measured in the axillary pouch. Characteristic MR joint studies show a CHL thickening along with the joint capsule in the rotator cuff interval and the sub-coracoid triangle sign in frozen shoulder [13]. A high sensitivity in clinical diagnosis with a low specificity can be a presence of abnormal tissue in the rotator interval [14].

### SCORING

The criterion for adhesive capsulitis diagnostic description requires validation as it includes variable pain and movement characteristics though present in the literature. The diagnosis of primary adhesive capsulitis currently depends on the findings of the history and physical examination, as there remains no gold standard confirmatory test to diagnose this disorder [15]. The Delphi technique which can be applied as a clinical identifier, limits to the differential diagnosis and assists the clinician to recognize the acute stage of primary (idiopathic) adhesive capsulitis and further guides the management and can facilitate future research [16]. Outcome measures, such as the Disabilities of the Arm, Shoulder, and Hand Questionnaire (DASH) [17] Simple Shoulder Test (SST) [18] Penn Shoulder Score [19], American Shoulder and Elbow Surgeons (ASES) score [20] can be used for shoulder specific conditions.

### TREATMENT

A definitive treatment and outcome measures for Frozen Shoulder does not exist because of the diversified factors in etiology, classification criteria, co-morbidities, multiple stages of manifestation of the disease process. The existing treatment of choice are Oral Medications, Active exercises, Corticosteroids, Mobilization, Manipulation, Distension arthrography, surgical arthrography. Any form of rehabilitation should be carefully tailored to the stage of tissue irritability (TABLE: 2) while little evidence supports the logic of modalities in the treatment of frozen shoulder, any form of exercise approach should avoid exacerbation of pain and inflammation [21]. In manipulation it was observed that end range manipulation and mobilization with movement (MWM) were found to be more effective in restoring mobility and functional ability [22] and CPM provides better response in decreasing pain perseverance than the conventional physiotherapy treatment protocol in the early phase a posteriorly directed joint mobilization technique was more effective than an anteriorly directed mobilization technique for increasing external rotation ROM in subjects with adhesive capsulitis [23]. End range mobilization (Maitland's) and mobilization with movement (Mulligan's) were proved effective in increasing mobility and functional ability. It is usually recommended that the intensity of exercises and functional activity initiation

is inversely proportional to the tissue's irritability level. (TABLE: 2).

In a clinical practice nocturnal pain would be the first symptom to get knocked out for an appropriate exercise program. Usually the marker for improvement is the pain reduction followed by a nominal increase in the functional ability level even without any notable change in the range of motion. Selection of particular treatment protocol depends purely on patient's choice and their optimal level in executing the exercises rather than on the physician or the physiotherapist's choice.

**Table 2:** Therapeutic approaches formulated on Irritability grade

Approaches	High Irritability	Moderate Irritability	Low irritability
Adjuvants	Deep Heat / Cryopacks	Deep Heat / Cryopacks	Superficial Heat / Cryopacks
Activity Adjustments	Required	Optimalisation	Negligible
Mobility/ Stretch	Low Intensity, Within Pain limits of active and assisted range	Low Intensity, With optimal pain in active range	End Range, Thrust (Over pressure), and Eccentric loading progressive.
Manual Therapy	Lowest intensity possible	Moderate intensity as tolerated	High intensity with Sustained Stretch
Strengthen	Nil	Nil	Low to High Resistance
Functional Ability	Nil	Optimal	Demanding
Others	Analgesics, Local steroids	Analgesics and Anti Inflammatory drugs	Nil

If either of these approaches doesn't yield a positive result for more than 3-6 months the other option to be considered is that of Manipulation under anesthesia (MUA) [24] or surgical capsular release and micro adhesiolysis [25]. MUA is considered to those who had failed in the conservative approach and corticosteroids are administered following this procedure to minimize the joint inflammation and irritability. The common complication of MUA is fractures, rupture of soft tissues (tendons, ligaments etc) and occasionally neuro vascular damage around the joint. Certain evidence exists for translational mobilization [26] where the manipulator concentrates more on accessory movements than physiological movements; it is generally suggested as a better option than MUA. Arthroscopic release is the procedure of choice when MUA is contraindicated and the advantage being the selection of specific capsular structure to be released [27]. Any of these surgical procedures is followed up by administration of continuous passive mobiliser (CPM).



## CONCLUSION

Since the etiology closely follows with the co morbidities and a conclusive etiology could not be defined, the control of diabetes or screening of pre diabetes and thyroid dysfunction treatment may very well control the incidence of adhesive capsulitis. The pre dominant co morbidity for peri arthritis is noted to be Diabetes and in particular type-II [28]. It is not the type of diabetes but the duration of the disease and the glycemic index, marking the causative factor as the glycemic control which plays a vital role in the etiology for adhesive capsulitis.

It becomes an important on the part of the physical therapist to emphasize and educate the patients with AC regarding the systemic cause of the disease together with regular therapeutic approaches. Hence a holistic approach and a continuum medical support along with a supervised aerobic exercise protocol may control the incidence and the duration of the condition in providing a good prognosis for a functional recovery.

Many authors have suggested that regular practice of supervised Yogasanas can be a better alternative both in controlling the diabetic status and maintaining an optimal shoulder function. The practice of Yogasanas has been found successful in maintaining low Glycemic index in diabetics [29] and hence the incidence of Adhesive Capsulitis may be controlled. Having the systemic cause for AC next to Diabetes is Hypothyroidism, supervised and graduated yogic practices with pranayama can yield a better clinical and a functional outcome along with the medical management [30].

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### Citation

Mohanakrishnan, J., & Mohanakrishnan, B. (2016). DIABETES AND SHOULDER ADHESIVE CAPSULITIS. *International Journal of Physiotherapy*, 3(4), 420-424.