Iran J Public Health, Vol. 50, No.3, Mar 2021, pp.616-617

Letter to the Editor

Association between Peanut Consumption and Temporomandibular Disorders in a Sample of the South Korean Population

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(Received 11 Aug 2019; accepted 19 Aug 2019)

Dear Editor-in-Chief

Nuts including peanuts are considered a healthy food. Many studies have reported that daily consumption of peanuts reduces cardiovascular disease and cognitive function (1). Despite its beneficial effects, peanut consumption may have adverse effects on the temporomandibular joints (TMJs) because of its hardness. However, most previous studies have focused on the effects of food consistency on masticatory pattern and associated eating habits in patients with temporomandibular disorders (TMD) (2). Overloading of the TMJ is considered the main cause of TMD. Micro-trauma from chewing hard foods such as peanuts could lead to overloading of the TMJ. Clinicians recommended avoiding hard food to prevent TMD. However, this recommendation is likely to lower diet quality and the joy of eating. Therefore, information about the optimal frequency and amount of peanut intake could help prevent negative effects on the TMJ.

The authors analyzed data from the Fifth Korean National Health and Nutrition Examination Survey (KNHANES V) 2012. The final sample size was 3,262 adults aged ≥ 19 yr. Multiple logistic regression analysis was performed to assess the relationship between peanut consumption and TMD. Individuals who consumed peanuts ≥ 5 times per week were at higher risk of TMD than other groups ($P < 0.01$). The individuals who consumed peanuts ≤ 1 time per week were at the lowest risk of TMD ($P < 0.01$). The adjusted odds ratios (ORs) and 95% confidence intervals (CIs) for TMD after adjusting for age and sex were 1.655 (0.756, 3.622) in those who consumed peanuts ≥ 5 times/week, 1.006 (0.599, 1.689) in those who consumed peanuts 2 ~ 4 times per week and 0.605 (0.453, 0.809) in those who consumed peanuts ≤ 1 time per week. After adjusting for age, sex, smoking, alcohol consumption, household income and education, ORs and 95% CIs for the same groups were 1.602 (0.719, 3.565), 1.009 (0.598, 1.700) and 0.611 (0.456, 0.820). After adjusting for age, sex, smoking, alcohol consumption, household income, education, regular exercise, BMI, and metabolic syndrome, these values were 1.685 (0.748, 3.792), 1.008 (0.600, 1.693), and 0.615 (0.452, 0.819).

Present study showed that the lowest adjusted ORs at 95% CI levels were seen in the subjects who consumed peanuts ≤ 1 time per week. These results may be related with reduced physiological loading. Physiological loading during routine activity is the most important environmental factors responsible for joint homeostasis and integrity (3). Mechanical stimuli for TMJ cause functional adaptation, which is achieved through car-

tilaginous remodeling (4). Non-physiological loading from overuse or disuse induce degenerative effects on the joint cartilage (3). In general, the physiological functional loading on TMJ occurs during mastication and these loads are influenced by the consistency of the food (5). Reduced functional force can cause decreased functional strain on the condyle, leading to reduced thickness of the cartilage and lower bone density (5,6).

This study showed the individuals who consumed peanuts ≥ 5 times per week had the highest value of the adjusted ORs at 95% CI level. Prolonged overloading causes the breakdown of joint lubrication (7). Fluid film lubrication is important for withstanding the dynamic and static loading of TMJ. The absence of lubrication can lead to increased friction in the TMJ. Chewing hard foods can cause increased friction in the TMJ. Increased friction in the joints is an important factor in disc displacement (7). If overloading continues, increased friction in the joints induces shear stress within the cartilage and results in tissue damage (8). Continuous pressure can increase cartilage deformation (9). The condylar cartilage and disc deform rapidly and have creep phase of asymptomatically increasing deformation after loading. However, immediate recovery may occur after removal of compression or during intervals (9). Muscles, articular cartilage and disc require sufficient recovery time after chewing hard food. Those who consume peanuts ≥ 5 times per week may experience prolonged loading without sufficient recovery time. A reduction in the frequency of peanut consumption may be advisable in these subjects because of potential damage to joints and muscles.

We demonstrated that the amount of peanut consumption per sitting had no effect on TMD. Sufficient recovery time may be more important than the degree of loading. Consuming peanuts less than 4 times a week are likely to provide minimal recovery time according to the present study. This study suggested that frequency of peanut consumption might be associated with TMD. Peanut intake more than five times per week may increase TMD.

Conflict of interest

The authors declare that there is no conflict of interest.

References

1. Barbour JA, Howe PR, Buckley JD, et al (201ᵛ). Cerebrovascular and cognitive benefits of high-oleic peanut consumption in healthy overweight middle-aged adults. *Nutr Neurosci*, 20(10):555-°62.
2. Piancino MG, Bracco P, Vallelonga T, et al (2008). Effect of bolus hardness on the chewing pattern and activation of masticatory muscles in subjects with normal dental occlusion. *J Electromyogr Kinesiol,* 18(6):931-7.
3. Sun HB (2010). Mechanical loading, cartilage degradation, and arthritis. *Ann N Y Acad Sci*, 1211:37-50.
4. Utreja A, Dyment NA, Yadav S, et al (2016). Cell and matrix response of temporomandibular cartilage to mechanical loading. *Osteoarthritis Cartilage*, 24(2):335-44.
5. Tanaka E, Sano R, Kawai N, et al (2007). Effect of food consistency on the degree of mineralization in the rat mandible. *Ann Biomed Eng*, 35(9):1617-21.
6. Pirttiniemi P, Kantomaa T, Sorsa T (2004). Effect of decreased loading on the metabolic activity of the mandibular condylar cartilage in the rat. *Eur J Orthod*, 26(1):1-5.
7. Nitzan DW (2001). The process of lubrication impairment and its involvement in temporomandibular joint disc displacement: a theoretical concept. *J Oral Maxillofac Surg*, 59(1):36-45.
8. Tanaka E, Kawai N, Tanaka M, et al (2004). The frictional coefficient of the temporomandibular joint and its dependency on the magnitude and duration of joint loading. *J Dent Res*, 83(5):404-7.
9. Kuboki T, Shinoda M, Orsini M, et al (1997). Viscoelastic properties of the pig temporomandibular joint articular soft tissues of the condyle and disc. *J Dent Res*, 76(11):1760-9.