CODEN [USA]: IAJPBB ISSN: 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES

http://doi.org/10.5281/zenodo.1450921

Available online at: http://www.iajps.com Research Article

FUNCTIONAL ASSESSMENT OF DENTIST STRESS LEVEL DURING LOCAL ANESTHESIA MANAGEMENT

[1]Vasil'ev Y., [2]Rabinovich S., [3]Dydykin S., [4]Demyanenko S.

[1]Associate professor, operative surgery and topographic anatomy department, Sechenov University, Moscow

[2] Head of the department, professor, A.I. Evdokimov Moscow state university of medicine and dentistry, dental anesthesiology department

[3]Professor, head of the department of operative surgery and topographic anatomy department, Sechenov University, Moscow

[4] Professor, Head of the Department of Dentistry and Orthodontics, Medical Academy named after S.I. Georgievsky, FGAOU VO "KFU im.V.I.Vernadsky"

Abstract:

As commonly assumed, dental treatment may cause patients acute and chronic stress, especially without adequate anesthesia. The regulatory system strain index, or the stress index (SI) and heart rate (HR), is evaluated in dentists performing local anesthesia. The study involved 86 doctors aged 25-55. SI was recorded on the portable cardio monitor system. Research was one-off and lasted 6 hours of dentist work since the morning. Normal SI was assumed as 50-150 conventional units (c.u.), whereas normal HR was determined by age. HR in Group 1 was found maximal in pain episodes during treatment with local anesthesia and SI was high during IANB. Group 2 HR, on average, did not exceed the age norm, whereas SI was high in the period of expecting clinically significant anesthesia. Group 3 featured maximum SI with persistent post-injection pain on record, confirmed by HR response. All the 3 groups feature credible SI prevalence with anesthesia, outcome expectation, and pain episodes during submaxillary dentistry.

Keywords: *monitoring, local anesthesia, individual approach, dentistry, SI*

Corresponding author:

Vasil'ev Y.,

Associate professor,

Operative Surgery and Topographic Anatomy Department,

Sechenov University,

Moscow

QR code

Please cite this article in press Vasil'ev Y et al., ***Functional Assessment of Dentist Stress Level during Local Anesthesia Management.,*** *Indo Am. J. P. Sci, 2018; 05(10).*

INTRODUCTION:

As known [1], stressors cause the general adaptation syndrome seen as non-specific host response aimed at mobilizing functional reserves and accompanied by regulatory system strain. Everyday life and activities inevitably cause some strain on regulatory mechanisms [2].

This 'working stress' depends on age, gender, individualities, health condition, but does not go beyond the so-called physiological standard. As commonly assumed, dental treatment may cause patients acute and chronic stress, especially without adequate anesthesia. A safe, efficient and predictable conductive anesthetic method in dentistry, especially for the mandible, is in great demand nowadays [3,4]. Some authors [5] note a negative trend in the adverse effects of occupational factors on dentists' health, but this problem is rather neglected [6]. Direct dependence of treatment quality on the clinician's health condition [7] necessitates more drilldown into factors behind changes in, specifically, the dentist's psychoemotional state.

Local anesthesia is a key dental intervention as, on the one hand, it requires the doctor to have good theoretical and practical training in both dental [8, 9] and such general medical sciences as anatomy, physiology, pharmacology, gerontology and pathophysiology [10, 11] and, on the other hand, it is important in ensuring the patient's comfort during treatment.

Study objective: assessing changes in the cardiovascular system with ECG monitoring by a GP dentist during and after local anesthesia.

MATERIALS AND METHODS:

ECG was selectively monitored in 86 doctors aged 25-55 portable cardio monitor. SI is measured by analyzing an RR interval distribution graph – the variation pulsogram. Central boundary activation and increased sympatic regulation during mental load or exercise manifest as rhythm stabilization, reduced RR interval duration dispersion, and more intervals of 1 duration type (MoA growth). The histograms' shape changes and they taper with parallel rise in height. This may be quantified by the histogram height/width ratio (SI=MoA/2*Mo*MxDMn, where MxDMn is the range).

Mo (mode) is the most common RR interval value in this time series. MoA (mode amplitude) is the number of RR intervals matching the mode value as a percentage in the sample size. MxDMn (range) reflects the variability of RR interval values in the time series under study. It runs over the difference between the maximum (Mx) and minimum (Mn) interval values and therefore may be distorted during arhythmia or artefacts. When building histograms (or variation pulsograms, depending on what was originally recorded – heartbeats or pulse), a data grouping method is the most critical choice. The research lasted 6 hours of dentists' work since the morning of 1 workday. The standard was assumed as 50-150 c.u. The apparatus is a unit sized 133*70*24mm and weighing 160g. These characteristics enabled wearing the apparatus under the dentist uniform. The doctors noted the unit's compactness and no restraint during work.

The study subjects formed 3 age groups: Group 1 comprised doctors aged 25-34, Group 2 with doctors aged 35-44, and Group 3 with doctors aged 45-55. As part of the study, the doctors were instructed to keep a diary in detail and with focus on local anesthesia management time, first post-injection minutes, and the time of possible patient pain episodes on-treatment. ECG was recorded in the CM5, CS1, and CS2 deflections. The entry criteria were absence of psychoemotional disorders and evident corporal pathology, consent to be studied.

Findings were statistically processed by standard Excel formulas. The Student t-test was assumed as the basic test of significance.

RESULTS:

Functional status assessment in Group 1 (aged 25-34) showed the average HR value at an appointment as 78.34±0.23 BPM (with $p>0.95$). During supramaxillary toponarcosis, there was a slight HR increase to 81.17±1.02 BPM ($p<0.01$). Submaxillary anesthesia featured a steady HR rise in all the subjects to group peaks at 97.45±1.02 BPM ($p<0.01$). HR figures decreased equally reliably for both jaws. SI assessment featured the peak value upon injection both in the upper jaw (199.48±0.48 c.u., $p<0.01$) and lower jaw, with stress prevalence in the last category (210.21±0.89 c.u., $p<0.01$).

In Group 2 (dentists aged 35-44), HR at an appointment did not exceed the age norm. However, during expectation of local anesthesia effects, HR managed at the maxilla rose to 86.33±1.19 BPM ($p<0.01$) and in the mandible to 89.9±1.23 BPM ($p<0.01$). SI assessment found the peak value simultaneous with expectations of clinically significant anesthesia both in the maxilla (217.7±1.14 c.u., $p<0.01$) and mandible, with stress prevalence in the last category (229.9±1.19 c.u., $p<0.01$).

In Group 3 (aged 35-44), HR at an appointment did not exceed the age norm. During periods of persistent pain senses in the etiological region after local anesthesia, HR reached 81.72±1.31 BPM ($p<0.01$) at the maxilla and 88.31±1.1 BPM ($p<0.01$) at the mandible. SI assessment featured the peak value upon pain sense detection in the etiological region after local anesthesia at the maxilla (220.03±1.06 c.u., $p<0.01$) and mandible, with stress prevalence in the last category (229.76±1.15 c.u., $p<0.01$).

DISCUSSION:

A lot of recent research indicates dentists' occupational diseases, especially stress [12]. The burnout syndrome is characteristic of dentists due to human-related risks, specific interaction with patients after negative treatment by other doctors, gender peculiarities, etc. [13] Emotional exhaustion dynamics lie in correlation between burnout and depersonalization, as well as work and job dissatisfaction. According to some authors, lady doctors are more susceptible to the burnout syndrome and depression [14]. Despite well-known correlation between dentistry and burnout, the doctor's basic manipulations exhausting the nervous system are presently neglected. One such manipulation is toponarcosis performed by doctors with workmanship, expertise, and skills. High public allergization, comorbidities and stress may entail adverse local and systemic complications.

Therefore, (Fig. 1), local anesthesia in all the 3 groups is a high SI trigger. Expectedly higher values are obtained after analyzing the results of IANBs. However, there is potential test error due to test unspecificity, and high figures in Group 3 may be combined with the chronic fatigue syndrome.

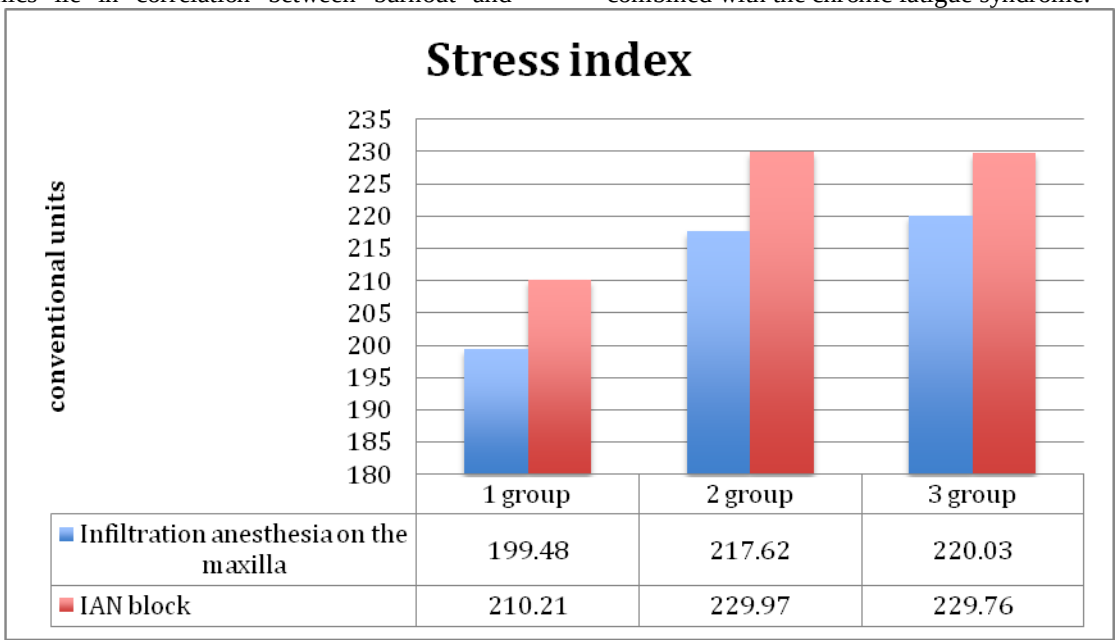

Figure 1. SI benchmark in the 3 groups

*IAN block – inferior alveolar nerve block

So we verified SI against HR values (Fig. 2) reflecting the situational response of the doctor's body to the stress caused by local anesthesia or the patient's pain reactions during incomplete or failed anesthesia.

As in SI assessment, there is a steady HR increase during local anesthesia management, especially in the maxilla, in all the 3 groups.

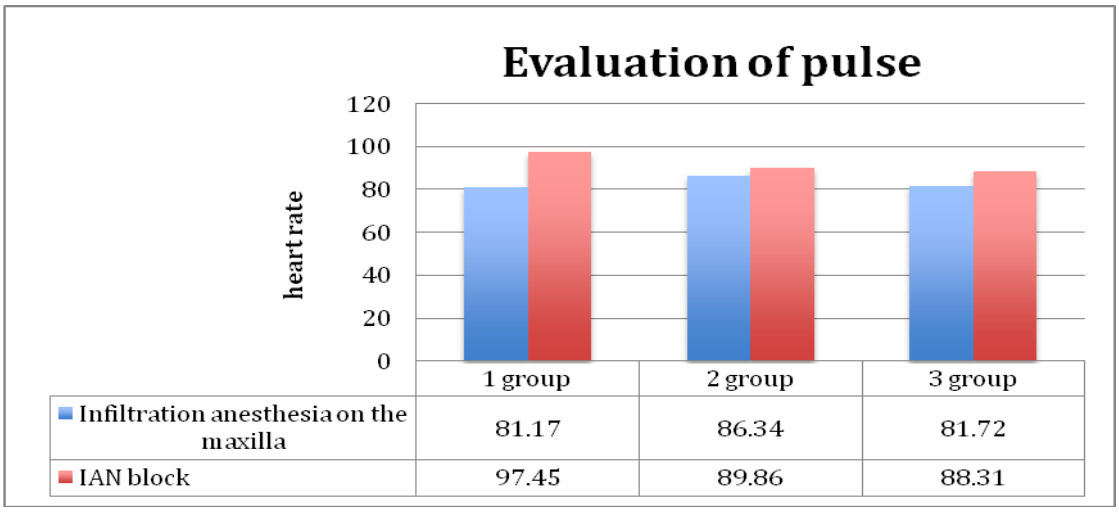

Figure 2. HR measurement in experimental groups

CONCLUSIONS:

1. Local anesthesia management is a stressful situation for dentists.
2. Regular practical training in up-to-date, efficient, safe and predictable local anesthesia technologies is needed to prevent stressful situations in dentists.
3. There is a need to assess the psychological comfort of dentists' work and develop stressor research reports to prevent the burnout syndrome.

REFERENCES:

1. Bilodeau L.P., Moody J.M., Rathbun J.D., Kraut R.A. Evaluation of ECG Changes in Dentists Treating Awake Patients. Anesth Prog. 1983 Nov-Dec 30(6):193-6.
2. Anoop U.R.; Ramesh, Verma K.; Narayanan. The ECG Made Easy for the Dental Practitioner. Indian J Dent Res. 2014 May-Jun; 25(3):386-9. doi: 10.4103/0970-9290.138349
3. Rabinovich S.A., Vasilyev Y.L. Individual Patient Approach in Dentistry as Part of Personalized Medicine. Russian Journal of Dentistry. 2014;3:12-14 (in Russian).
4. Vasil'ev Yu.L et al.. Individual Differences in the Mental Region According To Macroanatomical Study Data , Indo Am. J. P. Sci, 2018; 05(02).
5. Stanley F. Malamed. Is the Mandibular Nerve Block Passé? The Journal of the American Dental Association,2011;.142(.3):S-7S. 10.14219/jada.archive.2011.0340.0
6. Maslak E.E. Dentist's Social Portrait. Basic Research. – 2014. – No.4:305-309 (in Russian).
7. Rabinovich S.A. State-of-the-Art local anesthesia Technologies in Dentistry. M.: RF Health Ministry VUNMC; 2000 (in Russian).
8. Rob Berg. Changing Times in Dental Education. Dental Abstracts July-August, 2013 Volume 58, Issue 4:172-174. 10.1016/j.denabs.2013.05.001
9. Horsnell A. M. Dental Education and the Delivery of Dental Care. Version of record online: May 22, 2009. doi: 10.1111/j.1834-7819.1976.tb04421.x
10. Commercialized Dental Education. J Dent Res. December 1921 3:391-395. doi: 10. 1177/00220345210030040601
11. Moore P.A. Coda's Accreditation of Graduate Dental Anesthesiology Programs: A Benefit to All Dental Education. Anesthesia Progress: Fall 2008, Vol. 55, No.3:71-72. doi: http://dx.doi.org/10.2344/0003-3006-55.3.71
12. Nalliah R.P., Budd A., Allareddy V. Pilot Survey of the Health of Massachusetts Dentists. J Investig Clin Dent. 2017 Apr 16. doi: 10.1111/jicd.12263
13. Castañeda A.E., García de Alba, García J.E. Analysis of Possible Sociodemographic and Occupational Risk Factors and the Prevalence of Professional Exhaustion Syndrome (Burnout) in Mexican Dentists. Rev Colomb Psiquiatr. 2013 Jun; 42(2):182-90. doi: 10.1016/S0034-7450(13)70005-2. Epub 2013 Aug 3
14. Beschoner P., Braun M., Schönfeldt-Lecuona C., Freudenmann R.W., von Wietersheim J. Gender Aspects in Female and Male Physicians: Occupational and Psychosocial Stress. Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz. 2016 Oct; 59(10):1343-50. doi: 10.1007/s00103-016-2431-7