Assessment of Temporomandibular Joint Dysfunction in Patients with Stroke

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Goal: The aim of this study was to assess temporomandibular joint dysfunction in patients with stroke. *Materials and Methods:* Total of 100 participants, 50 healthy and 50 who had stroke, were recruited into this study. Digital caliper and algometer were used to assess temporomandibular joint range of motion and masticatory muscle pressure pain threshold. Labial commissure angle measurement was used for the assessment of facial paralysis severity. Fonseca questionnaire was used for temporomandibular joint dysfunction assessment and categorization. In addition, dominant mastication shift was measured by the question that asks the pre and poststroke dominant mastication side. *Findings:* In intergroup comparison, significant decrease was found in all temporomandibular range of motion parameters in favor of stroke group ($P < .05$). Despite the fact that no significant difference was found between groups for the pain threshold in masticatory muscles except for middle part of the left temporalis muscle, values were higher in healthy group ($P > .05$). As a result of intergroup examination of labial commissure angle degree, Fonseca questionnaire score, it was found that labial commissure angle and Fonseca questionnaire scores were higher in stroke group ($P < .05$). Intragroup examination of patients with stroke showed that dominant mastication side shift was seen in patients with stroke ($P < .05$). *Conclusion:* It was concluded that, temporomandibular joint dysfunction prevalence was higher in stroke group compared with healthy group and use of modalities specific to temporomandibular joint dysfunction treatment would be beneficial. **Key Words:** Hemiplegia—chewing—mastication—dysfunction—stomatognathic system—disorder.

Introduction

Stroke is defined by World Health Organization as "caused by the interruption of the blood supply to the brain, usually because a blood vessel bursts or is blocked by a clot. This cuts off the supply of oxygen and nutrients, causing damage to the brain tissue".[1] Stroke is the third leading cause of death in the developed countries and also the main cause of disability.[2-4]

Depending on the severity of the central nervous system damage, sensorimotor deficit and psychological symptoms such as spasticity, urinary incontinence, equilibrium and speech problems, depression, delirium, and unilateral neglect may accompany stroke.[5-11] In addition to these symptoms, sensorimotor deficits also cause strength loss in lip, tongue, masticatory muscles, quality of mastication, and bite force by affecting the stomatognathic system which consists of head and neck muscles, masticatory muscles, ligaments, temporomandibular joint, dental arcs, and salivary glands related to referred area.[12-15]

Temporomandibular joint dysfunction (TMJD) is a collective term which consists of subgroups ranging from masticatory muscle disorders, chronic mandibular hypomobility disorders to congenital developmental disorders specific to the joint.[16,17] TMJD is clinically

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characterized with symptoms such as limitation in jaw movements, pain in joint or masticatory muscles, deviation in mouth opening and locking sensation.[18] Prevalence of TMJD varies depending on the pathology; however, it is reported that 75% of the general population had asymptomatic TMJD, and only 3.6%-7.5% of them admit for medical attention.[19]

Despite etiology of TMJD based on many factors, pathologic changes in neuromuscular system lie on its pathogenesis.[17] Considering the fact that current evidence points out a number of compromised orofacial functions experienced by patients due to stroke; stroke, which is one of the central nervous system lesion diseases, may cause TMJD.[20-22]

Studies concerned on this topic are mostly focused on the assessment of mastication quality and lip and bite force measurement which are indirectly related to TMJD assessment in patients with stroke.[23,24] To the best of our knowledge no study was found which assesses directly the relationship between TMJD and stroke. From this point of view aim of our study was to assess TMJD in patients with stroke.

Materials and Methods

This study was approved by Izzet Baysal University Clinical Research Ethics Committee (2016/70). Before verbally informing about the study procedure, written consent form was obtained from the participants.

As a result of power analysis with 80% confidence interval and .10 ± .15 tolerance, it was found that 29 patients with stroke and 29 healthy individuals are required for the study. Fifty patients with stroke who admitted to Bolu Izzet Baysal Physical Therapy and Rehabilitation Education and Research Hospital and 50 healthy residents from Bolu and Düzce cities were included in the study. Three patients with postfacial paralysis story and total of 10 individuals who declined to participate were excluded from the study (Fig 1). Exclusion criteria were determined for both groups as having a cooperation problem, story of jaw fracture, postfacial paralysis, and orthognathic surgery. Inclusion criteria were determined for both groups as not having a systemic or congenital disease that affect the head and neck region, and currently not taking medical care for TMJD. In addition to those parameters mentioned above, only subacute and patients with chronic stroke were included to the study.

Temporomandibular range of motion, Fonseca questionnaire, labial commissure angle, and masticatory pressure pain threshold of both patients with stroke and healthy individuals were measured and assessed. In addition dietary intake and dominant chewing side after stroke was assessed in patients with stroke.

Temporomandibular movements were measured by digital caliper. All measurements were performed while subjects were sitting in a chair with their head supported.[25] Mandibular depression measurement was performed by measuring interincisal distance of the subjects right after they opened their mouth as wide as possible. Edges of the caliper were positioned in contact with the upper and lower central incisors during measurement.[26] Upper central incisor location in relation to lower central incisor was drawn vertically by biocompatible pencil before lateral deviation measurement. Before the first drawing procedure was completed, second drawing was performed while subjects deviated their jaw as much as possible. After both measurement points were drawn, the horizontal distance between these points were measured.[27] Protrusion movement was measured with lower part of the caliper by the calculation of the horizontal distance between upper and lower central incisors while subjects were asked to move their jaw as forward as possible.[19] Previously described reference measure values are 40 mm for mandibular depression, 7 mm for lateral deviation, and 6 mm for protrusion movement.[28]

Fonseca questionnaire was used to determine whether or not the subjects had TMJD. Fonseca questionnaire consists of 10 questions which may be answered by "yes,

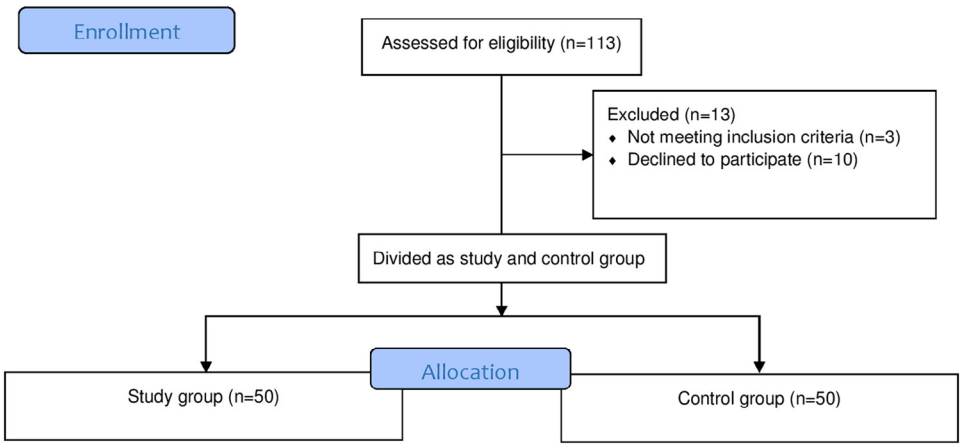

Figure 1. *Flow diagram.*