ISSN: 2581-5989
PubMed - National Library of Medicine - ID: 101738774

International Journal of Dental Science and Innovative Research (IJDSIR)

IJDSIR : Dental Publication Service

Available Online at: www.ijdsir.com

Volume – 2, Issue – 6, November - December - 2019, Page No. : 482 - 485

Salivary biomarkers in orofacial pain conditions: A literature review.

[1]Dr. Mahsa Mehryari, [2]Dr. Tahereh Momeni, [3]Dr. Maryam Seyed Majidi, [4]Dr. Milad Aghajani.

[1]Assistant professor, Department of oral and maxillofacial disease, faculty of dentistry, Babol university of medical sciences, Babol, Iran.

[2]Post graduate student of oral and maxillofacial medicine, department of oral medicine, dental faculty, Babol university of medical sciences, Babol, Iran.

[3]Assistant professor, Department of oral and maxillofacial pathology, faculty of dentistry, Babol university of medical sciences, Babol, Iran.

[4]Dentist, Ardabil, Iran.

Corresponding Author: Dr. Tahereh Momeni, Post graduate student of oral and maxillofacial medicine, department of oral medicine, dental faculty, Babol university of medical sciences, Babol, Iran.

Type of Publication: Review Article

Conflicts of Interest: Nil

Abstract

Orofacial conditions such as temporomandibular disorders are often associated with extended bouts of debilitating chronic pain. Unfortunately, these and other similar pathologies are characterized by their inherent complexity and poorly understood etiologies making diagnoses and subsequent treatments exceedingly difficult. With a significant proportion of the population suffering from painful orofacial conditions, the development of new and accurate diagnostic procedures is essential to improve the current standard of care. Here, we overview the potential of serum, saliva, and synovial fluids as reservoirs of biochemical information capable of discerning specific disorders, including those correlated with orofacial pain. Determining the worth of these biofluids in the assessment of health status could expedite diagnoses and enhance pain management strategies while also enhancing our understanding of disease pathophysiology.

Keywords: Salivary biomarkers, TMD, Orofacial pain.

Introduction

With affected areas including the face, mouth, ears, eyes, nose, and neck, orofacial discomfort may result from a diverse range of conditions. Among these are temporomandibular disorders (TMDs), the second most common musculoskeletal condition[1]. TMDs are highly prevalent and frequently associated with debilitating chronic pain, a feature with devastating impact on patients' quality of life. This emphasizes the need for developing methodologies aimed at early diagnosis and effective management[2]. However, the diagnosis of pain relies on patient reports, questionnaires, and semi-objective findings for diagnostics. The diagnosis of myalgia using the validated Diagnostic Criteria for TMD, includes three pain subgroups: local myalgia, myofascial pain, and myofascial pain with referral[3]. Although much effort has been placed into establishing novel modes to accurately diagnose disorders of chronic pain, the most efficacious methods have yet to be determined. We begin our discussion here with an overview of these biofluids

and go on to describe each of these as a prospective warehouse of biochemical indicators capable of determining individuals suffering from oral facial pain.

Saliva

Saliva is produced by a number of salivary glands located within and around the oral cavity including the parotid, submandibular, sublingual, and minor salivary glands and posterior deep lingual glands[4]. Each gland is comprised of clustered acinar cells called acini, which concertedly produce about 500–1500 ml daily. There are two categories of acinar cells: [1] serous cells, which secrete a non-viscous watery product, and [2] mucous cells, which secrete a highly viscous mucous-like product[5]. These cells produce a solution containing electrolytes, mucins, and enzymes, which subsequently flow into collecting tubes, where their composition can be further altered by the reabsorption of specific molecules before release into the mouth as saliva[6].

Function

Saliva lubricates and moistens the oral tissues to aid in speech, chewing, swallowing, and taste. Saliva also plays a key role in initiating and facilitating digestion. In addition, saliva's cleansing actions and intrinsic anti-pathogenic characteristics are crucial for maintenance of oral health[7].

Composition

Saliva is a continuously secreted, slightly acidic, clear, hypotonic fluid predominantly composed of water (99.5%). The remaining 0.5% is -comprised of inorganic ions, including sodium, chloride, potassium, and calcium, along with organic components, such as amino acids, proteins, antibodies, hormones, enzymes, lipids, and cytokines, among many others[8]. In addition, recent studies have shown that saliva actually contains a variety of genomic, transcriptomic, proteomic, microbiologic, and immunologic analytes that may be capable of identifying both local and systemic disorders in afflicted individuals. Consequently, saliva is now the focal point of multiple investigations aimed at establishing oral fluids as the preferred diagnostic medium[9].

Materials and methods

A systematic medical literature search was conducted with assistance from a research librarian in MEDLINE/PubMed and EMBASE databases for articles published between January 1, 1990 and December 31, 2019. Each study was independently assessed by two reviewers with expertise in the field of oral medicine.

Results and Discussion

The result of this study is shown in table 1. The orofacial region is anatomically complex and often presents with exclusive ailments and concomitant chronic pain not routinely experienced in other regions of the body[10]. These include, but are not limited to, masticatory muscle and temporomandibular joint disorders as well as burning mouth syndrome. Current diagnostic methodologies directed at the early identification of these conditions have thus far proved to be invasive and occasionally inaccurate[11]. Developing new procedures designed to discriminate these and other maladies associated with chronic orofacial pain could help initiate the expeditious onset of corrective therapies and alleviate much of their associated enduring discomfort[12]. The proceeding sections will describe the potential utilization of saliva as diagnostic media with the power to discern patients suffering from orofacial disorders commonly presenting with chronic pain. Unfortunately, most conditions presenting with chronic orofacial pain are difficult to differentiate, and establishing rapid and accurate methods of patient evaluation could allay a great deal of agony by identifying affected individuals at the earliest stages of pathogenesis. Finally, it can be inferred that at this time there is no one ideal biofluid capable of imparting an all-

encompassing portrait of our current health status. While saliva fluids all contain biomarkers indicative of unique disease states, both local and systemic, none are considered comprehensive, hence necessitating the ongoing research for personalized diagnostics and therapeutics. At this time, determining the appropriate biofluid by which to appraise health status continues to be a function of the disease condition in question. Table 1 lists a series of orofacial disorders commonly associated with chronic pain along with their respective biomarkers and biofluids source.

Table 1: Biomarkers related to orofacial pain conditions.

Saliva	Burning mouth syndrome	IL-2	Simcic et al. [11]
		IL-6	Zidverc-Trajkovic et al. [13]
		CGRP	Srinivasan et al. [14]
		Chondroitin sulfate	Loeb et al. [15]
		Kallikrein	Pekiner et al. [16]
		CD14	
		TLR-2	
		Magnesium	
	TMD	8-OHdG	Rodriguez de Sotillo et al. [17]
		Malondialdehyde	

Conclusion

The development of discriminatory orofacial pain biomarkers could help alleviate a great deal of patient discomfort by facilitating and expediting the initiation of corrective -treatments. Serum, salivary, and synovial fluids have all been shown to contain biochemical information that could serve to identify specific disease states associated with orofacial pain. Although substantial efforts have revealed their value as reservoirs of diagnostic analytes, continued research is necessary to establish their efficacy and comprehensive clinical acceptability. Credentialing these biofluids and their respective biomarkers could not only mitigate a great deal of patient discomfort but also support the formulation of novel preventive care, planning of therapeutic strategies, and furthering our understanding of the dis-ease processes. However, much remains to be learned and achieved.

References

1. Ahmad M, Schiffman EL. Temporomandibular joint disorders and orofacial pain. Dent Clin North Am 2016;60:105–124.
2. Robinson LJ, Durham J, Newton JL. A systematic review of the comorbidity between temporomandibular disorders and chronic fatigue syndrome. J Oral Rehabil 2016;43:306–316.
3. Shaffer SM, Brismée JM, Sizer PS, Courtney CA. Temporomandibular disorders. Part 1: Anatomy and examina- tion/diagnosis. J Man Manip Ther 2014;22:2–12.
4. Wormwood KL, Aslebagh R, Channaveerappa D, et al. Salivary proteomics and biomarkers in neurology and psychia- try. Proteomics Clin Appl 2015;9:899–906.
5. Nie S, Zhang H, Mayer KM, et al. Correlations of salivary bio- markers with clinical assessments in patients with cystic fibro- sis. PLoS One 2015;10:e0135237.
6. Hoffmann RR, Yurgel LS, Campos MM. Evaluation of salivary endothelin-1 levels in oral squamous cell carcinoma and oral leukoplakia. Regul Pept 2011;166:55–58.
7. Wingenfeld K, Nutzinger D, Kauth J, Hellhammer DH, Lautenbacher S. Salivary cortisol release and hypothalam- ic pituitary adrenal axis feedback sensitivity in fibromyalgia is associated with depression but not with pain. J Pain 2010; 11:1195–1202.

8. Psychogios N, Hau DD, Peng J, Guo AC, Mandal R, Bouatra S, et al. The human serum metabolome. PLoS One. 2011;6(2):e16957.
9. Blewis ME, Lao BJ, Schumacher BL, Bugbee WD, Sah RL, Firestein GS. Interactive cytokine regulation of synoviocyte lubricant secretion. Tissue Eng Part A. 2010;16(4):1329–37.
10. Ahn RS, Lee YJ, Choi JY, Kwon HB, Chun SI. Salivary cortisol and DHEA levels in the Korean population: age-related differences, diurnal rhythm, and correlations with serum levels. Yonsei Med J. 2007;48(3):379–88.
11. Simcić D, Pezelj-Ribarić S, Grzić R, Horvat J, Brumini G, Muhvić-Urek M. Detection of salivary interleukin 2 and interleukin 6 in patients with burn-ing mouth syndrome. Mediators Inflamm. 2006;2006(1):54632.
12. Boras VV, Savage NW, Brailo V, Lukac J, Lukac M, Alajbeg IZ. Salivary and serum levels of substance P, neurokinin A and calcitonin gene related peptide in burning mouth syndrome. Med Oral Patol Oral Cir Bucal. 2010;15(3):e427–31.
13. Zidverc-Trajkovic J, Stanimirovic D, Obrenovic R, Tajti J, Vécsei L, Gardi J, et al. Calcitonin gene--related peptide levels in saliva of patients with burning mouth syndrome. J Oral Pathol Med. 2009;38(1):29–33.
14. Srinivasan M, Kodumudi KN, Zunt SL. Soluble CD14 and toll-like receptor-2 are potential salivary biomark-ers for oral lichen planus and burning mouth syn-drome. Clin Immunol. 2008;126(1):31–7.
15. Loeb LM, Naffah-Mazzacoratti MG, Porcionatto MA, Martins JRM, Kouyoumdjian M, Weckx LM et al. Chondroitin sulfate and kallikrein in saliva: markers for glossofynia. Int Immunopharmacol. 2008; 8(7): 1056-8.
16. Pekiner FN, Gümrü B, Demirel GY, Özbayrak S. Burning mouth syndrome and saliva: detection of salivary trace elements and cytokines. J Oral Pathol Med. 2009;38(3):269–75.
17. Rodriguez de Sotillo D, Velly AM, Hadley M, Fricton JR. Evidence of oxidative stress in temporomandibu-lar disorders: a pilot study. J Oral Rehabil. 2011;38(10):722–8.