# Evaluation of Pain Relief in Platelet Rich Plasma (PRP) Intraarticular Injections Versus Occlusal Splinting for the Treatment of Temporomandibular Joint Osteoarthritis

## A Randomized Clinical Trial

Thesis submitted to the Oral and Maxillofacial Surgery Department

In partial fulfillment of the requirements for master degree Faculty of Oral and Dental Medicine,

Cairo University

*By*

***Rania Ihab Younis***

*B.D.S*

*Faculty of Oral and Dental Medicine,*

*October University for Modern Sciences and Arts (MSA) (2010)*

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***Rania Ihab***

# Contents

# List of Abbreviations

| Abbreviation | |
|---|---|
| TMJ | Temporomandibular Joint |
| TMD | Temporomandibular Disorder |
| OA | Osteoartheritis |
| PRP | Platlet Rich Plasma |
| PPP | Platelet Poor Plasma |
| RDC | Research Diagnostic Criteria |
| IL | Interleukin |
| TNF | Tumor Necrosis Factor |
| CT | Conventional Tomography |
| CBCT | Cone Beam Conventional Tomography |
| MRI | Magnetic Resonance Imaging |
| NSAIDs | Non-Steroidal Anti-Inflammatory Drugs |
| SS | Stabilization splint |
| RCT | Randomized Clinical Trial |
| GFs | Growth factors |
| TGF **β** | Transforming Growth Factor Beta |
| VAS | Visual Analogue Scale |
| HA | Hyaluronic acid |
| MIO | Maximal Interincisal Opening |
| SPSS | Statistical Package for Social Sciences |
| ELISA | Enzyme Linked Immunasorbent Assay |
| PCR | Polymerase Chain Reaction |
| DNA | Deoxyribonucleic Acid |
| RNA | Ribonucleic Acid |
| ΔΔCt | Critical Threshold |

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# Introduction

Temporomandibular disorder (TMD) is a multifactorial disease that embraces a number of clinical conditions, which involve: the temporomandibular joints (TMJs), masticatory muscles and associated structures ***(Winocur et al., 2010).***

Internal derangement (ID) of the temporomandibular joint (TMJ) is one of the most common temporomandibular disorders. In ***1983, Dolwick*** defined it as an abnormal relation between the temporomandibular disc with respect to the mandibular condyle, the temporal fossa, and the temporal eminence of the TMJ ***(Gil-dı and Jose, 2011).***

Internal derangement is associated with Temporomandicular joint Osteoarthritis (TMJ OA) because temporomandiular joint Osteoarthritis is the end stage of internal derangement **(*Stegenga, 1989 ; De Bont et al., 1995 ; Dimitroulis, 2005).***

Osteoarthritis is a chronic, progressive, and debilitating disease that is defined as the gradual deterioration (degeneration) of the cartilage in a joint. This disorder is associated with damage to the cartilage and surrounding tissues and is characterized by pain, stiffness, and loss of function ***(Kiliç et al., 2015).***

A variety of noninvasive means of treatment have been proposed for pain resolution, improvement of symptoms such as joint clicking and limitation of mouth opening, and modification of the course of TMJ OA, with variable success rates ***(Hayami, 2008).***

Occlusal appliances have been shown to be beneficial in the treatment of TMJ OA. Several studies were conducted and proved the efficacy of occlusal splint therapy in individuals with severe TMJ OA. Results showed reduction of clinical signs and symptoms by inducing favorable bone remodeling in the anterior division of the condylar head ***( BjØrnland et al., 2007*** ; ***Mejersjö and Wenneberg, 2008 ; Kim Yongi et al., 2014).***

Platelet-rich plasma (PRP) injections have been suggested for use in TMJ OA to increase the rate of bone deposition and quality of bone regeneration ***(Ohkub et al., 2003).***

Platelet-rich plasma (PRP) is a simple, low cost, and minimally invasive method that allows one to obtain from the blood which is a natural concentrate of autologous Growth Factors (GFs) ***(Anitua et al., 2004).***

The present study was designed to compare the effects of PRP injections versus occlusal splints in relieving of pain and dysfunction of TMJ OA in adult patients.

# Aim of the study

The aim of this study was to evaluate the pain relief in PRP intraarticular injections versus occlusal splinting for the treatment of TMJ OA.

# Review of Literature

The field of TMDs has been receiving growing attention over the past years, with several studies discussing many concerns regarding their diagnosis and treatment ***(Ying et al., 2013).***

Temporomandibular joint disorders are characterized by intra-articular positional and/or structural abnormalities which are presented clinically as: decreased mandibular range of motion, distinguished pain in muscles of mastication, generalized myofascial pain, TMJ pain, associated joint clicking with function, and a functional limitation and deviation of the jaw during opening ***(Wadhwa, 2008 ; Rando and Waldron, 2012).***

In general, TMDs can be divided into articular (associated with intracapsular conditions) and non-articular disorders (associated with extracapsular conditions) ***(Liu and Steinkeler, 2013).*** Articular disorders are best classified according to the ***Wilkes***' Staging Classification for ID of the TMJ (stages I–V). Wilkes' classification was based on clinical, radiologic, and anatomic findings.

***Wilkes (1989)*** classified the 5 stages of TMJ ID as follows:

I. Early stage, clinical presentation featured no pain or decreased range of motion, possible clicking, and when imaged, the disc was anteriorly positioned with normal bony contours.

II. Early/intermediate stage, there are episodes of pain, headache, opening clicks and intermittent locking. Radiographic presentation showed anterior

disc displacement, thickened posterior disc, and normal bony contours. The Anatomic correlation viewed were early disc deformity, anterior displacement, normal bony contours.

III. Intermediate stage, there are many painful episodes, intermittent locking, multiple functional symptoms, decreased range of motion. When imaged, anterior disc displacement is seen with disc deformity. This disc reduces early in stage III, but progresses to non-reducing (locking) on opening in the later stage. The anatomic correlation showed marked disc displacement and deformity with normal bony contours. The disc is subjected to deformity because of the forward and downward push of the condyle.

IV. Intermediate/late stage, the pain is increasing relatively to earlier stages, headache and restricted mandibular range of motion. When imaged, bony changes are markedly noticed such as flattened eminence, condylar deformity and osteosclerotic changes. Anatomically, adhesions of disc, bony changes, evidence of osteoarthritis, osteophytes, and no disc perforations are present.

V. Late stage, episodic or continuous pain, crepitus, limited range of motion at all times, constant functional difficulties are present. Radiograph showed disc perforations, gross deformities of bony structures and cartilage and progressive arthritic changes. Anatomical correlations are gross hard and soft tissue changes, perforations, adhesions and subcortical cysts.

Obviously TMJ OA is the last stage of TMJ ID as stated by ***Wilkes***. This is certified by many studies as ***De Souza et al. (2012)*** who concluded that TMJ OA doesn't occur alone and is a co-morbid disease process associated with other TMD. Therefore, OA is the end result of intra-capsular derangements.

The word Osteoarthritis is derived from the Greek 'osteo', standing for ' the bone', while 'arthro', means 'joint', and 'itis', meaning 'inflammation', which is the classical name of the disease ***(Mejersjö and Wenneberg, 2008).***

TMJ OA is a chronic joint disorder that affects the bony articular surfaces of the mandibular condyle and fossa such as flattening of the head of the condyle, and presence of osteophytes ***(Tanaka and Koolstra, 2008 ; Jeffrey Oksen, 2013)***. This agrees with the findings of ***Alexiou at al. (2009) and Cortes at al. (2011)*** which proved that this disorder has a complex pathophysiology, with a multitude of risk factors interacting at an individual level.

OA is usually associated with synovitis. It affects all of the tissues of the joint, including low leukocyte counts in the synovium, subchondral bone eburnation, fibrous adhesions of capsule, ligaments inflamamtion and contraction of periarticular muscles. ***(Brandt and Division, 2002 ; Mercuri, 2008).***Obviously, TMJ OA is a dysfunction that affects all articular structure of the joint (***Cevidanes et al., 2014).***

Etiology of TMJ OA was the subject of many studies which proved that the most common causes were: overloading, bruxism, unilateral chewing, genetic susceptibility, and internal derangement. Also, it was proved that deformity of the