IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 1, October 2022
Impact Factor: 6.252

Method to Diagnose Diabetes through Saliva

Achyut Agrawal[1] and Nilay Saraf[2]
Student, Department of Electrical and Electronics Engineering[1]
Student, Department of Computer Science and Engineering[2]
Vellore Institute of Technology, Chennai, Tamil Nadu, India
agrawalachyut12@gmail.com[1] and nilaysaraf220303@gmail.com[2]

Abstract:

A. Background

A prevalent long-term condition that has been linked to salivary amylase levels is diabetes mellitus (DM). Recently, salivary amylase diagnostics have been linked to DM. The metabolic alterations that the DM population goes through have an impact on their salivary parameters. Saliva is a special fluid that is necessary for the mouth cavity to operate normally. Saliva collection is less intrusive, simpler, and technically insensitive than blood collection, making diagnosis by saliva analysis potentially helpful. The primary benefit of this approach is that it is a quick diagnostic tool. Establishing a conservative approach to measuring blood sugar in place of venous blood samples can be aided by examining the link between blood glucose levels and its concentration in saliva. Depending on how saliva was collected under fasting or non-fasting settings, there were variations in salivary amylase levels. The type of diabetes, the kind of insulin treatment, or the level of glycemic control determines the variations in salivary amylase.

B. Methodology

Human saliva is an organic liquid vital created by the salivary organs. Saliva contains a few biomarkers which makes it valuable for multiplexed measures that are being created for point-of-care gadgets, quick tests, or for centralised clinical research facility tasks. The most significant perception is that proteins present in the blood are comparably present in saliva. Saliva-based diagnostics can likewise help in contriving early treatment systems. Salivary glucose focuses were seen as uniquely different in diabetes mellitus. This is on the grounds that the salivary organs act as a filter of blood glucose that are adjusted by hormonal or neural regulation. Since parts of saliva are derived from blood, the grouping of biochemical and immunological parts estimated in saliva could reflect blood levels. This prompt expanded emission of glucose from the ductal cells of the salivary organ, consequently expanding the glucose content in saliva. Salivary glucose can be used as an elective technique for diabetes and as a general evaluating apparatus for pre-diabetes and undiagnosed diabetes features the significant parts of saliva (harmless) and blood (intrusive). There have been a few reports showing biochemical changes in the saliva of diabetic patients. These modifications are related to salivary egg whites, amylase, support limit, electrolytes, glucose focus, IgA, IgG, IgM, lysozyme, peroxidase, and complete protein levels. Sampling, transport, and capacity of saliva are exceptionally straightforward when compared with blood. The entire mouth saliva is a salivary fluid and every one of the additional items incorporate cells from the mouth, nasal bodily fluid, blood from gum bruises, food flotsam and jetsam, and microbiota. For exact proteomic examination, the mucosal transudate furthermore, gingival crevicular are better impressions of the blood constituents. The materials and strategies used to gather saliva might impact the precision of testing. Prompt refrigeration at 4 degrees C would protect tests in the event that freezing is absurd yet support at this temperature ought to be no longer than 2 h prior to freezing at - 20 degrees C. Storage methodology and time from the collection principally influence the examination of the biochemical factors described by temperature instability and microbial development.

C. Results & Conclusions

Contrasted with the blood, saliva contains a comparable assortment of constituents that can be utilised for the diagnosis of diabetes mellitus. Salivary glucose levels can be analysed as a noninvasive symptomatic. In addition to biochemical and metabolomic analysis, a paper strip-based non-invasive glucose biosensor was effectively created for salivary examination to analyse diabetes. Saliva protein profiling could be an

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 1, October 2022
Impact Factor: 6.252

alluring chance to analyse and screen diabetes in future. Therefore, salivary diagnostics has developed into a sophisticated discipline and fills in as a region of the bigger field of molecular diagnostics, presently perceived as a vital participant in biomedical, fundamental, and clinical examination.

Keywords: Diabetes, Saliva

REFERENCES

[1]. Cui Y. et al.(n.d.). Unstimulated Parotid Saliva Is a Better Method for Blood Glucose Prediction. MDPI. Retrieved September 10, 2022.

[2]. Kumar K. P., et al.(n.d.). A Comparative Study of Glucose Levels in Blood and Saliva of Type 2 Diabetic Patients of Balkot. Retrieved September 10, 2022.

[3]. Ragunathan H., et al.(2019, January 1). Salivary glucose estimation: A noninvasive method Ragunathan H, Aswath N, Sarumathi T - Indian J Dent Sci. Retrieved September 10, 2022.

[4]. Lima-Aragão M. V. V., et al.(2016, February 16). Salivary profile in diabetic patients: biochemical and immunological evaluation - BMC Research Notes. BioMed Central. Retrieved September 10, 2022.

[5]. Indira M., et al.(2015, May 1). Evaluation of salivary glucose, amylase, and total protein in Type 2 diabetes mellitus patients Indira M, Chandrashekar P, Kattappagari KK, Chandra LK, Chitturi RT, BV RR - Indian J Dent Res. Retrieved September 10, 2022.

[6]. Gupta V., et al.(2020, January 1). Salivary glucose levels in diabetes mellitus patients: A case–control study Gupta V, Kaur A - J Oral Maxillofac Pathol. Retrieved September 10, 2022.

[7]. K.M P., et al.(2013).Evaluation of Salivary Profile among Adult Type two Diabetes Mellitus Patients in South India ,J Clin of Diagn Res. 7(8), 1592-1595. Retrieved September 10, 2022.

[8]. Cuero R., et al.(2019). DNA-based glucose sensor and photonicity for early detection of diabetes using saliva. (n.d.). Retrieved September 10, 2022.

[9]. Mirzaii-Dizgah I., et al. (2013, October 1). Stimulated Saliva Glucose as a Diagnostic Specimen for Detection of Diabetes Mellitus. Journal of Archives in Military Medicine. Retrieved September 10, 2022.

[10]. Smriti K., et al. (2016, March 8). Salivary Glucose as a Diagnostic Marker for Diabetes Mellitus. Journal of Diabetes Science and Technology. Retrieved September 10, 2022.

[11]. Caixeta D. C., et al. (2020, March 17). Salivary molecular spectroscopy: A sustainable, rapid and non-invasive monitoring tool for diabetes mellitus during insulin treatment. PLOS ONE. Retrieved September 10, 2022.

[12]. Pérez-Ros P., et al. (n.d.). Changes in Salivary Amylase and Glucose in Diabetes: A Scoping Review. MDPI. Retrieved September 10, 2022.

[13]. Dhanya M., et al. (2016, July 1). Salivary glucose as a diagnostic tool in Type II diabetes mellitus: A case-control study Dhanya M, Hegde S - Niger J Clin Pract. Retrieved September 10, 2022.

[14]. Gupta S., et al. (2017, September). Correlation of salivary glucose level with blood glucose level in diabetes mellitus. Journal of Oral and Maxillofacial Pathology. Retrieved September 10, 2022.

[15]. Tiongco R. E., et al. (2018, September 1). Salivary glucose as a non-invasive biomarker of type 2 diabetes mellitus. Journal of Clinical and Experimental Dentistry. Retrieved September 10, 2022.

[16]. V. Kadashetti, R. Baad, N. Malik, K.M. Shivakumar, N. Vibhute, U. Belgaumi, S. Gugawad, R.C. Pramod, Glucose level estimation in diabetes mellitus by saliva: a bloodless revolution, Rom. J. Intern. Med. 53 (2015) 248e252.

[17]. T. Arakawa, Y. Kuroki, H. Nitta, P. Chouhan, K. Toma, S. Sawada, S. Takeuchi, T. Sekita, K. Akiyoshi, S. Minakuchi, K. Mitsubayashi, Mouthguard biosensor with telemetry system for monitoring of saliva glucose: a novel cavitas sensor, Biosens. Bioelectron. 84 (2016) 106e111

[18]. A. Soni, S.K. Jha, A paper strip based non-invasive glucose biosensor for salivary analysis, Biosens. Bioelectron. 67 (2015) 763e768.

[19]. M. Numako, T. Takayama, I. Noge, Y. Kitagawa, K. Todoroki, H. Mizuno, J.Z. Min, T. Toyo'oka, Dried saliva spot (DSS) as a convenient and reliable sampling for bioanalysis: an application for the diagnosis of diabetes mellitus, Anal. Chem. 88 (2016) 635e639.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 1, October 2022
Impact Factor: 6.252

[20]. S. Fujii, T. Maeda, I. Noge, Y. Kitagawa, K. Todoroki, K. Inoue, J.Z. Min, T. Toyo'oka, Determination of acetone in saliva by reversed-phase liquid chromatography with fluorescence detection and the monitoring of diabetes mellitus patients with ketoacidosis, Clin. Chim. Acta 430 (2014) 140e144.

[21]. C.S. Chee, K.M. Chang, M.F. Loke, V.P. Angela Loo, V. Subrayan, Association of potential salivary biomarkers with diabetic retinopathy and its severity in type-2 diabetes mellitus: a proteomic analysis by mass spectrometry, Peer J. 4 (2016) e2022

[22]. W. Zhang, Y. Du, M.L. Wang, Noninvasive glucose monitoring using saliva nano-biosensor, Sens. Biosensing Res. 4 (2015) 23e29

[23]. J.P. Aitken, C. Ortiz, I. Morales-Bozo, G. Rojas-Alcayaga, M. Baeza, C. Beltran, A. Escobar, a-2-macroglobulin in saliva is associated with glycemic control in patients with type 2 diabetes mellitus, Dis. Markers (2015).

[24]. H. Abdolsamadi, M.T. Goodarzi, F. Ahmadi Motemayel, M. Jazaeri, J. Feradmal, M. Zarabadi, M. Hoseyni, P. Torkzaban, Reduction of melatonin level in patients with type 2 diabetes and periodontal diseases, J. Dent. Res. Dent. Clin. Dent. Prospects 8 (2014) 160e165

[25]. V.M. Barnes, A.D. Kennedy, F. Panagakos, W. Devizio, H.M. Trivedi, T. Jonsson, € L. Guo, S. Cervi, F.A. Scannapieco, Global metabolomic analysis of human saliva and plasma from healthy and diabetic subjects, with and without periodontal disease, PLoS One 9 (2014) e105181.

[26]. B.N. Satish, P. Srikala, B. Maharudrappa, S.M.P. Awanti, P. Kumar, D. Hugar, Saliva: a tool in assessing glucose levels in diabetes mellitus, J. Int. Oral Health 6 (2014) 114e117.

[27]. Choi, C. S., Lee, K., & Kim, S. (2017, April). Recent trends in the development of diagnostic tools for diabetes mellitus using patient saliva. TrAC Trends in Analytical Chemistry, 89, 60–67.