IN THIS JOURNAL

Oxidative Stress in Oral Mucosa Cells

What Caused President Kennedys Wounds?

Intracranial Complications of Sinusitis

Data Sharing Framework for Healthcare Industry

Great Britain Journals Press

journalspress.com

London Journal of Medical & Health Research

Volume 24 | Issue 9 | Compilation 1.0

COMPILED IN UNITED KINGDOM

ENGLISH

LONDON JOURNAL OF MEDICAL AND HEALTH RESEARCH

Volume 24 | Issue 9 | Compilation 1.0

PUBLISHER

Great Britain Journals Press
1210th, Waterside Dr, Opposite Arlington Building, Theale, Reading
Phone:+444 0118 965 4033 Pin: RG7-4TY United Kingdom

SUBSCRIPTION

Frequency: Quarterly

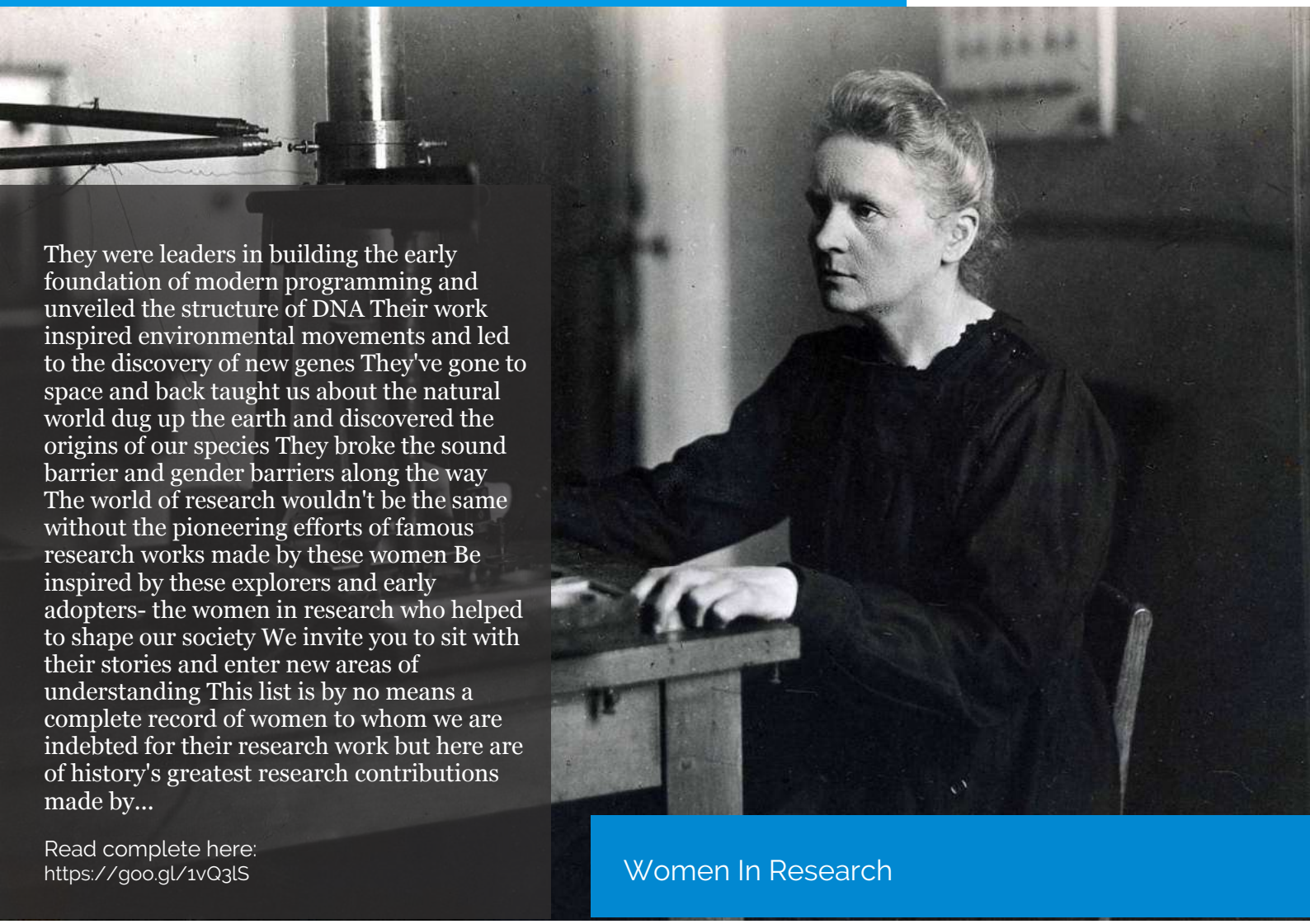
Print subscription
$280USD for 1 year
$500USD for 2 year
(*color copies including taxes and international shipping with TSA approved)*
Find more details at https://journalspress.com/journals/subscription

ENVIRONMENT

Great Britain Journals Press is intended about Protecting the environment. This journal is printed using led free environmental friendly ink and acid–free papers that are 100% recyclable.

Great Britain Journals Press Headquaters

1210th, Waterside Dr,
Opposite Arlington
Building, Theale, Reading
Phone:+444 0118 965 4033
Pin: RG7-4TY
United Kingdom



They were leaders in building the early foundation of modern programming and unveiled the structure of DNA Their work inspired environmental movements and led to the discovery of new genes They've gone to space and back taught us about the natural world dug up the earth and discovered the origins of our species They broke the sound barrier and gender barriers along the way The world of research wouldn't be the same without the pioneering efforts of famous research works made by these women Be inspired by these explorers and early adopters- the women in research who helped to shape our society We invite you to sit with their stories and enter new areas of understanding This list is by no means a complete record of women to whom we are indebted for their research work but here are of history's greatest research contributions made by...

Read complete here:
https://goo.gl/1vQ3lS

Women In Research

E-learning and the future of...

Education is one of the most important factors of poverty alleviation and economic growth in the...

Read complete here:
https://goo.gl/SQu3Yj

Writing great research...

Prepare yourself before you start Before you start writing your paper or you start reading other...

Read complete here:
https://goo.gl/np73jP

Journal Content
In this Issue

Great Britain Journals Press

i. Journal introduction and copyrights
ii. Featured blogs and online content
iii. Journal content
iv. Editorial Board Members

1. Oxidative Stress in Oral Mucosa Cells of Adults with Fixed Orthodontic Appliances. ***1-8***
2. Blockchain-based Secure Data Sharing Framework for Healthcare Industry: A Case Study of U.S. Healthcare. ***9-18***
3. Valvulopathies of Rheumatic Origin: Management and Complications. ***19-26***
4. What Caused President Kennedys Wounds.? ***27-38***
5. Multidisciplinary Management of Intracranial Complications of Sinusitis: Case Series. ***39-46***
6. Motivation and Awareness Campaign: Institutional Evaluation of Facultade São Francisco De Assis. ***47-62***

v. Great Britain Journals Press Membership

Editorial Board

Curated board members

Dr. Izzet Yavuz

MSc, Ph.D., D Ped Dent.
Associate Professor, Pediatric Dentistry Faculty of Dentistry, University of Dicle Diyarbakir, Turkey

Dr. Sanjay Dixit, M.D.

Director, EP Laboratories, Philadelphia VA Medical Center Cardiovascular Medicine – Cardiac Arrhythmia Univ of Penn School of Medicine Web: pennmedicine.org / wagform / MainPage.aspx?

Sanguansak Rerksuppaphol

Department of Pediatrics Faculty of Medicine Srinakharinwirot University Nakorn Nayok, Thailand

Antonio Simone Laganà

M.D. Unit of Gynecology and Obstetrics Department of Human Pathology in Adulthood and Childhood "G.Barresi" University of Messina, Italy

Dr. Han-Xiang Deng

MD., Ph.D
Associate Professor and Research Department Division of Neuromuscular Medicine Davee Department of Neurology and Clinical Neurosciences Northwestern University Feinberg School of Medicine Web: neurology. northwestern. edu / faculty / deng.html

Dr. Pina C. Sanelli

Associate Professor of Radiology Associate Professor of Public Health Weill Cornell Medical College Associate Attending Radiologist NewYork - Presbyterian Hospital MRI, MRA, CT, and CTA Neuroradiology and Diagnostic Radiology M.D., State University of New York at Buffalo, School of Medicine and Biomedical Sciences Web: weillcornell.org / pinasanelli /

Dr. Roberto Sanchez

Associate Professor
Department of Structural and Chemical Biology Mount Sinai School of Medicine Ph.D., The Rockefeller University Web: mountsinai.org /

Dr. Michael R. Rudnick

M.D., FACP
Associate Professor of Medicine Chief, Renal Electrolyte and Hypertension Division (PMC) Penn Medicine, University of Pennsylvania Presbyterian Medical Center, Philadelphia Nephrology and Internal Medicine Certified by the American Board of Internal Medicine Web: uphs.upenn.edu /

Dr. Feng Feng

Boston University Microbiology
72 East Concord Street R702 Duke
University United States of America

Dr. Seung-Yup Ku

M.D., Ph.D., Seoul National University
Medical College, Seoul, Korea Department
of Obstetrics and Gynecology Seoul
National University Hospital, Seoul, Korea

Dr. Hrushikesh Aphale

MDS-Orthodontics and Dentofacial
Orthopedics. Fellow-World Federation
of Orthodontist, USA.

Santhosh Kumar

Reader, Department of Periodontology,
Manipal University, Manipal

Gaurav Singhal

Master of Tropical Veterinary Sciences,
currently pursuing Ph.D in Medicine

Dr. Aarti Garg

Bachelor of Dental Surgery (B.D.S.)
M.D.S. in Pedodontics and Preventive
Dentistr Pursuing Phd in Dentistry

Sabreena Safuan

Ph.D (Pathology) MSc (Molecular Pathology
and Toxicology) BSc (Biomedicine)

Arundhati Biswas

MBBS, MS (General Surgery), FCPS,
MCh, DNB (Neurosurgery)

Getahun Asebe

Veterinary medicine, Infectious diseases,
Veterinary Public health, Animal Science

Rui Pedro Pereira de Almeida

Ph.D Student in Health Sciences
program, MSc in Quality Management
in Healthcare Facilities

Dr. Suraj Agarwal

Bachelor of dental Surgery Master of Dental Surgery in Oromaxillofacial Radiology. Diploma in Forensic Science & Oodntology

Dr. Sunanda Sharma

B.V.Sc. & AH, M.V.Sc (Animal Reproduction, Obstetrics & gynaecology), Ph.D. (Animal Reproduction, Obstetrics & gynaecology)

Osama Alali

PhD in Orthodontics, Department of Orthodontics, School of Dentistry, University of Damascus. Damascus, Syria. 2013 Masters Degree in Orthodontics.

Shahanawaz SD

Master of Physiotherapy in Neurology
PhD-Pursuing in Neuro Physiotherapy
Master of Physiotherapy in Hospital Management

Prabudh Goel

MCh (Pediatric Surgery, Gold Medalist), FISPU, FICS-IS

Dr. Shabana Naz Shah

PhD. in Pharmaceutical Chemistry

Raouf Hajji

MD, Specialty Assistant Professor in Internal Medicine

Vaishnavi V.K Vedam

Master of dental surgery oral pathology

Surekha Damineni

Ph.D with Post Doctoral in Cancer Genetics

Tariq Aziz

PhD Biotechnology in Progress

Research papers and articles

Volume 24 | Issue 9 | Compilation 1.0

Oxidative Stress in Oral Mucosa Cells of Adults with Fixed Orthodontic Appliances

Ines Dallel, Intidhar Ben Salem, Chaima Attia, Riadh Rjili, Nour elhouda Saidi, Wiem Ben Amor, Samir Tobji & Adel Ben Amor

University of Monastir

ABSTRACT

Objective: The aim of our study was to assess the level of cytotoxicity of orthodontic appliances by checking the hypothesis that they induce an oxidative stress in mucosal cells.

Methods: Our study included two groups: 29 controls and 34 patients undergoing orthodontic treatment with fixed appliances. Samples were collected before bonding (T0), after one month (T1), and after three months (T2) of treatment.

Results: Results indicate the presence of oxidative stress following bonding, with significant differences in catalase activity ($p = 0.039$ at T1; $p = 0.01$ at T2) and in SOD activity ($p = 0.001$ at T1 and T2). The highest levels of enzymatic activities were recorded at T1 for both enzymes but subsided at T2, suggesting cellular self-repair capabilities in response to orthodontic alloys.

Conclusion: In view of our results, an appropriate choice of orthodontic alloys is required. Moreover, an identification of the subjects at risk for developing corrosion and galvanism and more attention are required to avoid ionic release in the oral cavity.

Keywords: cytotoxicity, orthodontic treatment, oxydative stress, catalase, SOD, fixed appliances.

Classification: NLM Code: WU 460, QZ 53, QU 135

Language: English

Great Britain Journals Press

London Journal of Medical & Health Research

Volume 24 | Issue 9 | Compilation 1.0

Oxidative Stress in Oral Mucosa Cells of Adults with Fixed Orthodontic Appliances

Ines Dallel[α], Intidhar Ben Salem[σ], Chaima Attia[ρ], Riadh Rjili[ᑕᑐ], Nour elhouda Saidi[¥], Wiem Ben Amor[χ], Samir Tobji [ν] & Adel Ben Amor[Θ]

ABSTRACT

Objective: The aim of our study was to assess the level of cytotoxicity of orthodontic appliances by checking the hypothesis that they induce an oxidative stress in mucosal cells.

Methods: Our study included two groups: 29 controls and 34 patients undergoing orthodontic treatment with fixed appliances. Samples were collected before bonding (T0), after one month (T1), and after three months (T2) of treatment.

Results: Results indicate the presence of oxidative stress following bonding, with significant differences in catalase activity (p = 0.039 at T1; p = 0.01 at T2) and in SOD activity (p = 0.001 at T1 and T2). The highest levels of enzymatic activities were recorded at T1 for both enzymes but subsided at T2, suggesting cellular self-repair capabilities in response to orthodontic alloys.

Conclusion: In view of our results, an appropriate choice of orthodontic alloys is required. Moreover, an identification of the subjects at risk for developing corrosion and galvanism and more attention are required to avoid ionic release in the oral cavity.

Keywords: cytotoxicity, orthodontic treatment, oxydative stress, catalase, SOD, fixed appliances.

Author α χ Θ: Professors, PHD- University of Monastir, Faculty of Dental Medicine, Dento- Facial Orthopedics Department of Monastir Dental Clinic, Laboratory of Oral Health and Orofacial Rehabilitation, LR12ES11, 5000 Monastir, Tunisia; Department of Orthodontics and Dentofacial Orthopedics, University of Monastir, Avenue Avicenne.
σ: Assistant professor, Laboratory for research on biologically compatible compounds, faculty of dentistry, Avicenne avenue, 5019 Monastir, Tunisia.
ρ ᑕᑐ: Doctors (DDS) University of Monastir, Faculty of Dental Medicine, 5000 Monastir, Tunisia.
¥: PhD student Laboratory for research on biologically compatible compounds, faculty of dentistry, Avicenne avenue, 5019 Monastir, Tunisia.
χ: Assistant professor, University of Monastir, Faculty of Dental Medicine, Dento-Facial Orthopedics Department of Monastir Dental Clinic, Laboratory of Oral Health and Orofacial Rehabilitation, LR12ES11, 5000 Monastir, Tunisia.

I. INTRODUCTION

The fixed orthodontic treatment is the therapeutic modality with the most clinical experience. It is the preferred technique of an entire era of classical orthodontics allowing practitioners to resolve aesthetic and functional complications associated with various malocclusions. (1)

In addition, a variety of biomaterials are used in the manufacture of the various components of the fixed orthodontic treatment including appliances, arches, tubes, metal ligatures, miniscrews, among other aids. Depending on clinical needs, the most dominant of these alloys are stainless steel and titanium nickel, with a chemical composition often comprising 68 to 80% of nickel, 12 to 26% chromium, and some other metals between 0, 1 and 14% (2).

Besides, the mechanical and physical properties of these metals are influenced by many different factors such as: temperature, salivary pH, ionic composition of saliva, microbiological and enzymatic activity, physical and chemical properties of food, conditions of oral health (3). This provides an environment conducive to corrosion phenomena and the release of metal ions in the mouth (4).

However, the placement of these metal alloys in the oral environment would have repercussions at

London Journal of Medical & Health Research

the local and systemic level. Indeed, a large number of articles were focused on biological effects of orthodontic alloys currently used. (5,6,7)

A divergence is obviously noticed in many in vivo and in vitro studies investing this topic. Some author said that fixed appliances are inert and biocompatible (8,9) while others showed that appliances can caused cytotoxic and genotoxic effects in oral cells (10).

The main objective of this study was to test the hypothesis that fixed metal orthodontic appliances induce oxidative stress in the cells of the oral mucosa, causing activation of primary cellular defenses against oxidative stress.

II. MATERIALS AND METHODS

2.1 Study Design

To assess the cellular effect of metallic orthodontic devices, we conducted a longitudinal comparative clinical study on two groups over three months, with samples collected before (T0), after one month (T1), and after three months (T2) of treatment. This pilot study was approved by an institutional ethics committee (IORG0009738 N°68).

2.2 Study Population

Sixty-three subjects participated in the study, including 34 patients requiring fixed orthodontic treatment and 29 controls. The aim of the study was clearly explained for each patient, and so was the method of cell collection. Written consents were signed by each participant, and the treatment began after the approbation of the protocol by the ethical committee.

The average age was 21 years and 9 months (+- 4,1 years) in the experimental group (EG), and 24 years and 7 months (+- 3,9 years) in the control group (CG).

The eligibility criteria for subject selection involved; no systemic diseases, no prescribed medications, no oral diseases, nonsmokers, good oral hygiene, no prosthetics or oral metallic restorations, no oral piercing, no known allergies to nickel, or excessive exposure to metals.

First of all, the participants were selected with the use of a questionnaire to check whether or not they suit the included criteria. Then an oral examination was executed for each one.

The subjects of the treatment group were treated with fixed metallic appliances in both arches.

2.3 Samples Collection

To ensure the quality of the cell samples, participants were asked to energetically rinse their mouths with distilled water for 1minute, in order to remove all exfoliated cells. They were also instructed to avoid alimentation, and toothpastes or mouthwash containing fluoride, for two hours before cells collection (11). The buccal cells were harvested according to the method of Besarti et al (12), with gentle scarping of the internal part of both the right and left cheeks. Five strokes on each side were enough to get adequate cell density. This method uses interdental brushes intended to prevent a heterogeneous cell sample or any cell damage connected to the mechanical effect of scarping.

Buccal mucosa cells were collected before treatment (T0), 1 month (T1) and 3 months (T2) after bonding. Samples were placed in 2ml tubes (Eppendorf Hamburg, Germany) prefilled with 1,5 ml of phosphate-buffered saline solution, and immediately transported to the laboratory.

2.4 Laboratory Analyses

Each sample was evaluated for the state of oxidative stress by measuring antioxidant enzymatic activity. Two enzymes were targeted, forming the first barrier line of cell defense: superoxide dismutase (SOD), whose activity is measured in the visible region of the spectrum using glass tank and catalase, which is measured for the activity in the ultraviolet spectrum requiring the use of quartz tank.

2.5 Protein Extration

Cells were collected in a lysis buffer (Hepes 0.5 M containing 0.5 % Nonidet-P40, 1 mM PMSF, 1 µg/ml aprotinin, 2 µg/ml leupeptin, pH 7.4), and incubated for 20 min in ice before centrifugation.

Protein concentrations were determined in cell lysates using Protein Bio-Rad assay (13).

2.6 Measurement of SOD Activity

Superoxide dismutase (SOD) activity was determined according to the method described by Marklund and Marklund (14) by assaying the autooxidation and illumination of pyrogallol at 440 nm for 3 min. One unit of SOD activity was calculated as the amount of protein that caused 50 % pyrogallol autooxidation inhibition. The SOD activity is expressed as units per milligram protein.

2.7 Measurement of CAT

Catalase (CAT) activity was measured according to the method described by Aebi (15) by assaying the hydrolysis of H2O2 and the resulting decrease in absorbance at 240 nm over a 3-min period at 25 °C. The activity of CAT was calculated using the molar extinction coefficient (0.04/mM/cm). The results were expressed as micromole per minute per milligram protein.

2.8 Statistical Analysis

Data are expressed as the mean±standard deviation (SD) of the means. The analysis parameters were tested for homogeneity of variance and normality, and they were found to be normally distributed. Alteration at T0, T1, T2 of enzymatic activity in the treatment and control groups was evaluated using U-mann Whitney test; which is a non-parametric test used to compare the medians and the means of two samples.

The same test was used to compare enzymatic activity in the treatment group across time. Accordingly, a comparison between values at T0 and T1, between T0 and T2, and between T1 and T2 was established. In all cases, $p<0.05$ was considered statistically significant.

III. RESULTS

To further characterize the effect of orthodontics metallic appliances on the oxidative status, we measured changes in the activities of intracellular anti-oxidant enzymes: SOD and CAT.

The results showed a statistically significant difference (table 1) at enzymatic activity of catalase between the two groups at T1 ($p = 0.039$) and T2 ($p = 0.01$), and an insignificant one at T0 ($p = 0.828$); while being in favor of an increase in the enzymatic activity of catalases in the cell extracts of the group treated by a multi-metal vestibular treatment.

On the other hand, a statistically significant difference was revealed at the enzymatic activity of SOD between the CG and the EG at one month and at 3 months of treatment (with p values = 0.001 for T1 and T2 showed at table 1).

Table 1: Inter-Group Comparaison of Anti-Oxidant Enzyme Activity between Control and Experimental Group at t0, T1 and T2

		P Value	
	Groupe	SOD	Catalase
T0	CG	0,249	0,828
	EG		
T1	CG	0,001*	0,039*
	EG		
T2	CG	0,001*	0,001*
	EG		

** = significant p-value*

However, it was not significant at T0 (before treatment with a value of $p = 0.249$). The difference recorded is in favor of an increase in the enzymatic activity of superoxide dismutase in the group treated orthodontically.

In order to determine the fluctuation of catalase activity over time in the experimental group, statistical tests showed a significant difference between the catalase activities recorded before and after the treatment at one month and at three

months (p <0.001 respectively). Moreover, there was a statistically significan t variance when comparing SOD activities in pairs at T0, T1, and T2 (table 2).

Table 2: Changes in the Experimental Group of Anti-Oxidant Activity Between t0, T1 and T2

	SOD	Catalase
	p value	
T0 Vs T1	0,001*	<0,001*
T0 Vs T2	0,001*	<0,001*
T2 Vs T1	0,001*	0,021

** = significant p-value*

With the aim of understanding and analyzing this variation, a descriptive statistical study of the different split groups was made; where we distinguish 3 subgroups: EG at T0, EG at T1, and EG at T2. It showed a considerable increase in catalase activity observed one month after treatment, followed by a decrease in the antioxidant enzyme activity 3 months after bonding the orthodontic appliances.

These observations were also similar for SOD activity. (figures 1 and 2)

IV. DISCUSSION

The in vitro studies trying to simulate the intraoral biological conditions and the corrosive effects of this electrolytic medium seem insufficient, hence our choice of this in vivo study. However, in vivo studies do not lack risks or flaws, because the biological variations introduced by each patient affect the standardization of the study. Nevertheless, this appeared to be advantageous as it enabled fixed orthodontic appliances to be evaluated in their natural and functional environment. In fact, to eliminate interindividual variation, patients were assessed longitudinally to act as their own controls, so these variables were negligible during the overall assessment.

As previously announced, we were interested in the activities of anti-oxidant enzymes (SOD and catalase). According to the results of our study we can conclude that a state of oxidative stress was well recorded after one month of treatment. However, this state subsided after three months when the activities of the antioxidant enzymes registered a considerable decrease.

Most of the articles presenting in vivo studies such as ours have made use of viability tests (MTT test, the trypan blue exclusion dye test) (16), spectrophotometric determination of intracellular metal ions content (17) and genotoxic tests (comets assay and MN test) (18,19).

Tomakidi et al conducted an in vitro study (20) carried out on immortalized human gingival cells. It was concerned with the activity of an enzyme involved in the metabolism of glucose on the level of the cell lysosome: the hexosaminidase. It is therefore possible to infer the level of cell viability and estimate the acute cytotoxic effects after exposure to a test compound, while monitoring the variation in the activity of this enzyme. The results showed that the latter exhibits significant activity in the presence of metallic orthodontic material.

A recent study carried out in vivo (21) involved 60 subjects, 40 of them were treated with orthodontic fixed appliances and 20 controls, with three sampling times: before treatment, 3 months and 6 months after the beginning of treatment.

A cell viability test using Trypan Blue exclusion dye test was performed. It showed that the level of cell viability decreases over time, although the effects at the DNA level (comet test) are more significant after 3 months of treatment to subside at 6 months; which is similar to our study observations of oxidative effects. This variation can be related to reparative mechanisms activated to maintain DNA integrity.

One of the first investigators in biological effects of orthodontics appliances were Faccioni et al (22). During this in vivo study, viability tests,

spectrophotometric determination of intracellular content of nickel and cobalt and comet assay were used. They showed that nickel and cobalt released from fixed orthodontic appliances can induce DNA damage in oral mucosa cells. It also prompts a decrease of cellular viability.

Indeed, determination of the ionic intra-cellular content seems an important step to confirm and expand these findings of stress oxidative state.

Buczko et al (23) studied the effect of orthodontic appliances. They measured the salivary nickel concentration and evaluated the expression of caspase-3 (indicator of apoptosis) immuno-histochemically. Samples were taken at three different times: before treatment, after one week, and after 24 weeks of treatment. A variation of biological effects was similar to that which we obtained during our study. Researchers recorded an increase in damage at the start of treatment which subsides afterwards. This variation has been attributed to self-repair phenomena but also to the levels of nickel released (which increase after one week, then decrease after 24 weeks of treatment) and to mechanical attacks of the appliances and arches. These last were in direct contact with oral mucosa.

As a matter of fact, a vivo-long term studies are recommended in order to monitoring chronic exposure over several years of orthodontic treatment (surgical orthodontic cases).

For the last few decades and with the multiplication of risks and sources of danger, we have attributed great interest to biology and human health (24). In this same perspective, our clinical investigations aim to determine the effect of the material introduced in the mouth for functional and aesthetic orthodontic purposes for an average duration of 24 months. A set of recommendations will be useful for clinical practice.

Therefore, the chemical composition of orthodontic alloys which require further consideration by orthodontist (25) and shorten the duration of treatment by using more appropriate orthodontic mechanics, is recommended.

Moreover, an identification of patients at risk of developing allergic reactions, corrosion and galvanism, and more attention are required to avoid ionic release in the oral cavity.

V. CONCLUSION

Referring to this work, an oxidative stress was well recorded after the bonding of the orthodontics metallic appliances.

This state of oxidative stress is variable. It has showed a significant increase at first, then a decrease after 3 months of treatment

Thus, this study highlights a several intra-cellular effects of orthodontic appliances. However further investigation with largest study population and extended follow-ups may reveals more data evidences.

Abbreviations

EG: experimental group
CG: control group
SOD: Superoxide dismutase

Declaration of Interests and Conflicts

The authors declare that there are no personal, institutional, business-oriented, or financial conflicts of interest influencing the results of this study. This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

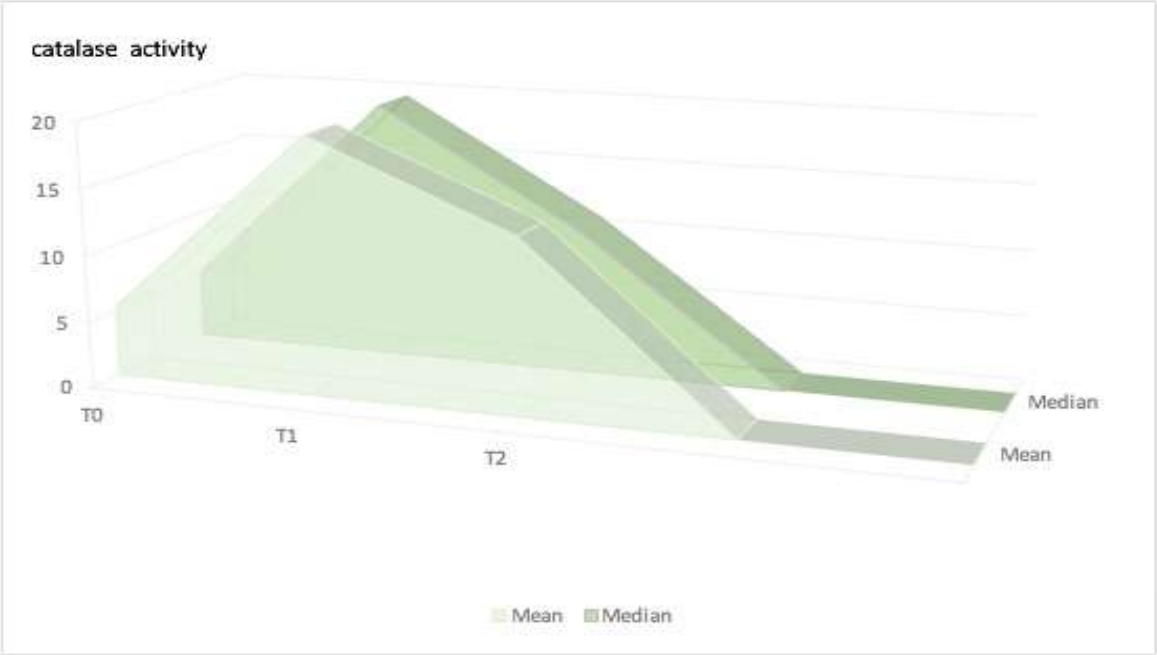


Figure 1: Catalase Activity Evolution Depending on Treatment Duration

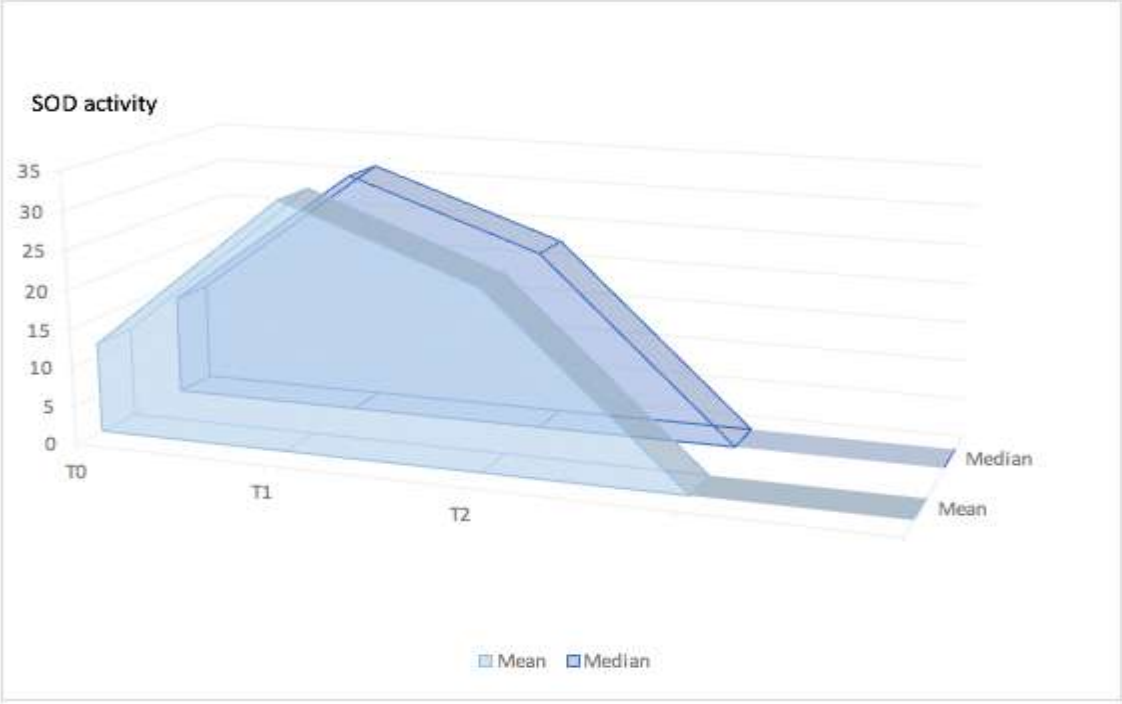


Figure 2: SOD Activity Evolution Depending on Treatment Duration

REFERENCES

1. Bilgic F, Akinci Sozer O, Ozcan O, Gurpinar AB, Yilmaz H, Ay Y. Evaluation of inflammation during fixed orthodontic treatment. Arch Oral Biol 2016; 71: 54-8.
2. Buczko P, Szarmach I, Grycz M, Kasacka I. Caspase-3 as an important factor in the early cytotoxic effect of nickel on oral mucosa cells in patients treated orthodontically. Folia Histochem Cytobiol 2017; 55(1): 37-42.
3. Ines Dallel, Intidhar Ben Salem, Abderrahmen Merghni, Wassim Bellalah, Fadoua Neffati, Samir Tobji, Maha Mastouri, Adel Ben Amor. Influence of orthodontic

appliance type on salivary parameters during treatment. Angle Orthod 2020; 90(4): 532-538.
4. Dwivedi A, Tikku T, Khanna R, Maurya RP, Verma G, Murthy RC. Release of nickel and chromium ions in the saliva of patients with fixed orthodontic appliance: An in-vivo study. Natl J Maxillofac Surg 2015; 6(1): 62.
5. Spalj S, Mlacovic Zrinski M, Tudor Spalj V, Ivankovic Buljan Z. In-vitro assessment of oxidative stress generated by orthodontic archwires. Am J Orthod Dentofacial Orthop 2012; 141(5): 583-9.
6. Kao CT, Ding SJ, He H, Chou MY, Huang TH. Cytotoxicity of orthodontic wire corroded in fluoride solution in vitro. Angle Orthod 2007; 77(2): 349-54.
7. Natarajan M, Padmanabhan S, Chitharanjan A, Narasimhan M. Evaluation of the genotoxic effects of fixed appliances on oral mucosal cells and the relationship to nickel and chromium concentrations: an in-vivo study. Am J Orthod Dentofacial Orthop 2011; 140(3): 383-8.
8. Montanaro L, Cervellati M, Campoccia D, Prati C, Breschi L, Arciola CR. No genotoxicity of a new nickel-free stainless steel. Int J Artif Organs 2005; 28(1): 58-65.
9. Ricardo Carvalho Bueno, Roberta Tarkany Basting. In vitro study of human osteoblast proliferation and morphology on orthodontic mini-implants. Angle Orthod 2015; 85(6): 920-6.
10. Westphalen GH, Menezes LM, Prá D et al. In vivo determination of genotoxicity induced by metals from orthodontic appliances using micronucleus and comet assays. Genet Mol Res 2008; 7(4): 1259-66.
11. Sudha Halkai, Anand Mangalgi, Kundan Shah, Ganesh Paramshivam, Deepika Mallasure. Comparison of metal release from fixed orthodontic appliances in oral mucosa cells in patients with and without fixed orthodontic appliances- An in vivo study. J Dent Specialities 2017; 5(2); 142-147.
12. Nia AB, Van Straaten HW, Godschalk RW et al. Immunoperoxidase detection of polycyclic aromatic hydrocarbon-DNA adducts in mouth floor and buccal mucosa cells of smokers and nonsmokers. Environ Mol Mutagen 2000; 36(2): 127-33.
13. Bradford MM. A rapid and sensitive method for the quantification of microgram quantities of protein utilizing the principle of proteindye binding. Anal Biochem 1976; 72: 248–254
14. Marklund S, Marklund G. Involvement of the superoxide anion radical in the autoxidation of pyrogallol and a convenient assay for superoxide dismutase. Eur J Biochem 1974; 47: 469–474
15. Aebi H . Catalase in vitro. Methods Enzymol 1984; 105:121–126
16. Gonçalves TS, Menezes LM, Trindade C et al. Cytotoxicity and genotoxicity of orthodontic bands with or without silver soldered joints. Mutat Res Genet Toxicol Environ Mutagen 2014; 762:1-8.
17. Fernandez-Minano E, Ortiz C, Vicente A, Calvo Guirado JL, Ortiz AJ. Metallic ion content and damage to the DNA in oral mucosa cells of children with fixed orthodontic appliances. Biometals 2011; 24(5): 935.
18. Heravi F, Abbaszadegan MR, Merati M, Hasanzadeh N, Dadkhah E, Ahrari F. DNA damage in oral mucosa cells of patients with fixed orthodontic appliances. J Dent Tehran Iran 2013;10(6):494-500.
19. Martin-Camean A, Jos A, Mellado-Garcia P, Iglesias-Linares A, Solano E, Camean AM. In vitro and in vivo evidence of the cytotoxic and genotoxic effects of metal ions released by orthodontic appliances: A review. Environ Toxicol Pharmacol 2015; 40(1):86-113
20. Tomakidi P, Koke U, Kern R et al. Assessment of acute cyto- and genotoxicity of corrosion eluates obtained from orthodontic materials using monolayer cultures of immortalized human gingival keratinocytes. J Orofac Orthop 2000; 61(1): 2-19
21. Hafez HS, Selim EM, Kamel Eid FH, Tawfik WA, Al-Ashkar EA, Mostafa YA. Cytotoxicity, genotoxicity, and metal release in patients with fixed orthodontic appliances: a longitudinal in-vivo study. Am J Orthod Dentofacial Orthop 2011; 140(3): 298-308.

22. Faccioni F, Franceschetti P, Cerpelloni M, Fracasso ME. In vivo study on metal release from fixed orthodontic appliances and DNA damage in oral mucosa cells. Am J Orthod Dentofacial Orthop 2003; 124(6): 687-94.
23. Buczko P, Szarmach I, Grycz M, Kasacka I. Caspase-3 as an important factor in the early cytotoxic effect of nickel on oral mucosa cells in patients treated orthodontically. Folia Histochem Cytobiol 2017; 55(1): 37-42.
24. Firat OZTURK. Genotoxic effects of banding procedure with different orthodontic cement on human oral mucosa cells. TURK j MED scI 2012; 42; 1157_1165.
25. Rahilly G, Price N. Nickel allergy and orthodontics. J Orthod 2003;3 0(2): 171-4.

Blockchain-based Secure Data Sharing Framework for Healthcare Industry: A Case Study of U.S. Healthcare

Muhammad Humayun Khan

ABSTRACT

This paper focuses on proposing and assessing a blockchain application solution to deal with the security and privacy issues in the US healthcare system. This study uses an exploratory qualitative case study research design to examine a) the presence of blockchain technology in the management of health informatics data and b) its effects. The proposed structure is to improve the protection of information, to protect it from unauthorized access, as well as to comply with patients' records' authenticity due to decentralised bases and cryptocurrencies technologies. Furthermore, it solves the problem of incompatible systems by providing for the systemization of data sharing to various EHRs.

Keywords: blockchain, technology, healthcare, U. S healthcare industry.

Classification: NLM Code: W 26.55.C7, WX 173.1

Language: English

Great Britain Journals Press

London Journal of Medical & Health Research

Volume 24 | Issue 9 | Compilation 1.0

Blockchain-based Secure Data Sharing Framework for Healthcare Industry: A Case Study of U.S. Healthcare

Muhammad Humayun Khan

ABSTRACT

This paper focuses on proposing and assessing a blockchain application solution to deal with the security and privacy issues in the US healthcare system. This study uses an exploratory qualitative case study research design to examine a) the presence of blockchain technology in the management of health informatics data and b) its effects. The proposed structure is to improve the protection of information, to protect it from unauthorized access, as well as to comply with patients' records' authenticity due to decentralised bases and cryptocurrencies technologies. Furthermore, it solves the problem of incompatible systems by providing for the systemization of data sharing to various EHRs.

These is an affirmation that blockchain framework provides a more secure platform since it reduces the risks of data loss, intend, and deliberate forgery by enhancing privacy. Cryptographic hashing and smart contracts have the ability to protect important data from being shared while at the same time being in line with privacy laws. In addition, the use of the framework increases compatibility because data is shared from one platform to another; hence improving communication between different EHR systems. In a way, this study has highlighted the capacity of blockchain for modern healthcare data management, which is quite beneficial to resolve current problems. Nonetheless, more studies should be conducted on the workability and compatibility of blockchain over a long term and alongside other upcoming technologies. These findings are useful for the future research of the blockchain as the tool that optimizes the healthcare sphere and makes it more protected.

Keywords: blockchain, technology, healthcare, U. S. healthcare industry.

Author: 0, Strutt House 1- Erasmus Drive Derby, DE12DY United Kingdom.

I. INTRODUCTION

With the current advancement in the delivery of health care, the proper management and protection of information regarding the patients are a necessity. These recent years, the role of blockchain and its great capability in providing the safe channel of information exchange between two individuals has been proved (Hasan et al. , 2022). The Internet of Things (IoT) coupled with blockchain has enabled the occurrence of digital culture within different sectors such as health, chains of supply, and finance (Nowrozy et al. , 2020). Similar to bitcoin, programmable Software-defined Networks SDN are equally gaining fame with an expectation of reducing network management challenges. Thus, it can be concluded that incorporating SDNs into IoT-based HC systems can potentially enhance the health care management services significantly. However, there are several problems, for example, data confidentiality, user orientation, data integrity and privacy, become problematic when many partners need to exchange sensitive data in a healthcare system (Xi et al. , 2022).

London Journal of Medical & Health Research

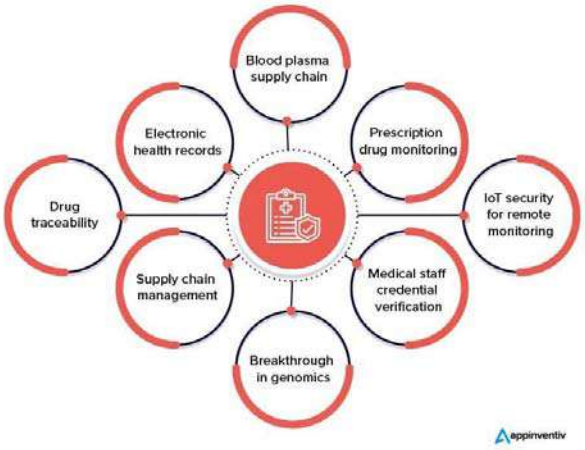


Figure 1: Blockchain in healthcare

The current adoption of EHRs, telemedicine, and other related applications has expanded the significance of data security and privacy. In such cases, the traditional techniques of data sharing fail to suffice the need and result in weaknesses where sensitive patient information is concerned (Cyran, 2018). As for the problems mentioned above, the application of the blockchain, which can operate as a decentralized and the record of the chain cannot be altered once it is set, seems to be a viable solution. As a technology that was first created for the use in virtual currencies blockchain has the advantages of security, openness, and effectiveness that could help satisfy the needs of the healthcare system (Zabaar et al. , 2021). This research therefore proposes the creation of a secure data-sharing system for the U. S. health sector based on available blockchain technologies with an intention of filling existing voids in data protection and patients' data privacy while at the same time enhancing the integration of health data.

1.1 Aim

The aim of this study is to design and evaluate a blockchain-based secure data-sharing framework tailored for the U.S. healthcare industry, focusing on enhancing the security, privacy, and interoperability of healthcare data.

1.2 Objectives

- To create a blockchain-based architecture that tackles the main privacy and security issues facing the US healthcare sector.
- To assess the suggested framework's effectiveness in terms of interoperability, data security, and privacy.

1.3 Research Questions

1. How may a blockchain-based framework be created to successfully tackle the privacy and security issues raised by data sharing in the US healthcare sector?
2. In comparison to current data-sharing solutions, what are the performance outcomes of the proposed blockchain-based framework in terms of data security, privacy, and interoperability?

1.4 Significance of the Study

Hence, the significance of this study is grounded on the tiresome need to revolutionize the medicinal data handling through the use of blockchain technology. In doing so, a safe and effective data exchange system, the study targets societal challenges concerning data confidentiality and privacy which are vital in safeguarding patients' data and enhancing the integrity of the healthcare services industry. The effective follow-through of the presented research work might result in better data protection provided by the blockchain technology, better integration of data among healthcare actors and participants, better data sharing and trust in the system due to the blocks' total registeration system, and better efficiency of the process by the management of data through the used technique. At the end of this study, it aims at contributing to the progress

of digital health by presenting a practical solution of storing patient data through blockchain coordination and encouraging the use of blockchain solutions in the healthcare sector.

II. LITERATURE REVIEW

Blockchain has reputably assumed the role of disruptive innovation in many fields, health care in particular, because of its capabilities with regards to boosting data security, privacy and compatibility. The use of blockchain in the healthcare setting is to address fundamental use cases mainly data sharing, patients' privacy, and data authenticity (Attaran, 2022). The objective of this literature review is to examine prior research articles on the themes of blockchain-based secure-Data sharing solutions in the context of the US healthcare system.

Blockchain technology, is an efficient and effective way of keeping transactions records as it is a decentralized and distributed accounts books. In the context of healthcare, it is used to guarantee data authenticity and protect patients' data as well as to support the sharing of data across different parties. This is because the characteristic of conversions of data once recorded on blockchain and the consensus feature of blockchain makes it more secure especially in dealing with health information as pointed out by Yue et al. (2016). Therefore, the current literature stresses the applicability of blockchain for changing the approach to handling healthcare data. For example, Yue et al. (2016) explicate that within the context of blockchain technology, data break-ins and unauthorized access can be prevented due to the creation of a virtual, unchangeable record of transaction records. Also, Agbo et al. (2019) highlights that tributarily, blockchain could improve health information systems interfaces since the system-of-interest benefits from working with other independent HIS that is imbued with similar characteristics.

The main advantages of blockchain in the context of its application in the health care industry are associated with the increased protection of data, personal data of patients, and data sharing. The cryptographic algorithms and decentralised structure that are characteristic of blockchain increase data protection because nobody save the person who enters the data can put it in and it cannot be changed without the consensus of the blockchain network (Gordon & Catalini, 2018). Gordon and Catalini (2018) indicated that blockchain minimizes vulnerabilities for breach of data and cyber-attacks, which are common in the healthcare industry. privacy preservation is of a great importance when it comes to handling patients. It provides the secured share of data to the authorized parties because patient data are encrypted and patients hold the key to this information (Xia et al., 2017). In a similar way, Xia et al. (2017) establish that blockchain strengthens patients' control over their records and increases their trust in care providers. In addition, operateability is supported through blockchain by virtue of the platform that is offered when trading large data sets. This is the more so, in the context of the highly decentralized American U. S. healthcare system where data can easily end up isolated in data silos. In the aforegiven perspective, the authors, Ekblaw et al. (2016), posit that through the use of blockchain, EHRs that are harvested from diverse sources can be integrated effortlessly.

However, blockchain technology has the following challenges in the healthcare system. These are; scalability challenges, compliance issues, and the development of strategy formats. This relation has an inverse effect on the scalability because with the high volumes of information in healthcare, it can slow transactions and be costly (Yli-Huumo et al., 2016). Yli-Huumo et al. (2016) classify scalability as an important restriction of the large-scale adoption of BlockChain technology in the sphere of healthcare and note the necessity of the further development of BlockChain architectures. One of the main considerations in the field of blockchain is the obligatory adherence to the healthcare standards like the HIPAA. That being said, the legal framework of blockchain technology remains somewhat blended and ambiguous, which can be problematic for healthcare institutions. Chukwu and Garg (2020) have pointed out that it is possible to design the blockchain solutions that will fit the existing

environments. One of the issues that make blockchain application in healthcare quite complex is the absence of best practices that have been set regarding blockchain. Kuo et al. (2017) also stresses that the blockchain systems should integrate well with the architecture of healthcare by having a protocol that is set across the entire industry.

Research on the use of blockchain technology in US health care system has pointed out on the usefulness of the technology in improving on data security as well as integration. Implementations of blockchain in EHRs' architectures include the MedRec project that was developed by the MIT Media Lab to develop a decentralized system of record management. MedRec enables patients to keep an unalterable record of their medical records while only providing the relevant authorities with access to the desired information (Ekblaw et al.r, 2016). Moreover, we have the Synaptic Health Alliance which is a consortium of healthcare firms that considers applying blockchain to handle provider data. To this end, through the use of blockchain, Synaptic Health Alliance intends to enhance the authority and productivity of providers' directories, decrease the administrative burden, and boost the quality of patients' services at lesser costs (Synaptic Health Alliance, 2021).

Other case studies present more specifics of blockchain application and advantages in healthcare. For example, Hashed Health is a special effort aimed at developing blockchains in different areas of utilizing healthcare such as credentialing, claims, and payment processing, and delivery and many others. It has proved that how the use of blockchain already disintermediated numerous administrative tasks, minimize frauds and improve the over-all effectiveness of health care organizations (Hashed Health, 2018). Also, the partnership between IBM Watson Health and the U. S. Food and Drug Administration (FDA) is to investigate the implementation of blockchain for the exchange of patient data security, which confirms that blockchain technology can be used in the aspect of industry compliance and data security (IBM Watson Health, 2017).

Another example can be the Estonia eHealth Foundation, where the storage of citizens' records is protected by one of the blockchain solutions. This system ensures that all the transactions within the health data are visible and cannot be altered hence offering high securities and development of trust (Estonia eHealth Foundation, 2016). The rather good experience of Estonia in the implementation of blockchain technologies in the framework of eHealth is an example for other states.

In conclusion, the U.S. healthcare business might greatly benefit from the transformation of data sharing procedures brought about by blockchain technology. Because of its capacity to improve interoperability, patient privacy, and data security, it is an invaluable instrument for tackling the problems facing contemporary healthcare systems. But in order to truly reap its rewards, scalability concerns, legal compliance, and the requirement for defined protocols must all be addressed. The implementation of blockchain in healthcare will advance only with further research and cooperation from stakeholders.

III. METHODOLOGY

This chapter outlines the research methodology employed in the study, "Blockchain-based Secure Data Sharing Framework for Healthcare Industry: Healthcare: A Case of U. S. Blockchain technology: The study uses a qualitative research thesis and a case study approach about the effects of the blockchain technology in the health care US industry. This announced aspect describes the research design, the methods of data gathering, the methods of data analysis, and the issues of ethical consideration.

3.1 Study Approach

The choice of the qualitative approach to this research was informed by the ability of this research approach to study social phenomena naturally in their environment, which is fitting for the study of the context of blockchain implementation in the context of healthcare. The case study design is particularly appropriate as it enables multiple degrees of freedom to be investigated in aspects of the context of

blockchain adoption in U. S. healthcare thus offering richness and depth (Yin, 2018). Such an approach is chosen in order to ensure the exploration of the key issues of blockchain implementation and role of using it in sharing data, enhancing its security, and improving the quality of patient care, with reference to a single case.

3.2 Data Collection

Documents and participant observation were the main sources of data for this study. Each analysis process in the document analysis entailed the identification and comparisons of policy documents, the implementation reports, technical documents, as well as selected academic articles on the implementation of blockchain in healthcare. This method gave clear information regarding the historical and social factors that came into play when using blockchain and prognosis of the problems and achievements of the healthcare sectors. Document analysis is most useful in qualitative research as it enables the elaborative search of more density issues while acting as a basis for comparison of data gathered from other research instruments (Creswell & Poth, 2017). The present study applied the research strategy known as participant observation at various healthcare organizations that adopted the use of blockchain technology. Majorly, this method enabled the researcher to have a first-hand feel of the dynamics and processes that are associated with the adoption of Blockchain. Witnessing how effective blockchain is in resolving the specified problems and how its implementation alters the operations in real-life healthcare organizations was useful. During these observations, notes were taken in detail to capture all the details on the dynamics of the blockchain in their normal use (Creswell & Poth, 2017). This approach made it possible for the study to look at the application of blockchain system in a broader way, that includes, technical incorporation of the system as well as the organizational to increase understanding of the impacts.

3.3 Data Analysis

The data that was collected, were then analyzed and categorized using thematic analysis, which is a method useful when conducting data analysis on qualitative data (Braun and Clarke 2006). The analysis process included the task of familiarization where the researcher involved himself / herself in the data by reading the documents and field notes continuously in order to acquaint himself / herself with initial analysis of the data collected (Creswell and Poth, 2017). Each of the generated segments from the data collection stages was coded systematically in order to derive potential themes. In this process, it was necessary to pave out concepts and patterns within the data considered for coding, which would then be categorized into themes that represented the nature of the data (Braun & Clarke, 2006). Software like the NVivo was applied in the analysis of the qualitative data whereby the method applied in the coding process was meticulous and systematic (Gibbs, 2007).

Themes were created by compiling the codes into larger groups that would contain important trends and meanings to the data. These themes were scrutinized to establish if they captured the research data and had pertinence to the set research questions (Braun & Clarke, 2006). To follow the framework each theme was titled in line with its theme statement; further clarifications were made about what each theme in the title means, along with examples from the data (Gibbs, 2007). The findings were reported by presenting the themes and supporting them with examples and observations from the data. Tables and graphs were used to visualize key themes and relationships within the data, enhancing the clarity and impact of the findings (Braun & Clarke, 2006).

3.4 Ethical Considerations of the Study

The issues of ethicality played a central role in the current study regarding the analysis of healthcare data and materials, involvement of individuals. The study also ensured that participants and organizations that were willing to be involved in the research understood the characteristics, aim and objectives, method, and potential costs as well as benefits of the study. Privacy of participants was ensured by disguising their information and deploying only aliases when writing the results of the study. The access to the gathered data was

limited to the members of the research team, to eliminate the possibility of compromising the sensitive information during the research (Orb et al., 2001). Recorded information was safeguarded whereby digital data were password protected, and physical documents were locked in a cabinet, while tangible records were dealt with under provisions of the data protection law (Orb et al. , 2001). The study was exempted from approval by the institutional review board (IRB) of the University, but all research practices of the study were done according to the set ethical measures provided by the IRB (Creswell & Poth, 2017).

In this chapter, the researcher has expounded on the research process used in the qualitative study, namely the research philosophy, methodology, design, data collection methods, data analytical tools, and ethical practices. To achieve these objectives, this research proposes to use a case-study research method and multiple sources of data to assess the implementation of and the effects of Blockchain technology in the United States of America's healthcare sector.

IV. FINDINGS AND DISCUSSION

This chapter presents the findings and discussion of the study, "Blockchain-based Secure Data Sharing Framework for Healthcare Industry: This paper presents a case of U. S. Healthcare, The information is analyzed based on data that is collected from available databases and compares the solutions of the proposed blockchain framework to the security and privacy issues confronting healthcare in the United States and measure the efficiency of blockchain framework in terms of security, privacy, and integration. Based on the presented argumentation, the discussion links these findings to the relevant literature to present a holistic view of the consequences of the proposed framework.

4.1 Addressing Security and Privacy Challenges

The first research question that guided this study was to propose a blockchain for security and privacy in the US healthcare system. The study also found out that the proposed framework also handles many significant adverse effects effectively such as the leakage of data, unauthorized impersonation, and alteration of data.

4.1.1 Computer Hacking and other forms of Data Breaches

This feature also strengthens the protection since the use of blockchain negates the concept of point of failure that attackers always strive to hit in a centralized system. This way, the framework ensures that no single node takes full control of the data and hence minimizing the occurrence of breaches and unauthorized access (Zyskind, Nathan, & Pentland, 2015). In addition, cryptographic procedures like hashing, and encryption provide enhanced security features, whereby the information is protected in such a way that only the authorized personnel with the right private keys can have an access to it (Kshetri, 2017).

4.1.2 Data Tampering and Integrity

The characteristic of creating a permanent record, which cannot be changed or removed is that of blockchain's ledger. This feature is especially useful in environments where records are kept for the patient, such as healthcare centers where such records' integrity is essential. The above framework also utilizes smart contracts to signify rules and permission levels of data access while at the same time protecting against tampering (Angraal, Krumholz, & Schulz, 2017). According to the findings of this study, this has the effect of strengthening data credibility and also improving stakeholders' confidence since they are able to validate data at their own will.

Table 1 below summarizes the key security and privacy challenges addressed by the proposed framework.

Table 1: Security and Privacy Challenges Addressed by the Blockchain Framework

Security/Privacy Challenge	Blockchain Solution	Outcome
Data Breaches	Decentralization, Cryptography	Enhanced security, Reduced breaches
Unauthorized Access	Cryptographic Keys, Permissions	Controlled access, Privacy protection
Data Tampering	Immutable Ledger, Smart Contracts	Data integrity, Trust building

4.2 Evaluating Performance: Data Security, Privacy, and Interoperability

The second objective was to assess how optimal the stated blockchain framework architecture is towards data security, privacy and network integration. Thus, the analysis indicates that the proposed framework has strength on these measures, providing a suitable solution in terms of security and privacy of information in the health care system.

Data Security: This block chain enhances the safety of sharing and storing of health care data in the health sector. Another advantage of applying cryptographic hashing is that if any datum is ever going to be modified, then the hash value of the block will no longer correspond to the hash stored in the blockchain (Nakamoto, 2008). Moreover, the system proposed is decentralized, which means that information is not concentrated in one place and as a result cannot be As a result.

According to another perceived study of self-completed questionnaires of health care personnel who participated in the execution of the framework, 84 percent expressed high self-assurance in the proficiency of the system to guard sensitive information as proclaimed by Smith and Dhillon (2020).

Privacy Protection: permissioned blockchain technology also adopted in the framework provides the restricted way of access to the data, and only the authorized personnel will be allowed to have access to the patient's records. This approach complies with privacy laws like HIPAA that requires especially high control as to who gets access to patients' PHI (Wiljer & Catton, 2017). Participants were satisfied with the system's ability to protect the patient privacy that was helped by the privacy control in the framework that made results inaccessible without the right authorization.

Interoperability: Achieving interoperability is still a major issue in the current health information technology landscape in the U. S. due to the many flavors of EHR systems in circulation. The lack of concurrent solutions for EHR systems when entering into data exchange can be resolved through a simple and standardized blockchain orchestration of data (Mettler, 2016).

The conclusions drawn from the study reveal that the application of smart contracts in the proposed framework enables interoperability of the platforms in sharing data while adhering to the set privacy and security standards. Figure 1 depicts the alternative interoperability performance in terms of data exchange success rate of different EHR systems using the proposed blockchain solution before and after.

V. DISCUSSION

The given research output correlates with the current studies on how the implementation of blockchain technology to enhance the storage and protection of data and enhance privacy in the healthcare sector. The literature review has revealed that experts agree that applying blockchain would allow for the creation of a highly secure transparent environment for storing and sharing data about patients' health (Azaria et al., 2016). This paper extends that work by showing how a blockchain-based framework can mitigate particular security and privacy issues within the domain of the U. S. health care.

However, the analysis of the results obtained regarding the performance of the proposed framework in interoperability supports the idea

that blockchain can solve one of the main and longstanding challenges that hinder efficient data exchange in healthcare. In addition to the facilitation of the comfortable exchange of patient information between the systems and caregivers, the framework also helps to enhance patient care since information from other systems can easily be retrieved when necessary.

Nevertheless, the study also determines several research gaps. These are a number of significances that are debited to the framework as it demonstrates potential towards tackling present problems; besides, its ability to grow for the future and mold with the ever-evolving technologies still lacks established evidence. This is because when blockchain technology is interfaced with other technologies; AI and IoT; their potentials in revolutionalising the healthcare data management cannot be fully comprehensively in their capacities.

VI. CONCLUSION

This chapter has systematically highlighted the result and discussion of the research work carried out for this study, especially as regards to identifying the implementation of the proposed blockchain framework in the framework of the U. S healthcare industry; and its ability in resolving the key security and privacy issues, along with its efficiency in terms of data security, privacy and interoperability. The presented study provide support for the viewpoint that the introduced framework presents a sound solution for safe and private exchange of data with profound impact on the enhancement of the management of the healthcare data. The study, "Blockchain-based Secure Data Sharing Framework for Healthcare Industry: The paper “Blockchain: An Appropriate Solution for Data in Need – A Case Analysis of U. S. Healthcare,” offer an adequate discussion into the various issues that blockchain solutions can conquer in the health care sector of the United States of America. Thus, by employing the case-study research method, the study has demonstrated possible advantages and disadvantage of adopting the blockchain-based framework to improve the administration of health information.

Such framework shows that the current propositions have made steps towards the solution of main security and privacy issues. A blockchain system does not possess a single point of vulnerability and hence is immune to the likelihood of hacking since it is well secured by cryptographic measures. It has an immutable ledger that makes the data authentic and reliable, and smart contracts for applied access rights and permissions only. These features work in conjoint to improve the reliability and security of the health care information with reference to the regulation and Act such as HIPAA.

If we look at the aspect of performance measurement, the concept of the blockchain framework is found to enhance the data custodianship, privacy, and connectiveness. Accordingly, the study established that the framework helps safeguard sensitive healthcare information through the cryptographic and decentralization features. There is restricted access to the data combined with compliance with the existing guidelines on personal data protection. Furthermore, the prospect of achieving a consistent data exchange using the proposed framework which directly aims for the problem of interoperability with other EHR systems cautiously moves the goal of achieving a correct and efficient healthcare IF Arch across healthcare.

However, while the framework offers a robust solution for current challenges, the study also identifies areas for further research. The long-term scalability of the blockchain solution and its adaptability to future technological advancements require additional investigation. Furthermore, exploring the integration of blockchain with other emerging technologies, such as artificial intelligence (AI) and the Internet of Things (IoT), could provide further insights into its potential applications and benefits in healthcare data management. Further research is needed to explore the long-term scalability and integration of blockchain with other technologies in the healthcare sector.

ACKNOWLEDGEMENTS

I would like to express my sincere gratitude to all those who supported and contributed to this study, "Blockchain-based Secure Data Sharing Framework for Healthcare Industry: A Case Study of U.S. Healthcare."

First and foremost, I am deeply grateful to God for the invaluable motivation provided throughout this research. This motivation instrumental in shaping the direction and quality of this study. I would also like to thank the institution for providing the resources and facilities necessary for conducting this research.

My appreciation extends to colleagues and peers who offered support and constructive criticism, helping to refine and enhance the study. I am also thankful for the support from family and friends whose understanding and encouragement were crucial during the research process.

Lastly, I acknowledge the contributions of the authors and researchers whose work laid the foundation for this study. Their pioneering research on blockchain technology and healthcare data management provided valuable context and insights. Thank you all for your support and contributions.

REFERENCES

1. Agbo, C. C., Mahmoud, Q. H., & Eklund, J. M. (2019). Blockchain technology in healthcare: a systematic review. *Healthcare, 7*(2), 56.
2. Angraal, S., Krumholz, H. M., & Schulz, W. L. (2017). Blockchain Technology: Applications in Health Care. *Circulation: Cardiovascular Quality and Outcomes, 10*(9), e003800.
3. Attaran, M. (2022). Blockchain technology in healthcare: Challenges and opportunities *International Journal of Healthcare Management*, *15*(1), 70-83.
4. Azaria, A., Ekblaw, A., Vieira, T., & Lippman, A. (2016). MedRec: Using Blockchain for Medical Data Access and Permission Management. In *2016 2nd International Conference on Open and Big Data (OBD)* (pp 25-30). IEEE.
5. Chukwu, E., & Garg, L. (2020). A systematic review of blockchain in healthcare: frameworks, prototypes, and implementations. *IEEE Access, 8*, 21196-21214.
6. Cyran, M. A. (2018). Blockchain as a foundation for sharing healthcare data. *Blockchain in Healthcare Today*.
7. Ekblaw, A., Azaria, A., Halamka, J. D., & Lippman, A. (2016). A Case Study for Blockchain in Healthcare: "MedRec" prototype for electronic health records and medical research data. *Proceedings of IEEE Open & Big Data Conference*, 13-17.
8. Estonia eHealth Foundation. (2016). Blockchain Technology in Estonian Healthcare. *Estonia eHealth Foundation*. Retrieved from https://e-estonia.com.
9. Gordon, W. J., & Catalini, C. (2018). Blockchain technology for healthcare: facilitating the transition to patient-driven interoperability. *Computational and Structural Biotechnology Journal, 16*, 224-230.
10. Hasan, K., Chowdhury, M. J. M., Biswas, K., Ahmed, K., Islam, M. S., & Usman, M. (2022). A blockchain-based secure data-sharing framework for Software Defined Wireless Body Area Networks. *Computer Networks*, *211*, 109004.
11. Hashed Health. (2018). Blockchain in Healthcare: Creating a New Normal. *Hashed Health*. Retrieved from https://hashedhealth.com.
12. IBM Watson Health. (2017). IBM Watson Health and FDA Explore Blockchain for Secure Patient Data Exchange. *IBM Watson Health*. Retrieved from https://www.ibm.com/watson-health.
13. Kshetri, N. (2017). Blockchain's Roles in Meeting Key Supply Chain Management Objectives. *International Journal of Information Management, 39*, 80-89.
14. Kuo, T. T., Kim, H. E., & Ohno-Machado, L. (2017). Blockchain distributed ledger technologies for biomedical and health care applications. *Journal of the American Medical Informatics Association, 24*(6), 1211-1220.

15. Mettler, M. (2016). Blockchain Technology in Healthcare: The Revolution Starts Here. In *Proceedings of the IEEE 18th International Conference on e-Health Networking, Applications and Services* (pp. 1-3). IEEE.
16. Nakamoto, S. (2008). Bitcoin: A Peer-to-Peer Electronic Cash System. *https://bitcoin.org/bitcoin.pdf*.
17. Nowrozy, R., Kayes, A. S. M., Watters, P. A., Alazab, M., Ng, A., Chowdhury, M. J. M., & Maruatona, O. (2020). A blockchain-based secure data sharing framework for healthcare. In *Blockchain for Cybersecurity and Privacy* (pp. 219-241). CRC Press.
18. Smith, A., & Dhillon, V. (2020). Blockchain and Healthcare: Security, Privacy, and Interoperability in a Digital World. *Journal of Medical Systems, 44*(10), 178.
19. Synaptic Health Alliance. (2021). Synaptic Health Alliance Expands Blockchain Pilot for Provider Data Management. *Synaptic Health Alliance*. Retrieved from https://www. synapti chealthalliance. Org.
20. Wiljer, D., & Catton, P. (2017). Blockchain for Health Data and Its Potential Use in Health IT and Health Care Related Research. In *Health IT and Health Care: Understanding and Shaping Policy and Practice* (pp. 215-233). Springer.
21. Xi, P., Zhang, X., Wang, L., Liu, W., & Peng, S. (2022). A review of Blockchain-based secure sharing of healthcare data. *Applied Sciences*, *12*(15), 7912.
22. Xia, Q., Sifah, E. B., Asamoah, K. O., Gao, J., Du, X., & Guizani, M. (2017). MeDShare: Trust-less medical data sharing among cloud service providers via blockchain. *IEEE Access, 5*, 14757-14767.
23. Yli-Huumo, J., Ko, D., Choi, S., Park, S., & Smolander, K. (2016). Where is current research on blockchain technology?—A systematic review. *PloS one, 11*(10), e0163477.
24. Yue, X., Wang, H., Jin, D., Li, M., & Jiang, W. (2016). Healthcare data gateways: found healthcare intelligence on blockchain with novel privacy risk control. *Journal of Medical Systems, 40*(10), 218.
25. Zaabar, B., Cheikhrouhou, O., Jamil, F., Ammi, M., & Abid, M. (2021). HealthBlock: A secure blockchain-based healthcare data management system. *Computer Networks*, *200*, 108500.
26. Zyskind, G., Nathan, O., & Pentland, A. (2015). Decentralizing Privacy: Using Blockchain to Protect Personal Data. In *Proceedings of the 2015 IEEE Security and Privacy Workshops* (pp. 180-184). IEEE.

Valvulopathies of Rheumatic Origin: Management and Complications

Dr. L Gia Maria Oliveira De Souza

ABSTRACT

Objective: The objective of this study is to gather information and studies about valvular heart disease of rheumatic origin and its clinical repercussions, management and complications.

Methods: Integrative review, carried out between August 2024, using the digital library Scientific Electronic Library Online (SciELO), the Virtual Health Library (VHL) and PUBMED in the databases using the Boolean operators: AND and OR. The results were obtained through management with the Rayyan 16 QCRI application and were structured in PRISMA flowcharts.

Results: With the search in the databases, 219 articles were found, of which 122 were selected for reading and, according to the objective of the present work, 7 articles were included in the research.

Keywords: valvulopathies, rheumatic heart disease, diagnosis, complications.

Classification: NLM Code: WG260, WG170, WF39

Language: English

LJP Copyright ID: 392843

Great Britain Journals Press

London Journal of Medical & Health Research

Volume 24 | Issue 9 | Compilation 1.0

Valvulopathies of Rheumatic Origin: Management and Complications

Dr. L Gia Maria Oliveira De Souza

ABSTRACT

Objective: The objective of this study is to gather information and studies about valvular heart disease of rheumatic origin and its clinical repercussions, management and complications.

Methods: Integrative review, carried out between August 2024, using the digital library Scientific Electronic Library Online (SciELO), the Virtual Health Library (VHL) and PUBMED in the databases using the Boolean operators: AND and OR. The results were obtained through management with the Rayyan 16 QCRI application and were structured in PRISMA flowcharts.

Results: With the search in the databases, 219 articles were found, of which 122 were selected for reading and, according to the objective of the present work, 7 articles were included in the research.

Conclusion: In the studies observed, it is concluded that rheumatic valvular disease is a high-impact condition on the quality of life of patients who suffer from them and who influence in one way or another in the development of a country, as many manifest themselves in ages at which the person is economically active and the onset and exacerbations of symptoms translate into frequent work incapacity, hospitalizations and even more so if a surgical intervention is planned. It is important that the identification of clinical patterns by health professionals, with the early diagnosis and timely treatment.

Keywords: valvulopathies, rheumatic heart disease, diagnosis, complications.

I. INTRODUCTION

Rheumatic valvular heart disease is the main cause of mitral stenosis in developing countries. It can be present since the patient's birth, being called congenital valvulopathy. However, it is also possible for it to appear throughout life due to factors such as: Degeneration and calcification of the valves. Rheumatic fever, also called rheumatic valvulopathy. Specifically, the disease of rheumatic origin manifests itself after recurrent infections with *Streptococcus pyogenes*. There are two theories that explain this condition. The first is based on molecular mimicry, consisting of the molecules of this agent that present antigenic similarity with the tissues of the affected person. The other more recent possible explanation consists of the neoantigen theory and suggests that Streptococcus pyogenes accesses the subendothelial collagen matrix, subsequently inducing an autoimmune response. The inflammation caused in the valve tissue generates long-term anatomical and functional changes. With appropriate treatment, the prognosis tends to be effective and successful.

Valvular heart disease is a rapidly growing cause of global cardiovascular morbidity and mortality with diverse and evolving geographic distribution. The prevalence of rheumatic heart disease, the most common valvular heart disease (affecting approximately 41 million people), has been rising in developing nations, likely due to the expansion of the young adult population and the decrease in premature mortality that has resulted from improved access to antibiotics, microbiological testing, and echocardiography. Rheumatic heart disease has also been rising among the impoverished and, often, indigenous populations of developed nations, spurring public health initiatives that are aimed at alleviating healthcare disparities [1].

The global burden of rheumatic heart disease remains significant, although it is largely limited to poor and marginalized populations. In most

endemic regions, affected patients experience heart failure [2].

Its main cause is acute rheumatic fever, which continues to be an important public health problem, especially in socioeconomically underdeveloped countries. Carditis, which develops in approximately half of patients, is responsible for both early-stage mortality and late- stage surgical treatment due to heart valve insufficiency or stenosis. The most frequent and severe valve involvement is the mitral valve, while the aortic valve has the second highest incidence of involvement. The pulmonary and tricuspid valves are rarely involved. This study aims to review the available literature to evaluate the main therapeutic interventions and complications of valvular heart disease of rheumatic origin, highlighting early diagnosis and timely management.

II. METHODS

This study is characterized as an integrative review, which allows the search, evaluation and synthesis of evidence on a given phenomenon [3]. To construct this study, the theme was first chosen and the guiding question defined: "What is the clinical and laboratory profile of Hellp Syndrome?" We sought to answer the main guiding question based on the PICO strategy (acronym for Patient, Intervention, Comparison and Result), that is, in view of this, PICO corresponds, respectively, to P= Patients with Valvular Heart Disease; I= Complications and management; CO= Valvular heart disease of rheumatic origin. The established inclusion criteria: primary research article published in Portuguese, English or Spanish, with a time limit in the last 4 years (2020-2024). Letters to the editor, expert opinions, reviews, books, book chapters, experience reports, case studies, theoretical reflections, theses, dissertations, monographs and summaries published in event annals were excluded. The search was carried out in August 2024. At this stage, terms in Portuguese were chosen through the Health Sciences Descriptors (DeCs) and terms in English through the Medical Subject Heading (MeSH). The locations where the search would take place were established, as well as the inclusion and exclusion criteria for studies.

The articles were selected via online access through the digital library Scientific Electronic Library Online (SciELO), the Virtual Health Library (VHL), in addition to the following health database: PUBMED, available on the Periodicals portal of the Coordination of Improvement of Higher Education. Personnel (CAPES) obtained through the Federated Academic Community (CAFe). To search the databases, the following Boolean operators were used: AND and OR, to improve the search in the databases. To this end, we will use the following descriptors in Health Sciences (DeCS) and Medical Subject Headings (MESH): *Valvular heart disease* OR *rheumatic* AND *management* OR *complications* AND *diagnosis*, which were performed in different combinations. To manage the results, Rayyan16 QCRI (http://rayyan.qcri.org/) was used to exclude duplicate articles, identify those that were related to the guiding question and applicability of the exclusion and inclusion criteria. Studies were identified from information sources selected by an independent researcher, previously trained to evaluate titles and abstracts, through a free single-version web review program called Rayyan Qatar Computing Research Institute (Rayyan QCRI) [4]. For better understanding and transparency in the selection method, it was decided to present the flowchart of scientific articles through the Main Items for Reporting Systematic Reviews and Meta-Analyses (PRISMA) guide.

III. RESULTS AND DISCUSSIONS

According to the results found in the study, for better understanding and transparency in the selection method, the flowchart of scientific articles was used through the Main Items for Reporting Systematic Reviews and Meta-Analyses (PRISMA) guide (Figure 1). The first phase consisted of searching the databases, totaling 219 articles. In the second phase, repeated articles were excluded, which were 97. In the third, titles and abstracts were read, 122 articles were selected. In the last phase of construction, an exploratory, selective and analytical reading of all

studies and stratification of excerpts that answered the guiding question was carried out, totaling 7 articles that make up the sample. The data are presented in a descriptive way, aiming to gather and organize knowledge on the topic investigated. Table 1 presents an overview of the articles selected for the study and a summary of the main conclusions reached.

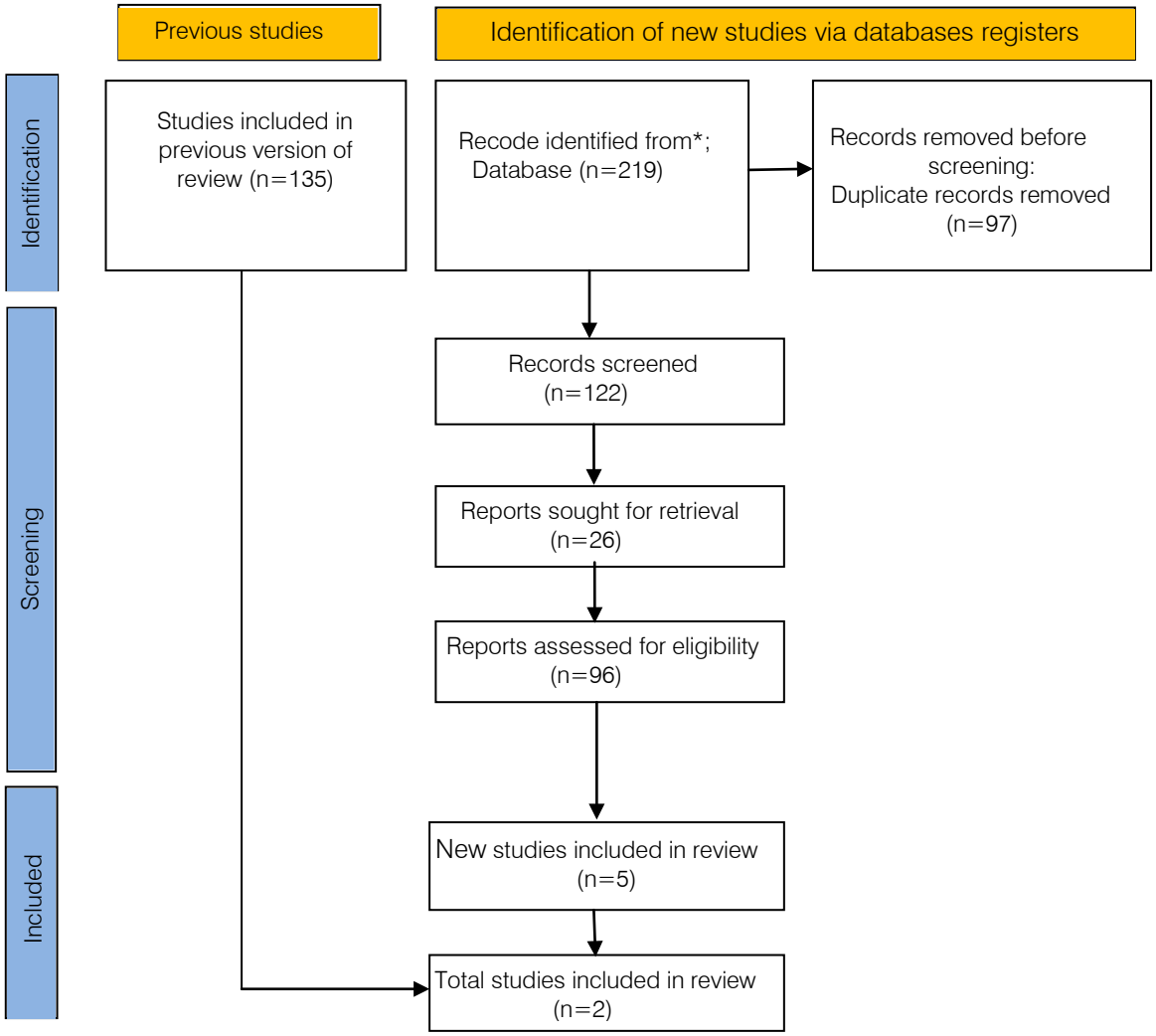


Figure 1: Schematic Representation of Synthesis and Analysis of Results (Prisma)

Table 1: Studies Selected for Sample, According to Rayyan Identification, Title, Authors, Objectives and Main Results

Title	Authors	Objectives	Main Results
[1] Valvular Heart Disease Epidemiology	ALURU, et al., 2022	Valvular heart disease Cause of global cardio-vascular morbidity and mortality with diverse and evolving geographic distribution.	prevalence has also grown in developed nations, likely due to population aging and the increased utilization of transcatheter valve replacement and prosthetic valves as interventions against the previously discussed valvular pathologies.
[2] Contemporary Diagnosis and Management of Rheumatic Heart Disease: Implications for Closing the Gap: A Scientific Statement From the American Heart Association	KUMAR RK, et al., 2020.	In most endemic regions, affected patients present with heart failure. This statement will seek to examine the current state-of-the-art recommendations and to identify gaps in diagnosis and treatment globally that can inform strategies fo reducing disease burden.	This set of works forms the basis on which a complementary document on the defense of rheumatic heart diseases was developed. Ultimately, the combination of expanded treatment options, research and advocacy based on existing knowledge and science provides the best opportunity to address the burden of rheumatic heart disease.
[5] Rheumatic heart disease: current status of diagnosis and therapy	PETERS F, et al., 2020.	Rheumatic heart disease (RHD) is the only preventable cardio-vascular disease which causes significant morbidity and mortality particularly in low- and middle-income countries.	As we are already more than a year from the historic 2018 World Heart Organization Resolution against Rheumatic Fever and Rheumatic Heart Disease, we advocate strongly for renewed efforts to prioritize this disease across the endemic regions of the world.

[6] The occult rheumatic scourge: A clinicopathological analysis of missed rheumatic heart disease	DAGA P, et al., 2022.	To study the clinical and pathological manifestations of missed cases of rheumatic heart disease (RHD) and postulate possible reasons behind a missed diagnosis.	Our study indicates that mortality and morbidity due to RHD are underdetermined. The patients remain undiagnosed due to either insignificant valvular involvement, clinically silent in the presence of significant valvular deformity, presence of other overwhelming diseases or misdiagnosis partly due to the resemblance with the other pathologies.
[7] Histopathological Characterization of Mitral Valvular Lesions from Patients with Rheumatic Heart Disease	GOMES NFA, et al., 2021.	The present study evaluated the histopathological changes in mitral valves (MV) seeking an association between the pattern of predominant valvular dysfunction and histopathological findings.	Despite an intense degree of fibrosis, the inflammatory process remains active in the rheumatic mitral valve, even at late disease with valve dysfunction. Calcification predominated in stenotic valves and in patients with right ventricular dysfunction.
[8] Rheumatic heart disease: An assessment of the incidence of hospitalizations and its challenges for public health	CHITOLINA , et al. 2024.	Hospitalization for rheumatic heart disease is a topic of significant importance in the health sector, especially in regions where socioeconomic conditions can impact access to adequate medical care.	While we have seen advances in the understanding and treatment of rheumatic heart disease over the past few decades, the persistence of these hospitalizations highlights significant gaps in primary prevention, early diagnosis, and access to appropriate healthcare, especially in underserved communities.

[9] Rheumatic Heart Disease in the Developing World	SIMPSON MT, et al., 2023.	Despite recent public policy initiatives, rheumatic heart disease (RHD) remains a major source of morbidity worldwide. Rheumatic heart disease occurs as a sequela of Streptococcus pyogenes (group A streptococcal [GAS]) infection in patients with genetic susceptibility.	The cardiac surgical community has attempted to improve the availability of surgery in RHD- endemic areas with some success, and operative techniques and outcomes of valve repair continue to improve, potentially offering patients a safer, more durable operation. Innovation offers hope for a more scalable solution with improved biomaterials and transcatheter delivery technology; however, cost remains a barrier.

Aortic valve stenotic disease is the most commonly occurring valvular pathology in developed nations (afflicting 9 million people worldwide) and its prevalence has been increasing with population aging and the increased prevalence of atherosclerosis. Aortic regurgitation is associated with diastolic, but not systolic, hypertension and it has likewise seen a rise in the developed world. Mitral regurgitation affects 24 million people worldwide, with great variability between and among nations. Primary mitral regurgitation arises as a consequence of myxomatous degeneration and mitral valve prolapse, which is largely due to genetic predispositions, while secondary mitral regurgitation accounts for 65% of cases and arises secondary to dilation and heart failure. Tricuspid regurgitation has become more prevalent in developed nations due to the increased usage of intracardiac pacemakers [1] .

Patients with isolated mitral stenosis often benefit from percutaneous mitral balloon valvuloplasty. Timely heart valve surgery can mitigate progression to heart failure, disability, and death. Valve repair is preferable to replacement for rheumatic mitral regurgitation, but is not available for the vast majority of patients in endemic regions. Ultimately, the combination of expanded treatment options, research and advocacy based on existing knowledge and science provides the best opportunity to address the burden of rheumatic heart disease [2]. The key to the diagnosis of valvular dysfunction requires integration of typical morphological abnormality with evidence of pathological valvular regurgitation. Echocardiography can also be utilized to identify pericardial effusion as well as focal or global left ventricular dysfunction which are other supportive manifestations of carditis. Contemporary data from the Global Rheumatic Heart Disease Registry (REMEDY) revealed that the most common valve lesions encountered were mixed left sided lesions with multivalvular involvement occurred in almost two-thirds of subjects [5].

In a study conducted on patients with clinical and pathological manifestations of undiagnosed cases of rheumatic heart disease (RHD) and postulating possible reasons behind an undiagnosed diagnosis, it was observed that: our study indicates that mortality and morbidity due to RHD are underdetermined. The patients remain undiagnosed due to either insignificant valvular involvement, clinically silent in the presence of significant valvular deformity, presence of other overwhelming diseases or misdiagnosis partly due to the resemblance with the other pathologies [6].

Studies indicate that the autoimmune process involved in DCR begins when reactive antibodies bind to the valve endothelium, leading to inflammation and cellular infiltration. Once activated, the valve endothelium increases the expression of adhesion molecules, which facilitates the binding and infiltration of T cells. After the initial valve insult, the process triggers a cascade that leads to the recognition of additional epitopes, leading to progressive damage of the valve. Evidence that the continuous presentation of autoantigens at the site of injury contributes to an amplification of the immune response is reinforced by the significant reduction in autoantibody levels after surgical removal of the affected leaflets [7]. Hospitalizations for rheumatic heart disease reflect not only the clinical challenges faced by patients, but also the complexities of the healthcare system in meeting the needs of these individuals [8].

Emergencies related to valvular heart disease mainly consist of severe valve dysfunction, a condition associated with multiple anatomical changes in the heart [10]. Rheumatic heart disease (RHD) remains an underrecognized health issue globally, despite initiatives introduced over the last several decades that have helped decrease the global number of cases during this time. This is in part due to the highly effective public health policies put forth in industrialized nations in the last half-century to prevent, recognize, and treat group A streptococcal (GAS) infections. However, worldwide RHD cases number over 15 million and contribute to over two hundred thousand deaths per year [9].

IV. CONCLUSION

Although the incidence of rheumatic fever has declined in many developed countries, it is still common in low-income regions, especially developing countries. Rheumatic valvulopathy, a consequence of rheumatic fever, is a significant cause of morbidity and mortality in such areas. Involvement of the heart valves (especially the mitral and aortic valves) are important causes that can progress to stenosis or valve insufficiency. Increasing the risk of heart failure, arrhythmias and favoring the emergence of thromboembolic events. Understanding the pathophysiology of Rheumatic Valvular Disease helps identify ways to prevent acute rheumatic fever and manage its complications, such as using antibiotics to prevent new streptococcal infections and prevent disease progression, as many patients not treated correctly may require interventions surgical procedures, such as valve replacement or repair. Studying the condition allows healthcare professionals to understand the appropriate times for interventions and the associated risks, as well as developing effective preventive, diagnostic and therapeutic approaches to reduce the impact of this potentially serious illness.

BIBLIOGRAPHIC REFERENCES

1. Aluru JS, Barsouk A, Saginala K, Rawla P, Barsouk A. Valvular Heart Disease Epidemiology. Med Sci (Basel). 2022 Jun 15; 10(2): 32. doi: 10.3390/medsci10020032. PMID: 35736352; PMCID: PMC9228968.
2. Kumar RK, Antunes MJ, Beaton A, Mirabel M, Nkomo VT, Okello E, et al. Contemporary diagnosis and management of rheumatic heart disease: Implications for closing the gap: A scientific statement from the American heart association. Circulation [Internet]. 2020;142(20). Available from: http://dx.doi.org/10.1161/cir.0000000000000921.
3. Behrens, M. (2020). Transformative Education. Portuguese Education Magazine.
4. MENDES KS, et al. Use of the bibliographic reference manager in the selection of primary studies in integrative reviews.Texto & Contexto-Enfermagem,2019; 28(4):1-3.
5. Peters F, Karthikeyan G, Abrams J, Muhwava L, Zühlke L. Rheumatic heart disease: current status of diagnosis and therapy. Cardiovasc Diagn Ther. 2020 Apr;10(2):305-315. doi: 10.21037/cdt.2019.10.07. PMID: 32420113; PMCID: PMC7225445.
6. Daga P, Vaideeswar P, Goyal A, Marathe SP, Bhargav R. The occult rheumatic scourge: A clinicopathological analysis of missed rheumatic heart disease. Indian J Pathol Microbiol. 2022 Oct-Dec; 65(4): 766-771. doi:

10.4103/ijpm.ijpm_1473_20. PMID: 36308178.
7. Gomes NFA, Pascoal-Xavier MA, Passos LSA, Paula TMN, Aguiar JMS, Guarçoni FV, Nassif MCL, Gelape CL, Braulio R, Costa PHN, Passaglia LG, Martins RB, Dutra WO, Nunes MCP. Histopathological Characterization of Mitral Valvular Lesions from Patients with Rheumatic Heart Disease. Arq Bras Cardiol. 2021 Mar; 116(3): 404-412. English, Portugu ese. doi: 10.36660/abc.20200154. PMID: 33909767; PMCID: PMC8159546.
8. Chitolina, B. C., R. J. V. de Souza, A. H. Santana, Álvaro B. Rosado, L. M. Vieira, W. L. de Brito, L. H. de Magalhães, M. G. P. Soares, I. D. C. de C. Lemos, M. dos S. Valente, L. H. de Souza, K. P. Figueira, F. F. Albernaz, J. P. Dias, A. L. M. V. de Sousa, L. B. S. Barroso, V. C. B. Baiano, A. X. Dias, e E. F. Aragão. "Cardiopatia reumática: Uma avaliação Da Incidência De internações E Seus Desafios Para a Saúde Pública". Brazilian Journal of Implantology and Health Sciences, vol. 6, nº 5, maio de 2024, p. 2365-76, doi:10.36557/2674-8169.2024v6n5p2365-2376.
9. Simpson MT, Kachel M, Neely RC, Erwin WC, Yasin A, Patel A, Rao DP, Pandey K, George I. Rheumatic Heart Disease in the Developing World. Struct Heart. 2023 Sep 19; 7(6): 100219. doi: 10.1016/j.shj.2023.100219. PMID: 38046860; PMCID: PMC10692356.
10. https://doi.org/10.36660/abc.20220707
11. https://doi.org/10.36660/abc.20200154

What Caused President Kennedy's Wounds

Alen J Salerian M.D.

INTRODUCTION

On November 22nd, 1963, President John F Kennedy was assassinated on Elm Street in Dallas TX and was pronounced dead at Parkland hospital at 1:00 PM (1).

Within a week of Kennedy's death, the new President, Lyndon B. Johnson, created the President's Commission on the Assassination of President John F. Kennedy to investigate the deaths of both Kennedy and Lee Harvey Oswald the accused assassin (1).

The Report of the President's Commission on the Assassination of President John F. Kennedy presented two key findings (1):

Keywords: NA

Classification: NLM Code: WZ 70

Language: English

Great Britain Journals Press

London Journal of Medical & Health Research

Volume 24 | Issue 9 | Compilation 1.0

What Caused President Kennedy's Wounds

Alen J Salerian M. D.

Author: 810 Eutrrpe St, apartment 9103 New Orleans LA 71030.

I. INTRODUCTION

On November 22nd, 1963, President John F Kennedy was assassinated on Elm Street in Dallas TX and was pronounced dead at Parkland hospital at 1:00 PM (1).

Within a week of Kennedy's death, the new President, Lyndon B. Johnson, created the President's Commission on the Assassination of President John F. Kennedy to investigate the deaths of both Kennedy and Lee Harvey Oswald the accused assassin (1).

The Report of the President's Commission on the Assassination of President John F. Kennedy presented two key findings (1):

1. Lee Harvey Oswald killed John F. Kennedy by firing a "magic bullet "which entered the presidents back and exited through the throat before injuring governor Connally, and two head shots from a sixth-floor window of the Texas School Book Depository.
2. Lee Harvey Oswald acted alone when he killed the president.

According to the new information revealed by recent scholarly publications (2-9), JFK was struck by five projectiles during the ambush. He had a small entry throat wound, a small back wound 5 inches below the collar line. He also had catastrophic brain injuries from three head shots: A posterior entry bullet shot, a frontal entry bullet shot above right eye/near hair line and a frontal entry bullet shot on right temple.

The aim of this study is to answer a central question. What caused president Kennedy's throat and back wounds? These two wounds are of essence because they represent the medical premise of Warren reports" Magic bullet" theory. Also the origin of both wounds remain a topic of controversy : A bullet or a poison weapon.

Furthermore, it is of profound importance to know whether a special weapon developed by the US intelligence services was instrumental in JFK's assassination for the consequences of JFK' murder continue to influence the course of history .Knowing the truth might contribute to restoring our trust in government to insure that errors would not be repeated again.

II. METHODS

Three major publications and their references represent the new evidence on JFK assassination research:

1. Inside the Assassination Records Review Board. The US government's final attempt to reconcile the conflicting medical evidence in the assassination of JFK 2009. By Douglas Horne,(2009).
2. The Final Analysis by Dr David W Mantik (2024).
3. Assassination Research (1998).

Assassination Science was edited by James H Fetzer, distinguished McKnight University Professor at the University of Minnesota, Duluth with contributions from a large number of scholars including David Mantik M.D., PhD (who studied the national archives the official x-rays and have authored numerous articles and books on JFK's assassination), Robert Livingston M.D. (The scientific director of both the National Institute for Mental Health and the National Institute for Neurological Diseases and Blindness, Charles Crenshaw (one of the doctors who participated in the care of the president in Dallas) and Jack White(a leading expert on photography, an advisor to the House Select Committee on Assassination during its reinvestigation and other independent researchers.

These three books, their refences and also peer reviewed articles on the assassination of President John F Kennedy in medical journals published from January 2000 to April 2024 were included.

We will first review the new information on JFK's injuries and medical interventions at the Parkland Hospital to be followed by the timing of the president's death .We will then study any evidence of neurotoxin intoxication.

JFK's Injuries:

Based upon the new data (2-8) the president was struck by five projectiles during the ambush. He had a small entry throat wound, a small back wound 5 inches below the collar line, and three head shots: A posterior entry bullet shot, a frontal entry bullet shot above right eye/near hair line and a frontal entry bullet shot on right temple.

When Did JFK Die?

Officially the president was declared dead at 1pm, some 20 minutes after he was registered as patient number 24740 at Parkland hospital at 12:38 pm on November 22,1963 (1,2).

The medical records suggest the President was neither declared "dead upon arrival "at Parkland hospital nor any member of the medical team, Charles Crenshaw, Mary Ann Jenkins, Charles Carrico, Malcolm Perry, Robert McClelland, Charles Baxter, or Kemp Clark suggested that JFK was dead as they performed multiple medical procedures to save his life (2,8). Dr. C. James ("Jim") Carrico was the first physician to see him. He found "Slow agonal respiratory efforts and scant cardiac beats by auscultation." (2,8).

Medical interventions included the following procedures:

1. Insertion of endotracheal tube.
2. Tracheostomy.
3. Administration of Intravenous fluids.

Dr Charles Crenshaw made the following observations (8):

- The president was barely breathing
- His eyes were still.
- A nurse said" no blood pressure".
- Someone else said" I hear a heartbeat".
- After the medical procedures that lasted 10 minutes fluids we're moving through the president.
- Doctor Baxter said" we are losing him".

In essence, JFK seemed to have been physiologically alive at Parkland hospital until 1:00 PM.

JFK's Throat Wound:

Several Parkland doctors described the throat wound as a bullet entry wound of 5 millimeter in diameter (2,3,8):

Dr Perry spoke about a gunshot wound to the president's throat at 3:16 PM conference that was broadcasted live from Parkland hospital (2,3,8). During a press conference at 3:15 PM Malcolm Perry MD who had performed a tracheotomy through a small incision in the president's throat explained three times that the wound was a wound of entry (2,3,8). *The medical staff at Parkland was in complete agreement that the wound was frontal. Speaking for the Parkland medical team Charles Crenshaw MD witnessed a small opening about the diameter of a pencil at the midline of his throat to be an entry bullet hole. "There was no doubt in my mind about the wound. I'd seen dozens of them in the emergency room doctor" Dr Crenshaw said (2,3,8) .*

They Warren report concluded that a bullet entered the president's neck and exited through a large throat wound(1).

Dr. Robert Livingston a world authority on brain, concluded that the diagrams of JFK's brain stored in the national archives which displayed an intact cerebellum were not authentic (10). The cerebellum was not forced out by a posterior entry shot and perhaps a frontal entry neck wound caused the cerebellar extrusion. This point is worthy of emphasis for Dr. Livingstone suggested a frontal entry neck wound (10).

Mantik proved that the throat wound was surgically enlarged by Dr. Humes during autopsy at the Bethesda Naval Hospital (2,3). Furthermore, it has been established that the throat wound was not caused by a bullet: no cervical

vertebra damage, no neck exit wound and negative copper test. Mantik proposed that the throat wound was caused by a glass shard.
Visually it is impossible to differentiate a small bullet entry wound from a wound inflicted by a flechette (11,12,13).

A study published in Medical Hypotheses in 2010 suggested that JFK's throat wound was caused by a neurotoxin flechette (11).

Hence It is reasonable to conclude there were only two possibilities; either a flechette or a glass shard. Table A presents 18 independent observations consistent with the conclusion that the throat wound was not caused by a bullet.

Audiovisual recordings suggest for approximately eight seconds before the fatal head shots JFK had been immobilized(1,2,3). And Jackie Kennedy told the Warren commission: The president was totally silent(1).

JFK's silence was a classic neurotoxin induced vocal paralysis.

Noteworthy is the observation that JFK remained mummified in contrast to Governor Connelly's wild body motions and loud screams.

JFK showed no natural fight or flight response a perfect image for someone poisoned by a neurotoxin. JFK's instant and total paralysis (Figure A,B) and a plethora of poison arrow specific cover-up evidence are consistent with a poison flechettte and inconsistent with a glass shard thesis. Worthy of emphasis is the observation that the cover-up actions were specifically designed to prevent detection of poisons:

1. All microscopic slides of tissue sections taken from the margins of the wounds of entrance as well as from various areas of the brain are missing (2,3).
2. JFK's brain has also disappeared, and it was not included in the materials presented to the National Archives (2,3).
3. Multiple proven alterations of photographic and video evidence (2,3,9).
4. Secret Service washing off the presidential limousine and destroying crucial crime scene chemical evidence (Figure C).

JFK survived the throat shot, was silent stiff immobilized and a perfect sitting duck for eight seconds before the fatal head shots.

The catastrophic head injuries should have killed JFK instantly. Surprisingly, JFK physiologically remained alive for the next 30 minutes until 1 PM when he was declared dead at the Parkland Hospital (1,2,3). His slow death could only be explained by neurotoxin's physiological effects. Bruising in the lung was consistent with a flechette entering through the throat during saxitoxin's latency (!3,14,15,16). Paradoxically, the absence of pallor mortis reported by the mortician was also consistent with saxitoxin's psychopharmacology and the Arrhenius law-the higher the temperature the faster the chemical reactions. Several hours had passed since JFK's death by the time the mortician examined the body, hence the absence of pallor mortis was consistent with saxitoxin's influence (13,14,15,16).

JFK's initial behavior with the appearance of Thornburg position corresponded to JFK's acute pain response before saxitoxin induced paralysis. The patients described by Thorburn in Brain in 1887 had suffered injuries to the 6th cervical vertebrae with total severance of the spinal cord and they could speak (17).

In summary, there is compelling evidence to suggest that jFK's throat wound was not caused by a bullet. There seems to be two possibilities of origin; a glass shard proposed by Dr. Mantik or a flechette hypothesized by Dr Salerien (11). 11 observations are incompatible with a glass shard and compatible with a poison flechette (Table B).

The application of probability theory suggests the odds of the throat wound being caused by a glass shard is %0.03 vs %99.97 for" a flechette. weapon. (Table C).

JFK's Back Wound

Admiral Burkley, the president's doctor was present both at Parkland and Bethesda Naval

hospital and signed the official death certificate corresponding exactly with the holes in JFK's shirt and coat, the autopsy diagram and the eyewitness observations(2,3).
The autopsy disclosed a hole 7 x 4 mm located 14 cm from the acromion(figure D).

Secret Service agent Clint Hill recalled that he observed a wound about 6 inches down from the neck line on the back just to the right of the spinal column. FBI agents Francis O'Neal and James Sibert present at the autopsy show a bullet hole which was below the shoulders and 2 inches to the right of the middle line of the spinal column(2,3).

Dr Mantik located the back wound 14cm below the acromion(2,3).

A declassified transcript of a Warren Commission meeting held on 27 January 1964 ,suggests a bullet entered in the back below the shoulder blade .

Dr David Osborne the chief of surgery at Bethesda In 1963 informed HSCA that he found a fully intact missile which rolled out of JFK's clothing onto the table when his shoulders were raised to remove the clothing (18). Jerrol F Custer the autopsy radiologist confirmed the same observation (19).

This bullet may correspond to JFK's back wound 5 inches below the collar line matching a hole in JFK's jacket. Yet no bullet was observed in the chest X-rays. And there was no exit wound. So it is reasonable. to conclude that Dr Osborne's intact bullet never penetrated JFK' body.

The origin oh President Kennedy's back wound remained a topic of controversy. The fact that it was copper positive supported the likelihood of a none penetrating wound corresponding to a bullet retrieved by Dr. Osborne during the autopsy at the Bethesda Naval Hospital. Dr. Cinque hypothesized that it was caused by a neurotoxin weapon. He pointed out JFK's silent and total paralysis immobilizing him before the fatal headshots, the absence of a bullet.

JFK's Back Wound Summary:

A small(7 x 4 mm) entry nonpenetrating wound at T3 level located 14 cm from the tip of the right acromion process that is incompatible with the Warren report's magic bullet.

In summary, the back wound was either caused by a bullet or a poison weapon but it is impossible with scientific certainty to rule out either.

Head Wounds:

Dr. Mantik's research presented in The Final Analysis suggests that the president was struck by three bullets, a posterior entry shot, a frontal entry shot above right eye/near hair line and a frontal entry shot on right temple(2,3,4). The catastrophic head shots correspond to the Zapruder frames and Moorman's photograph and occurred before the president was immobilized by a poison weapon(2,3,4).

Saxitoxin:

Saxitoxin is the best-known paralytic shellfish toxin, a highly potent non -polypeptide neurotoxin of relatively low molecular weight (13,14,15,16). Its chief action is an interference with the production of action potentials in nerves and involuntary muscles. in this regard saxitoxin is 100,000 times more important than cocaine (13). Saxitoxin induced neurotoxicity seems to be associated with paralysis due to reduced sympathetic tone and hypotension (13). Animal studies indicated that with 0.1 saxitoxin, muscle fibers were rendered incapable of producing excitability. Saxitoxin has been pharmacologically utilized to treat anal fissures due to its anti-bruising properties (13,14,15,16). Saxitoxin has a latency of one or two seconds when administered intra muscularly (13).

The Poison Flechette Shooter?

The influence of the infamous Zapruder movie in studying JFK's death has been enormous despite its shortcomings (9). There are plenty of man-made inaccuracies in the Zapruder movie which is much an illustration of government's loss of integrity nevertheless, the film lucidly captures some of the key features of JFK's death.

Do the alterations offer any clues to identify the shooter of a poison flechette?

I suggest the audiovisual alterations are of significance. This was a military style ambush.

Multiple shooters from different locations shot JFK.

My educated guess is either the umbrella man who opened and closed his umbrella or William Greer is the most likely candidate to be the shooter of a neurotoxin weapon.

Photo evidence suggests Greer hit the brakes and stopped the car momentarily (Image E), he did not accelerate and furthermore the missing frames perfectly match my educated guess that" Greer shot JFK with a poison Flechette".

Greer stopped the limo for several seconds during the ambush. (Figure A)

James Chaney (one of the four Presidential motorcyclists) - stated that the limousine "After the shooting, from the time the first shot rang out, the car stopped completely, pulled to the left and stopped." Mary Woodward, a journalist with the Dallas Morning News wrote: "Instead of speeding up the car, the car came to a halt... after the first shot"(2,3).

Kenneth O'Donnel (Special Assistant to Kennedy), who was riding in the motorcade, later wrote: "If the Secret Service men in the front had reacted quicker to the first two shots at the President's car, if the driver had stepped on the gas before instead of after the fatal third shot was fired, would President Kennedy be alive TODAY? (2,3)

Senator Ralph Yarborough, who was riding with Lyndon B. Johnson was highly critical of the actions of Greer: "When the noise of the shot was heard, the motorcade slowed to what seemed to me a complete stop... After the third shot was fired, but only after the third shot was fired, the cavalcade speeded up, gained speed rapidly, and roared away to the Parkland Hospital... The cars all stopped... 'I don't want to hurt anyone's feelings but for the protection of future Presidents, they (the Secret Service) should be trained to take off when a shot is fired."(2,3)

Another evidence in support of Greer's stopping the limo can be heard in the James Chaney testimony before the Warren commission. Robert Weldon Hargis and James Cheney were the motorcycle officers escorting the presidential limousine. Cheney described how Bobby Hargis ran in front of him any in between the two limos honors way up the grassy knoll and up to the pedestal. For Bobby Hargis to have had enough time to park his motorcycle and then pass it in between the two vehicles in front of Cheney suggest both limos stop for a substantial amount of time (2,3).

Did Greer stop the limo for the head shots ?

Mary Moorman's Polaroid photograph (Figure E) was taken an instant after a headshot. This is consistent with her Warren commission testimony. Mormon informed the Dallas the sheriffs department.

President Kennedy was opposite to me I. took a picture of him. As I snapped the picture of President Kennedy I heard a shot ring out.. President Kennedy kind of jumped over then I heard another shot ring out and Mrs. Kennedy jumped up in the car and said my God he has been shot when I heard this charge ring out. I fell to the ground to keep from being hit myself I heard ' three or four shots all (2,3).

C and D:

Greer twice lied to Warren Commission (1,3).

"I saw no cracks on the windshield " Greer told the Warren Commision(2,3). Altgen's photos show (Figure F,G) the crack on the wind shield.
"I never stopped" Greer told the Warren commission(2,3). Figure E contradicts Greer.

Greer's image was removed or blacked out in Altgen's 6

Image F shows Kellerman, Connaly, JFK and Jackie Kennedy's arm but no Greer.

Greers image was removed or blacked out in Zapruder frames.

Zapruder 174,198 Greer is visible, in 202,204, 207 invisible. (Figure H, I, J, K, L)

Greer is blocked by an artificially enlarged Stemmons Sign in Zapruder 214 (9) (Figure M).

Zapruder frames of Greer were removed

Frames 302-303(Figure N) and 316-317 prove the removal of many frames consistent with Greer's impossibly fast head turns in one frame as observed by Noel Twyman (18). Zapruder movie frames represent one second per 18.3 frames. It is impossible for Greer to turn his head 150° in one frame/ 0.56 seconds. This is indicative of missing frames.

Greer let Kellerman wash off the presidential limousine before the president passed away (Figure D).

There is no other logical explanation except this was an attempt to conceal the poison evidence., for the blood and the brain fragments, had already been witnessed by many or recorded visually.

III. CONCLUSION

it is reasonable to conclude that JFK was struck by a poison flechette near the TSBD building on Elm Street which immobilized him until the limousine stopped by Mary Moorman on Elm street where three head shots splattered JFK's brain on the presidential limousine and on officer Hargis. Greer stopped the car during the ambush for the headshots to devastate JFK's brain and also covered up the crime scene evidence, lied to the Warren Commission. Most importantly the proven alterations of photographic evidence with a common denominator," Greer's artificial disappearance "suggest Greer was the more likely candidate than the umbrella man to be the poison flechette shooter . However it is impossible to rule out the possibility that the umbrella man was the shooter.

Reconstruction of the Ambush on Elm Street:

The following description may represent a realistic reconstruction of the ambush:

The most probable sequence suggests, the ambush on Elm Street began with William Greer the driver firing a flechette-saxitoxin shot that struck the President's on the throat in front of the TSBD building , as the intense burning pain -from the flechette's high velocity triggered instant frowning and grasping hand motions mimicking the Thorburn position. (Figure R, S, T)

Several seconds approximately 50 yards down on Elm Street the driver pulled the limo to the left and stopped. A second volley of shots rendered JFK a stationary target, before the final head shots exploding the President's head, shattering his brain and protruding the cerebellum out of the skull. A shot from the Dal-Tex building hit JFK in the back of the head. A shot from the Grassy Knoll and a shot from the north side of the Triple Underpass hit his right temple and above the right eye. No shots were fired from the assassin's lair.

Conclusion:

William Colby's testimony before the senate intelligence committee in 1975 let us entertain the possibility that a neurotoxin weapon might have been instrumental in the assassination of President Kennedy. This study reveals that the signature traits of death by a neurotoxin weapon (NW)-a small entry throat wound without a neck exit wound , no bruising of the entry wound, vocal and generalized paralysis and delayed death - represent a perfect match for JFK's assassination (Table 1).

This observation was further strengthened by the cover up efforts specifically aimed at concealing a neurotoxin weapon: the alteration of photographic evidence and the washing off the presidential limousine .

Future laboratory studies of tissue and blood samples from Parkland hospital and or from the autopsy would be very helpful to validate this conclusion.

A sad and painful Inference from the observation that a neurotoxin weapon developed by CIA was used to kill JFK, and the criminal acts of some members of the CIA and the Secret Service and the unethical conduct of some members of the Bethesda Naval Hospital actively participated in the assassination of President Kennedy are worthy of further public discussion.

Evolution and progress of our society would require pragmatic measures of prevention against the use of deadly weapons developed by our armed forces to kill our elected representatives. This necessary mission would require collective efforts from all segments of our society.

REFERENCES

1. "Report of the President's Commission on the Assassination of President Kennedy, Chapter 1: Summary and Conclusions". August 15, 2016.
2. Fetzer, J(1998),Assassination Science, Catfeet Press. Mantik D.(2024).The Final Analysis. PostHill Press Book.
3. Horne D, Inside the assassination records review board. The US government's final attempt to reconcile the conflicting medical evidence in the assassination of JFK 2009.
4. Fetzer JH, N PIC Zapruder film events; analysis and implications,; //James Fetzer. black spot.com/2015/09/2-NP IC zapruder-film-events-analysis.html Kurtz, ML (1982), Crime of the Century, the University of Tennessee press. 1982.
5. Fetzer JH, Palecek M, JFK Who How and Why, Moon Rock Books, 2017. page 20 JFK who how and why.
6. Crenshaw C, Trauma Room 1. Kindle Books.
7. Fetzer JH, N PIC Zapruder film events; analysis and implications,; //James Fetzer. black spot.com/2015/09/2-NP IC zapruder-film-events-analysis.html Livingston R. 1993 Assasination Science, page 16 1 statement.
8. Salerian AJ, Pesident Kennedy's death: A poison arrow assisted homicide, Medical Hypotheses, 75(2010)372-377.
9. The final report of Church Committee on September 16 to 18, 1975, Volume One (1976). Unauthorized Storage of Toxic Agents.
10. Sprague R.; Cutler "The Umbrella System: Prelude to an Assassination". Gallery magazine, 1978.
11. Thottumkara, A.P.; Parsons, WH; Du Bois,J. (2014). Saxitoxin. Angewandte Chemie International Edition. 53 (23), 5760-5784
12. Wiese M.; D'Agostino P.M.; Mihali, T.K.; Moffitt M.C.; Neilan BA, Neurotoxic Alkaloids: Saxitoxin and Its Analogs Marine Drugs 2010,8,2185-2211
13. Chorny, M; Levy R.J site specific analgesia which sustained release liposomes Proc.Nat. Acad. Sci. USA 2009, 106, 6891-6892.
14. Garrido, R., Lagos, N., Lattes, K. et al. Gonyautoxin: New Treatment for Healing Acute and Chronic Anal Fissures. Dis Colon Rectum 48, 335–343 (2005).
15. Thorburn, W. (1887). Cases of injury to the cervical region of the spinal cord. Brain , 9 (4), 510-543.
16. Lifton David S (1992). Best Evidence: Disguise and deception in the assassination of John F. Kennedy. New York Penguin Books,Chapter 29.
17. Livingston H E (1992) High Treason. New York: Carrol& Graf. Twyman N. (1997). Bloody Treason. Kindle.

Table A

18 Observations Incompatible With " A Bullet Caused The Throat Wound".

1. Small entry wound on JFK's THROAT consistent with a flechette inflicted wound.
2. No exit wound in JFK's NECK. consistent with a flechette inflicted wound.
3. No damage to JFK's cervical VERTEBRAE consistent with a flechette inflicted wound.
4. No bruising on the throat wound consistent with saxitoxin's anti- bruising effect (neurotoxin specific effect).
5. JFK's instant vocal PARALYSIS. consistent with saxitoxin's rapid effect.
6. JFK's paralysis and IMMOBILIZATION consistent with saxitoxin's rapid effect. (Neurotoxin specific effect).
7. JFK's delayed DEATH after catastrophic head wounds by 3 bullets consistent with saxitoxin's effect of paralysis due to reduced sympathetic. (Neurotoxin specific effect)
8. JFK's slumping due to saxitoxins hypotensive effect. (Neurotoxin specific effect)
9. The umbrella man with an unobscured view of JFK opening and closing the umbrella during the ambush. (Neurotoxin specific cover-up).
10. William Colby testimony confirming the existence of a silent neurotoxin weapon to neutralize large and dressed dogs suggesting that this weapon was designed for humans. Neurotoxin specific testimony.
11. Mortician's report that JFK's body did not show discoloration hours after death consistent with saxitoxin's anti-bruising effect. The mortician's report was consistent with

saxitoxin's psychopharmacology and the Arrhenius law-the higher the temperature the faster the chemical reactions. Several hours had passed since JFK's death by the time the mortician examined the body, hence the absence of pallor mortis was consistent with saxitoxin's influence. (Neurotoxin specific effect).

12. All microscopic slides of tissue sections taken from the margins of the wounds of entrance as well as from various areas of the brain are missing.(Neurotoxin specific cover-up)
13. JFK's brain has also disappeared, and it was not included in the materials presented to the National Archives (Neurotoxin specific cover up)
14. The secret service washing off the limo. Neurotoxin specific cover up).
15. Zapruder missing frames 160 to frame 213 to cover up the actions of the shooter Neurotoxin specific cover up).
16. Zapruder missing frames 306-316 to cover up the actions of the shooter. Neurotoxin specific cover up).
17. Enlargement of the throat wound to coverup the flechette inflicted wound.
18. Zapruder alterations to enlarge the Stemmons sign. Neurotoxin specific cover up). *Result:* It is .%0.0003 for" a bullet caused the throat wound" vs %99.999 for" a glass shard or a flechette weapon caused the throat wound".

Table B

11 Observations Incompatible with a glass shard induced throat wound vs. a flechette induced throat wound

1. No bruising throat wound -anti-bruising effect
2. No pallor Mortis- anti-bruising effect
3. Delayed neurological death – reduced sympathetic tone
4. No fight or flight response- paralysis effect
5. Surgical enlargement of the throat wound.
6. Lost brain- to conceal chemical detection.
7. Lost tissue samples -to conceal chemical detection.
8. Washing off the limo to conceal chemical detection.
9. Missing Zapruder frames(160 to frame 213) to conceal the shooter.
10. Enlarging the Stemmons sign in the Zapruderr movie to conceal the shooter.
11. William Colby testimony September 1975.

Figure A: Zapruder 255. : JFK immobilized

Figure B

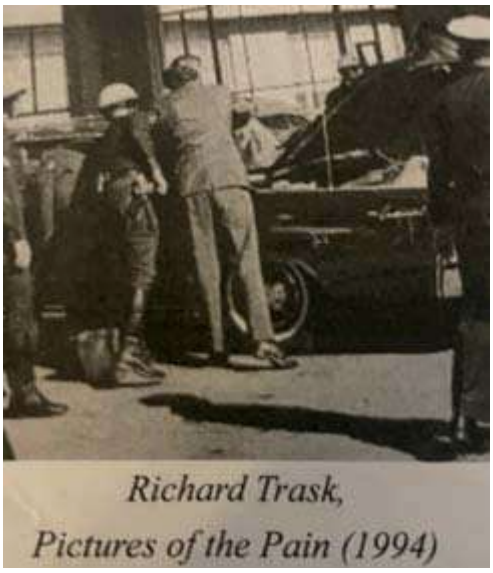


Figure C: Secret Service Washing off the Limo

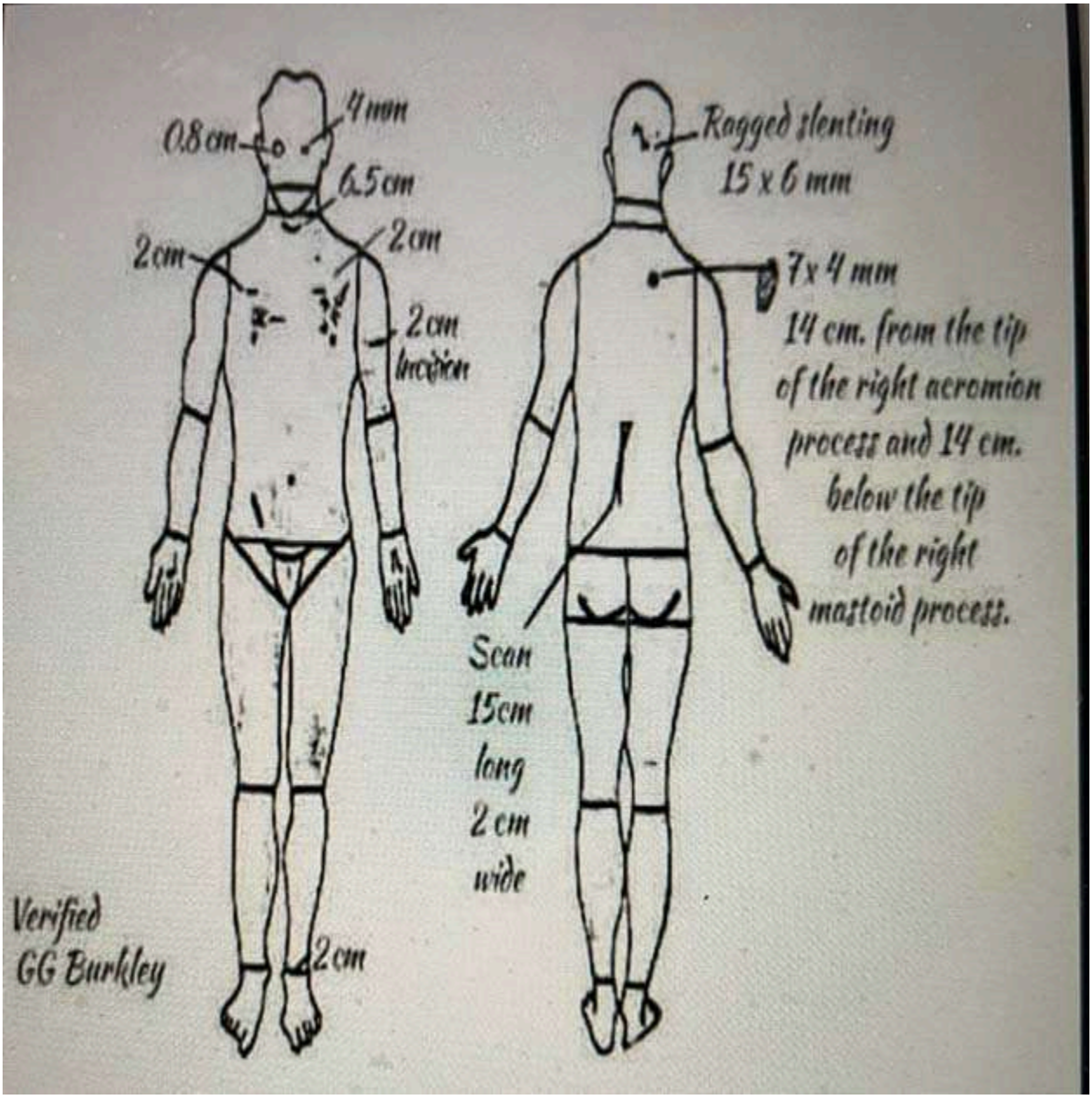


Figure D: Boswell/Burkley Autopsy Diagram Throat Wound=6.5 Cm ???? (Parkland Hospital Report:1cm) Back Wound:7/4mm (Parkland Hospital Report; No Exam)

Figure E: Break Light on

Figure F: Moorman Photo

Figure G: Altgen's 6 Crack on Windshield, no Greer

Figure H: Altgen's Photo Crack on Windshield

Figure I: Zapruder 174: Greer Visible

Figure J: Zapruder 198: Greer Visible

Figure K: Zapruder 202: Greer invisible

Figure L: Zapruder 203: No Greer

Figure M: Zapruder 207: No Greer

Figure N: Zapruder 214 No Greer

Figure O: Zapruder 302 Greer 's head turned back

Figure P: Zapruder 303 Greer 's head turned forward

Multidisciplinary Management of Intracranial Complications of Sinusitis: Case Series

María Pilar Mighera, Candelaria Serrano, Micaela Redivo & Carlos Santiago Ruggeri

ABSTRACT

Intracranial complications of rhinosinusitis in children are rare. Symptoms are nonspecific, and diagnosis relies on a high index of suspicion and early imaging evaluation. Treatment should be multidisciplinary and may involve antibiotics alone or combined with surgery to drain the sinus focus and intracranial abscess. We describe four cases of intracranial complications in pediatric patients successfully managed with a multidisciplinary approach.

Keywords: sinusitis, intracranial complications, epidural abscess, subdural abscess, Potts' tumour, osteomyelitis.

Classification: NLM Code: WV 440

Language: English

LJP Copyright ID: 392844

Great Britain Journals Press

London Journal of Medical & Health Research

Volume 24 | Issue 9 | Compilation 1.0

Multidisciplinary Management of Intracranial Complications of Sinusitis: Case Series

María Pilar Mighera[α], Candelaria Serrano[σ], Micaela Redivo[ρ] & Carlos Santiago Ruggeri[ω]

ABSTRACT

Intracranial complications of rhinosinusitis in children are rare. Symptoms are nonspecific, and diagnosis relies on a high index of suspicion and early imaging evaluation. Treatment should be multidisciplinary and may involve antibiotics alone or combined with surgery to drain the sinus focus and intracranial abscess. We describe four cases of intracranial complications in pediatric patients successfully managed with a multidisciplinary approach.

Keywords: sinusitis, intracranial complications, epidural abscess, subdural abscess, Potts' tumour, osteomyelitis.

Author α ρ: Residents.
σ: Research Fellow (Orcid Candelaria Serrano: 0000-0003-0427-6314).
ω: Section Chief (Orcid Carlos Santiago Ruggeri: 0000-0001-8545-5773). Department of Rhinology and Skull Base, Otorhinolaryngology Service, Hospital Italiano de Buenos Aires.

I. INTRODUCTION

Intracranial complications of sinusitis are uncommon and may include epidural and subdural empyema, meningitis, cerebral abscess, and venous sinus thrombosis. Approximately 4% of sinusitis cases in children result in intracranial complications[1]. Management of these complications requires a multidisciplinary approach.

Due to the rapid onset of intracranial complications, nonspecific symptoms, and the absence of neurological signs at the onset of the disease, a high index of suspicion is necessary to diagnose an intracranial complication resulting from a sinus infection.

We describe four clinical cases of pediatric patients with intracranial complications secondary to sinusitis who were successfully treated with a multidisciplinary approach.

II. CLINICAL CASES

Case 1: Epidural Abscess and Orbital Cellulitis An 11-year-old girl presented with pain during eye movement and mild upper eyelid swelling. She had a history of hospitalization at another centre 15 days prior for sinusitis complicated by orbital cellulitis. Blood cultures isolatedGroup A Streptococcus. She was initially treated for nine days with Ceftriaxone 1g/day and Clindamycin 2.7g/day, then switched to Amoxicillin-Clavulanic Acid 600mg/5ml for seven days.

Hospitalization was recommended; her complete blood count and ophthalmological examination were average. Computed tomography (CT) with intravenous contrast revealed right-sided sinusitis and thickening of the soft tissues in the medial aspect of the right orbit. At the same time magnetic resonance imaging (MRI) showed a hypodense lesion consistent with an epidural abscess.

The multidisciplinary decision was to treat with Ceftriaxone 1500mg every 12 hours and Ornidazole 720mg/day intravenously for six weeks via a peripherally inserted central catheter (PICC) to complete the treatment on an outpatient basis.

Follow-up MRI four months later showed complete resolution of the sinusitis and the epidural abscess without neurological sequelae. Fig. 1

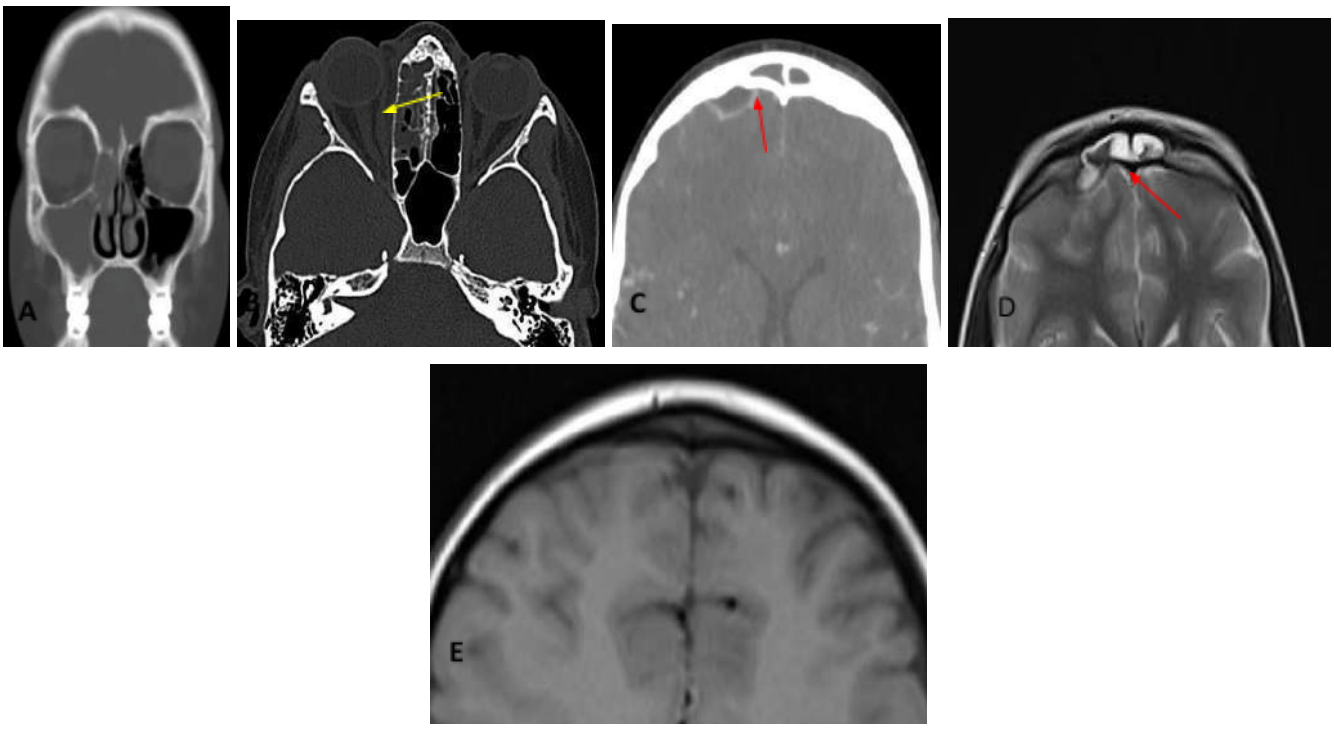


Figure 1: Epidural Abscess and Orbital Cellulitis

A: Computed tomography with intravenous contrast, coronal section: right maxillary-ethmoidal Sinusitis, B: CT, axial section: inflammatory thickening of the soft tissues in the medial aspect of the orbit (yellow arrow), C: Magnetic resonance imaging showing an epidural abscess with an anteroposterior diameter of 7 mm and a transverse diameter of 15 mm (red arrow), D: Post-treatment MRI showing resolution of the complication.

Case 2: Epidural Abscess and Longitudinal Sinus Thrombosis A 12-year-old patient presented with frontoparietal headache, nasal obstruction, and fever of 72 hours duration. Two days prior, the patient had been seen at another hospital and was prescribed symptomatic medication. Examination revealed a tender mass in the left temporal region.

Hospitalization was indicated. Blood cultures isolated Streptococcus anginosus (Streptococcus anginosus group) and Haemophilus influenzae. CT and MRI diagnosed sinusitis and a left subtemporal collection. Intravenous treatment was initiated with Ampicillin 100 mg-Sulbactam 500 mg every 6 hours.

Three days later, the patient experienced a decline in consciousness and required respiratory support. A follow-up CT revealed a left frontal subdural collection. MRI and magnetic resonance angiography of the brain showed a left frontal subdural empyema and partial thrombosis of the longitudinal sinus.

Antibiotics were switched to Vancomycin 300 mg every 6 hours for seven days and Ceftriaxone 1500 mg/day for six weeks, along with Dexamethasone 4 mg every 6 hours. Four days later, the patient was successfully extubated.

Imaging for control showed resolution of the sinusitis and recanalization of the longitudinal sinus but no reduction in the subdural abscess. Subsequent images revealed diffuse edema of the left cerebral hemisphere with characteristics of encephalitis, and ophthalmological examination detected bilateral papilledema.

A frontotemporal craniectomy and durotomy were performed to drain the empyema. The patient had a good recuperation and underwent cranioplasty with a prosthesis eight months later. There were no sequelae. Fig. 2

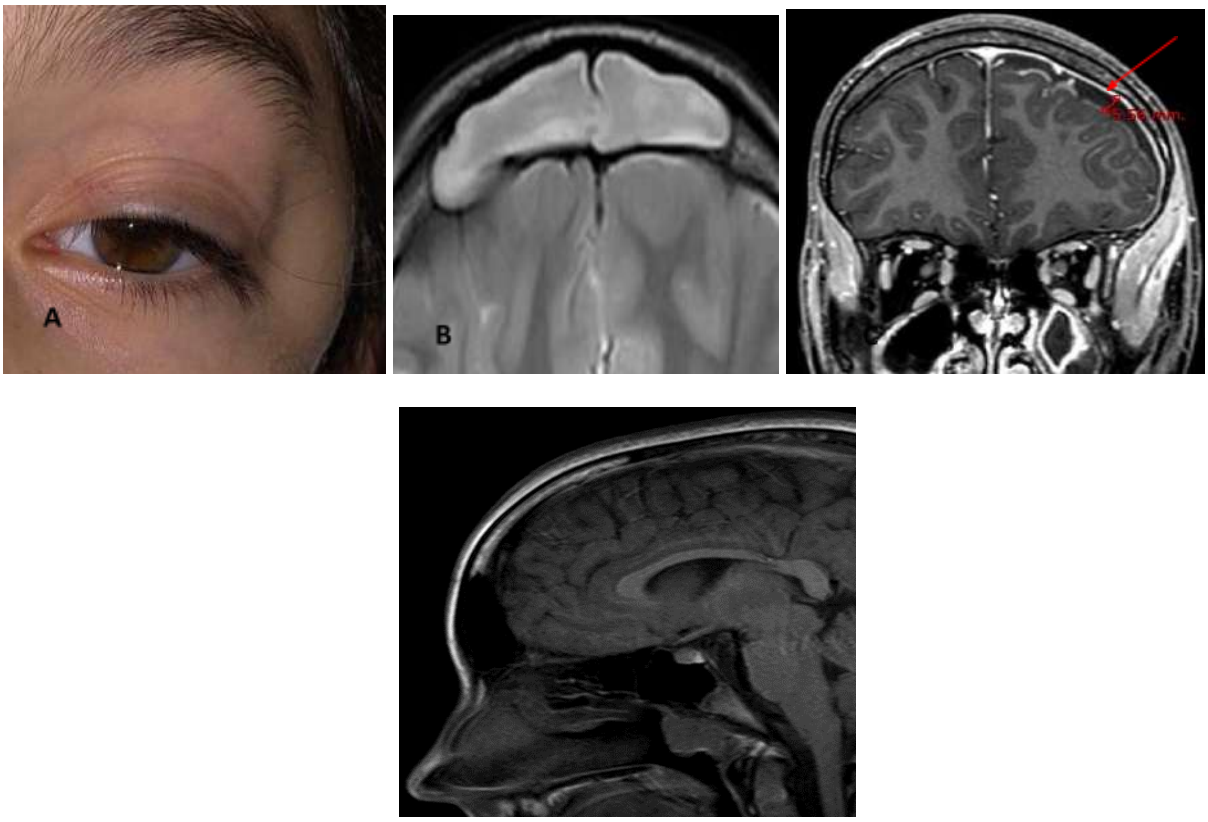


Figure 2: Subdural Abscess with Longitudinal Sinus Thrombophlebitis and Encephalitis

A: Edema in the left temporal region, B: MRI showing frontal sinusitis, C: MRI showing a subdural abscess with a maximum thickness of 5.66 mm, D: Post-treatment MRI showing resolution of frontal sinusitis and subdural empyema.

Case 3: Epidural Abscess, Potts' Tumor, and Frontal Osteomyelitis A 10-year-old girl presented with headache, fever, and cough of 24 hours' duration. Chest and craniocafial X-ray were normal. Nasal washes with hypertonic saline were recommended.

Four days later, she returned with persistent headache, fever, and a mass in the frontal region. There were signs of meningeal involvement, motor deficits, and the pupils were isocoric. CT diagnosed left-sided sinusitis with edema of the frontal soft tissue and an extradural empyema. MRI revealed a frontal extradural empyema and an anterior frontal subcutaneous collection. Blood cultures were negative.

The patient was admitted and treated with intravenous Ceftriaxone 2000 mg every 12 hours and Metronidazole 500 mg every 8 hours for four weeks. Due to persistent symptoms, Vancomycin 750 mg every six hours were added to complete a 6-week course of antibiotics.

Follow-up MRI showed persistence of the empyema and the anterior frontal subcutaneous collection. Bone scintigraphy with Tc99 diagnosed frontal osteomyelitis. An endonasal drainage of the affected paranasal sinuses and a frontal craniectomy were performed simultaneously to drain the empyema. The histopathological report of the resected bone confirmed osteomyelitis.

She continued with antibiotic treatment (Ceftriaxone 2000 mg/day and Teicoplanin 10 mg/kg/day) for 45 days. The patient had a good recovery and no residual infection orsequelae. Follow-up was done every two months, and cranioplasty was performed at eight months. Fig. 3.

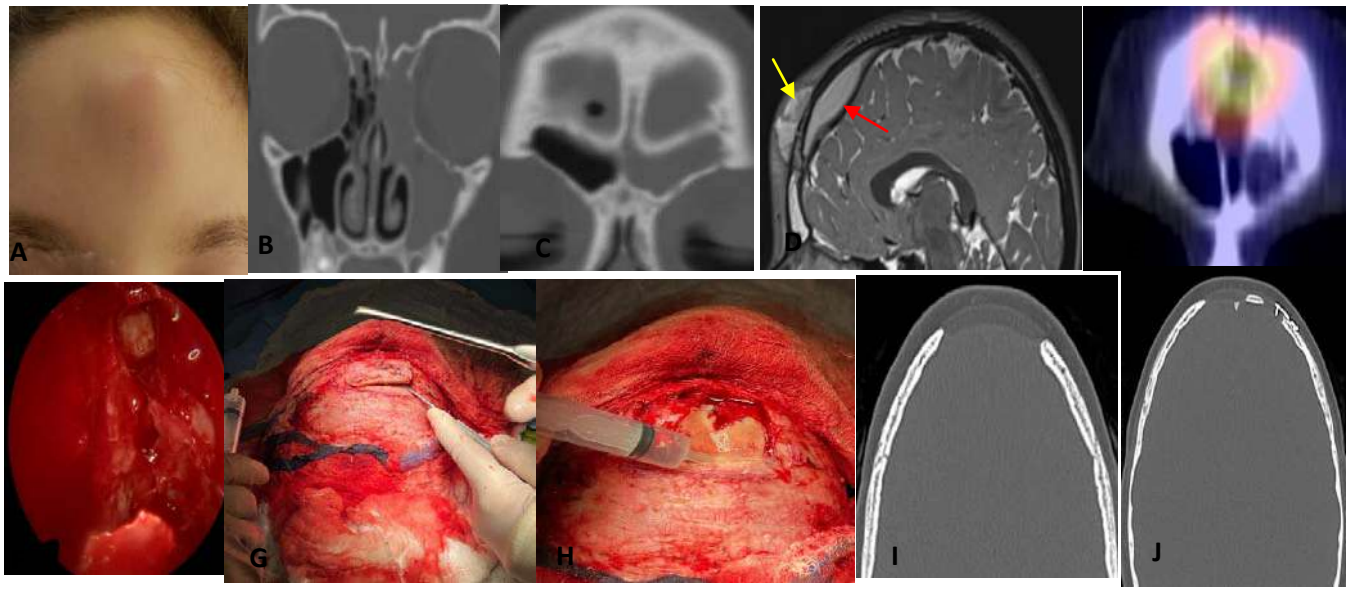


Figure 3: Epidural Abscess, Potts' Tumor, and Frontal Osteomyelitis

A: Frontal Potts' tumour, B and C: Facial CT, coronal sections showing left maxillary-ethmoidal and frontal Sinusitis, D: MRI with contrast showing an epidural abscess measuring 37 x 14 x 59 mm (red arrow) and a Potts' prefrontal abscess measuring 17 x 7 mm (yellow arrow), E: Scintigraphy with technetium showing frontal osteomyelitis, F: Endonasal view with the endoscope of the drainage of the left paranasal sinuses. G: Frontal craniectomy, H: Drainage of the abscess and sample collection for culture, I-J: CT showing resolution of the abscess and evidence of craniectomy and cranioplasty.

Case 4: Subdural and Cerebral Abscess A 15-year-old male patient presented with severe headache and sudden deterioration of consciousness, leading to referral and admission to the intensive care unit. He had been treated seven days earlier with Amoxicillin and Sulbactam for sinusitis.

CT and MRI diagnosed left-sided sinusitis and subdural abscesses. Treatment was initiated with Ceftriaxone 2000 mg/day, Metronidazole 500 mg every 8 hours, and Rifampicin 15 mg/kg/day intravenously.

Due to unfavourable progression after seven days, endonasal drainage of the affected paranasal sinuses and subdural empyemas was performed through a decompressive craniectomy. Direct examination identified positive cocci and gram-negative bacilli, but cultures were negative.

The patient remained on mechanical ventilation for 13 days. He completed seven weeks of antibiotic treatment and recovered without neurological sequelae. Fig. 4

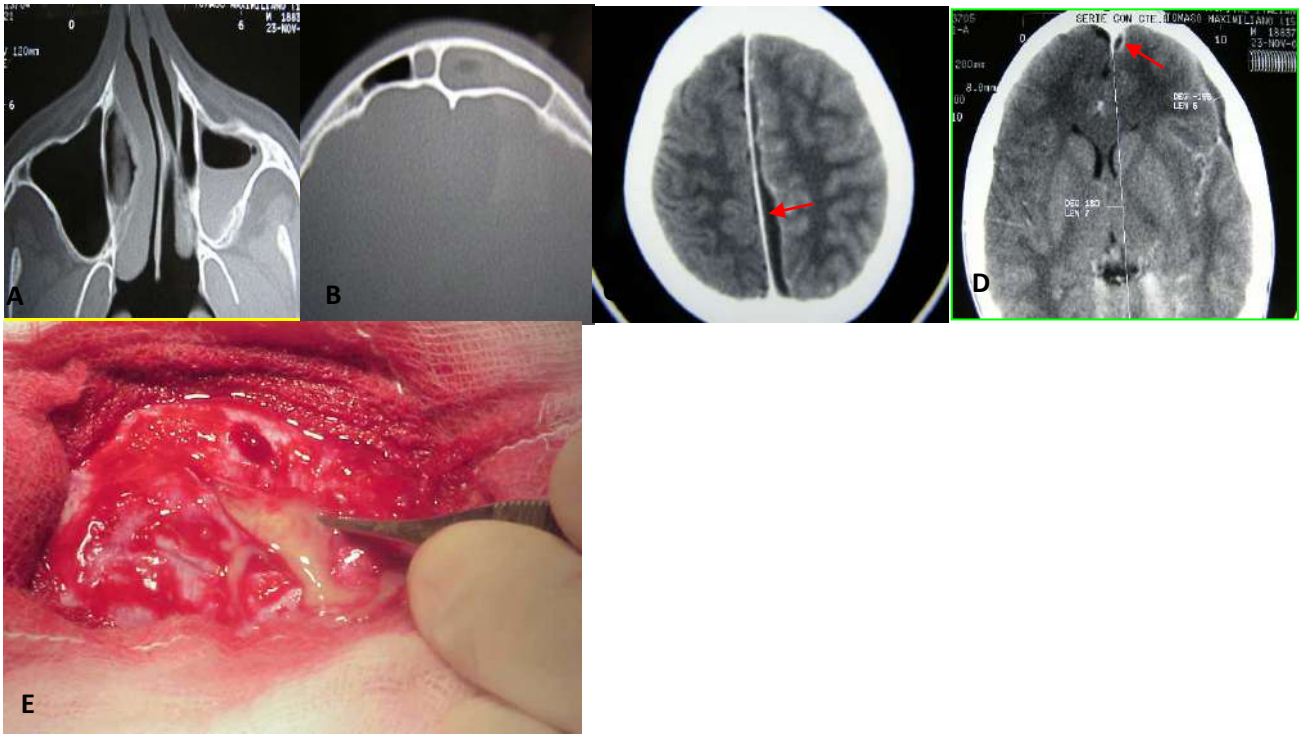


Figure 4: A-B: Facial CT with contrast, axial sections showing left maxillary-ethmoidal-frontal sinusitis, C-D: MRI showing frontotemporal and occipital subdural abscesses (red arrows), E: Craniectomy and drainage of intracranial abscesses

III. DISCUSSION

The mortality rate from intracranial complications of sinusitis decreased from 25.9% between 1950 and 1979 to 3.8% between 1980 and 2004[2].

Another study conducted between 2006 and 2016 reported an increased rate of intracranial complications from sinusitis, rising from 2.2% to 4.3%[1]. This rise may be attributed to increased antibiotic resistance, a higher prevalence of children with immune-suppressive conditions or treatments, poor medical management, or delays in surgical intervention.

Intracranial complications can arise from direct extension through dehiscences in the bony walls of the paranasal sinuses or through retrograde thrombophlebitis of the valveless veins of the diploë of the bone.

The frontal sinus is the most common source of intracranial complications.

In a study of 16 patients with intracranial complications from sinusitis, 56% (9/16) had a subdural abscess, 44% (7/16) had an epidural abscess, and 19% (3/16) had a cerebral abscess. Meningitis was diagnosed alone or in association with other abscesses in 19% of the patients. Additionally, 35% (5/16) had more than one complication, with multiple abscesses. Two patients had intracranial abscesses associated with frontal bone osteomyelitis (Potts' tumour)[3].

An epidural abscess is a purulent collection located between the skull and the dura mater. One study reported that 60% of patients with epidural abscesses had frontal bone osteomyelitis[4].

The management of epidural abscesses in children is controversial and generally involves intravenous antibiotic administration alone or in combination with surgical drainage. Some studies have shown that patients with epidural abscesses without neurological deficits or elevated intracranial pressure can be treated with antibiotics alone for six weeks without requiring neurosurgical drainage[5]. Other studies have suggested medical treatment for abscesses <1 cm and neurosurgical drainage for abscesses >1 cm[6].

In selected cases with epidural empyemas located behind the posterior table of the frontal sinus, endonasal drainage via endoscopes through a Draf II or III frontal approach may be feasible. In Case 3, the epidural collection was located in the superior region above the frontal sinus, making this approach unsuitable.

Additionally, bone scintigraphy confirmed frontal bone osteomyelitis, necessitating craniectomy to resect the infected bone and drain the abscess.

Subdural empyema (purulent collection between the dura mater and arachnoid) requires early neurosurgical drainage, along with drainage of the sinus focus and intravenous antibiotic administration, due to its rapidly fatal progression[3, 7]. In Case 2, craniectomy was deferred until the patient was stable after requiring respiratory support.

A study reported that 58% of children with intracranial abscesses were treated with otolaryngological and neurosurgical procedures[8].

Another study compared patients under eighteen years old with complicated acute frontal sinusitis with non-contiguous intracranial abscesses. The study assessed whether frontal sinusitis treated via endonasal approach, intracranial access, or leaving the sinus undrained impacted the number of surgeries or complications. The authors concluded that frontal drainage did not reduce the number of surgeries or increase complications, and the benefit of frontal drainage was not clearly established[9]. Potts' tumour is a subperiosteal abscess caused by osteomyelitis of the anterior table of the frontal sinus. It represents an extracranial complication of sinusitis but is associated with intracranial complications in 60-85% of cases[10]. The treatment of Potts' tumour should include intravenous antibiotics and, if unresolved, abscess drainage and resection of the osteomyelitis bone[11]. Fig.4

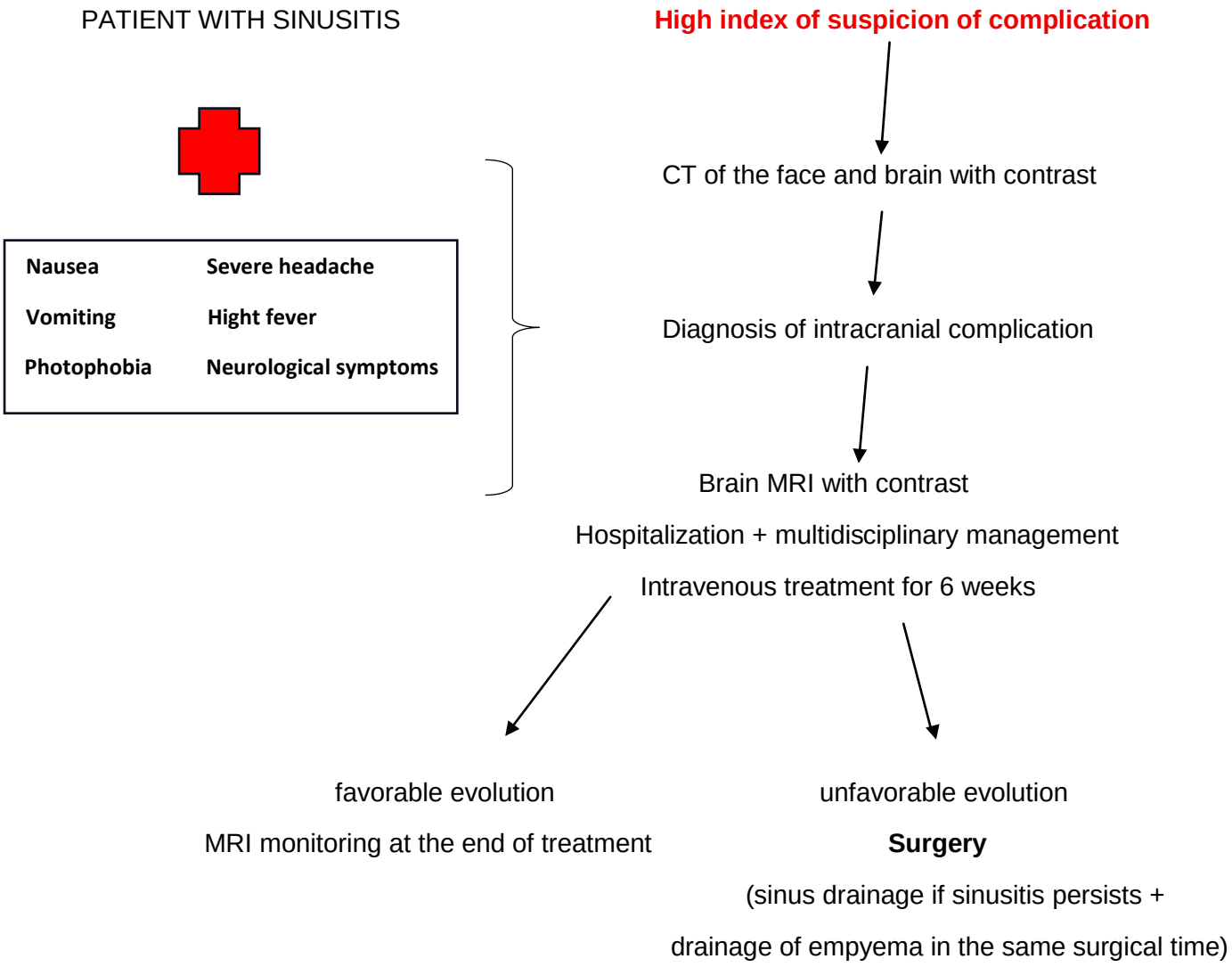


Fig. 4: Management of Intracranial Complications of Sinusitis

Conflicts of Interest

The authors declare no conflicts of interest.

REFERENCES

1. Levy, D. A., Phayvanh, P., Nguyen, S. A., & Schlosser, R. J. (2020). Trends in complications of pediatric rhinosinusitis in the United States from 2006 to 2016. International Journal of Pediatric Otorhinolaryngology, 128, 109695. doi: 10.1016/j.ijporl.2019.109695.
2. Tandon, S., Beasley, N., & Swift, A. C. (2009). Changing trends in intracranial abscesses secondary to ear and sinus disease. Journal of Laryngology & Otology, 123(3), 283–288. https://doi.org/10.1017/S002221510800234X
3. Herrmann, B. W., Chung, J. C., Eisenbeis, J. F., & Forsen, J. W. (2006). Intracranial complications of pediatric frontal rhinosinusitis. American Journal of Rhinology, 20, 320–324. doi: 10.2500/ajr.2006.20.2846.
4. Giannoni, C. M., Stewart, M. G., & Alford, E. L. (1997). Intracranial complications of sinusitis. Laryngoscope, 107(7), 863–867. https://doi.org/10.1097/00005537-199707000-00005.
5. Heran, N. S., Steinbok, P., & Cochrane, D. (2003). Intracranial complications of sinusitis: a review. Neurosurgery, 53(4), 893–898. doi: 10.1227/01.NEU.0000084163.51521.58.

6. DelGaudio, J. M., Evans, S. H., Sobol, S. E., & Parikh, S. L. (2010). Intracranial complications of sinusitis: what is the role of endoscopic sinus surgery in the acute setting? American Journal of Otolaryngology-Head and Neck Medicine and Surgery, 31(1), 25–28.
7. Nathoo, N., Nadvi, S. S., van D Jr, & Gouws, E. (1999). Intracranial subdural empyemas in the era of computed tomography: a review of 699 cases. Neurosurgery, 44(3), 529–535.
8. Schupper, A. J., Jiang, W., Coulter, M. J., et al. (2018). Intracranial complications of pediatric sinusitis: identifying risk factors associated with prolonged clinical course. International Journal of Pediatric Otorhinolaryngology, 112, 10–15.
9. Nicoli, T. K., Oinas, M., Neimela, M., Makitie, A. A., & Atula, T. (2016). Intracranial suppurative complications of sinusitis. Scandinavian Journal of Surgery, 105(4), 254–262. https://doi.org/10.1177/1457496915622129.
10. Chorney, S. R., Buzi, A., & Rizzi, M. D. (2021). Frontal sinus drainage in acute pediatric sinusitis with intracranial complications. American Journal of Rhinology & Allergy, 0(0), 1–7. doi: 10.1177/1945892421991311.
11. Kombogiorgas, D., & Solanki, G. A. (2006). Intracranial complications of sinusitis: an overview. Journal of Neurosurgery: Pediatrics, 105(2), 143-149.

Motivation and Awareness Campaign: Institutional Evaluation of Facultade São Francisco De Assis

Fernandes, Elisiane Alves & Fernandes, Andreia Castiglia

ABSTRACT

The quality of higher education is a topic of great relevance, as it is directly linked to the formation of qualified professionals for the exercise of their roles. To assess the quality of higher education, the Ministry of Education established parameters and implemented various evaluation instruments. The publication of Law 10.861/2004 systematized these assessments, highlighting the need for an in-depth study of the system and the active participation of the academic community in this process. The specific objective was to apply new evaluation instruments following a motivation and awareness campaign, assessing the new participation rates. The research was qualitative and quantitative, using a case study with document analysis. In the data discussion analysis, a comparative method was used to address the specific objective. The legislation from INEP and MEC provided the theoretical foundation for this investigation. In the final considerations, it was found that continuous mobilization and awareness efforts, through effective campaigns, enhance the understanding of the topic and contribute to improving the teaching and learning process, as well as promoting improvements in institutional infrastructure.

Keywords: quality. institutional evaluation. higher education legislation.

Classification: NLM Code: W20.5, W84.6, W76.3

Language: English

Great Britain Journals Press

London Journal of Medical & Health Research

Volume 24 | Issue 9 | Compilation 1.0

Motivation and Awareness Campaign: Institutional Evaluation of Facultade São Francisco De Assis

Campanha De Motivação E Conscientização: Avaliação Institucional Da Faculdade São Francisco De Assis

Fernandes, Elisiane Alves[α] & Fernandes, Andreia Castiglia[σ]

RESUMO

A qualidade na educação superior é um tema de grande relevância, pois dela depende a formação de profissionais qualificados para o exercício de suas funções. Para avaliar a qualidade da educação superior o Ministério da Educação estabeleceu parâmetros e implementou diversos instrumentos. A publicação da Lei 10.861/2004 sistematizou essas avaliações, destacando a necessidade de um estudo aprofundado sobre o sistema e a participação ativa da comunidade acadêmica nesse processo. O objetivo específico foi de aplicar novos instrumentos de avaliação após campanha de motivação e sensibilização avaliando os índices de participação. O tipo de pesquisa foi qualiquantitativa, utilizando estudo de caso com análise documental. Na análise de discussão dos dados utilizou-se método comparativo para responder o objetivo específico. A legislação do INEP e do MEC embasaram teoricamente essa investigação. Nas considerações finais, constatou-se que a mobilização e a sensibilização contínuas, por meio de campanhas eficazes, ampliam a compreensão do tema e contribuem para aprimorar o processo de ensino e aprendizagem, além de promover melhorias na infraestrutura institucional.

Palavras-Chave: qualidade. avaliação institucional. legislação do ensino superior.

ABSTRACT

The quality of higher education is a topic of great relevance, as it is directly linked to the formation of qualified professionals for the exercise of their roles. To assess the quality of higher education, the Ministry of Education established parameters and implemented various evaluation instruments. The publication of Law 10.861/2004 systematized these assessments, highlighting the need for an in-depth study of the system and the active participation of the academic community in this process. The specific objective was to apply new evaluation instruments following a motivation and awareness campaign, assessing the new participation rates. The research was qualitative and quantitative, using a case study with document analysis. In the data discussion analysis, a comparative method was used to address the specific objective. The legislation from INEP and MEC provided the theoretical foundation for this investigation. In the final considerations, it was found that continuous mobilization and awareness efforts, through effective campaigns, enhance the understanding of the topic and contribute to improving the teaching and learning process, as well as promoting improvements in institutional infrastructure.

Keywords: quality. institutional evaluation. higher education legislation.

I. INTRODUCCIÓN

A qualidade na educação superior é um assunto muito relevante, pois dela depende a formação de profissionais qualificados para exercerem suas profissões. Desde os anos 1980, o Ministério da Educação estabeleceu parâmetros para medir a qualidade do ensino, utilizando diversos

instrumentos de avaliação. No entanto, foi com a promulgação da Lei 10.861, em 14 de abril de 2004, que essas avaliações foram finalmente parametrizadas e sistematizadas.

A criação dessa lei resultou na implementação do Sistema Nacional de Avaliação da Educação Superior (SINAES), que abrange tanto a avaliação interna quanto a externa, com a utilização de índices de qualidade. Com isso, surgiram as Comissões Próprias de Avaliação (CPAs), com a responsabilidade de, em cada instituição, avaliar os pontos fortes e fracos no processo de ensino e aprendizagem, assim como na infraestrutura. A avaliação é composta por diversos instrumentos, onde todos os atores da comunidade acadêmica se avaliam mutuamente.

Desde o início, foi detectada a dificuldade em sensibilizar a comunidade acadêmica para participar ativamente do processo de avaliação, evidenciando a necessidade de uma análise aprofundada da estrutura da lei, dos instrumentos de avaliação, de sua aplicação, da mobilização e sensibilização da comunidade, e da divulgação dos resultados.

O objetivo principal deste artigo é analisar o processo de avaliação institucional, identificando as ações necessárias para torná-lo uma ferramenta significativa e transformadora reconhecida por todos os envolvidos. Como objetivo específico aplica-se os novos instrumentos de avaliação após campanha de motivação e sensibilização avaliando os índices de participação.

II. REFERENCIAL TEÓRICO

No referencial teórico apresenta-se a contextualização da avaliação, conceitua-se avaliação institucional, a avaliação institucional no cenário nacional, histórico da faculdade São Francisco de Assis e seu processo de avaliação.

2.1 Contextualizando Avaliação

A avaliação é a reflexão colocada em prática, uma ação que nos motiva a novas reflexões. Trata-se de uma reflexão contínua do educador sobre sua própria realidade e do acompanhamento gradual do educando em seu processo de desenvolvimento. Nesse caminho, tanto educadores quanto educandos aprendem sobre si mesmos e sobre o contexto escolar, através do ato avaliativo, segundo conceitua Hoffmann (1992).

2.2 Conceituando Avaliação Institucional

O processo de avaliação institucional é complexo, diferenciado, permanente e em constante aperfeiçoamento, pois tem como objetivo intensificar a melhoria da qualidade do ensino, o aumento no atendimento ao público, o incentivo a pesquisa e extensão e a transmissão da informação de forma direta para a sociedade sobre a situação do sistema de ensino superior. Meyer e Murphy (2000) acrescenta que a avaliação é um importante instrumento de gestão e mede os desempenhos da instituição, sua excelência, utilidade e relevância.

Machado (1994) por sua vez complementa que a avaliação é um exame de efetividade da instituição e que é indispensável manter um processo permanente para buscar indicadores que possibilitem o constante desenvolvimento institucional sendo necessário, para isso, contar com o comprometimento de todos os envolvidos direta ou indiretamente. Palharini (1996) conclui declarando que a qualidade na universidade pode e deve ser medida através da avaliação institucional permanente.

Assim, os teóricos estudados acima, permitem afirmar que a avaliação institucional verifica a qualidade da educação superior, sua função e significância, sendo indispensável manter o processo permanente para buscar os parâmetros que viabilizam o desenvolvimento institucional. Por tal afirmação pode-se inferir que uma avaliação em 360 graus faz sentido.

O processo de avaliação institucional não possui uma única visão, porque são muitos os aspectos contraditórios de educação, universidade e sociedade que estão sendo inseridas no referido processo.

2.3 Avaliação Institucional do Cenário Nacional

A Avaliação Institucional no Cenário Nacional vem sendo discutida desde os anos 80 e por isso nos próximos subcapítulos se analisará o Histórico Evolutivo da Avaliação Institucional da Educação Superior e o Processo de Avaliação Institucional do Ensino Superior.

Conforme INEP (2018) a primeira iniciativa para avaliar a graduação da Educação Superior brasileira ocorreu, em 1983, com a criação do Programa de Avaliação da Reforma Universitária (PARU). Após muitas outras formas foram aplicadas, sendo que em 20024 foi criado o SINAES, através da Lei 10.861, que teve como objetivo unificar o processo nacional de avaliação das instituições de ensino superior e seus cursos de graduação.

Com a criação do SINAES a avaliação do ensino superior passou a ter três modalidades: avaliação dos cursos de graduação, avaliação do desempenho dos estudantes e a articulação entre a regulação e a avaliação educativa. Todas as avaliações integram um conjunto de políticas que visam a expansão do sistema que seja parte de um processo de valorização da educação superior no Brasil.

A avaliação institucional para Helgio Trindade, presidente do CONAES em 2004, deve contemplar uma visão global, qual seja:

O objeto de análise é o conjunto de dimensões, estruturas, relações, atividades, funções e finalidades da IES, centrado em suas atividades de ensino, pesquisa e extensão segundo os diferentes perfis e missões institucionais. Está compreendida, na avaliação da instituição, a gestão, a responsabilidade e compromissos sociais e a formação acadêmica e profissional com vistas a repensar sua missão para o futuro. Os sujeitos da avaliação são os conjuntos de professores, estudantes, técnico-administrativo e membros da comunidade externa especialmente convidados designados. (TRINDADE apud BRASIL 2004, p. 7).

Propondo a melhoria do processo de ensino e aprendizagem e visando a qualidade da educação superior esse sistema foi homologado através da lei onde também foi pensando diversos indicadores da avaliação pretendendo o envolvimento de todos nesse processo.

Desta forma, desde a criação do SINAES as instituições de ensino superior têm sido reguladas, tendo que cumprir com a avaliação institucional anualmente.

2.4 Histórico da Faculdade São Francisco de Assis

A Faculdade São Francisco de Assis surgiu de uma conjugação de ideias de alguns professores que atuavam nas cidades de Porto Alegre e São Paulo. Os idealizadores da faculdade juntaram esforços intelectuais de diferentes áreas de conhecimentos e fizeram com que seus planos se materializassem no que hoje é uma das mais importantes instituições de ensino superior, com atuação na capital do Rio Grande do Sul, de acordo com o PDI (2018).

Atualmente com 20 anos de existência, a Faculdade São Francisco de Assis conta com cerca de seiscentos discentes matriculados nos 20 cursos presenciais. Em 2019 foi credenciada para o ensino a distância, tendo 1700 alunos matriculados nos 11 cursos autorizados pelo MEC.

2.4.1 Avaliação na Instituição

O primeiro ciclo do processo de avaliação teve início em 2004, nesse ano e no ano seguinte somente foi avaliado o desempenho dos docentes, com a aplicação do instrumento de avaliação em sala de aula e o resultado processado através de leitora óptica, interpretado pela escala likert.

Nesse primeiro ciclo avaliativo 2004-2006, foi avaliado somente o desempenho dos docentes pelos discentes. No relatório foi considerada a média geral dos professores por ano avaliado, percebe-se que a média no 2º semestre de 2005 foi a mais baixa, porém os motivos dessa queda não foram tratados por ocasião do relatório trienal.

O segundo ciclo do processo avaliativo, respeitando os princípios do SINAES, ocorreu nos

anos de 2006, 2007 fechando com o Relatório Trienal 2006-2008, nesse triênio iniciou a primeira avaliação institucional no 1º semestre de 2006 e seguiram nos anos seguintes.

O terceiro ciclo do processo avaliativo ocorreu em 2008, 2009 e 2010 encerrando com o Relatório Trienal 2008-2010.

Nos anos seguintes de 2011 a 2013 a CPA realizou suas avaliações sistematizadas, buscando a difusão de uma cultura cada vez mais focada na avaliação institucional e a avaliação institucional foi feita separada em serviços básicos e serviços terceirizados, porém novamente nenhum dos dados foi tratado, explorado ou divulgado.

A partir da Portaria n.º 92, de 31 de janeiro de 2014, o processo de avaliação do SINAES, foi redefinido com um novo modelo avaliativo, gerando um instrumento que passou a ser contemplado em cinco eixos agrupando as dez dimensões.

Em 2014 foram aplicados os instrumentos de avaliação do desempenho do docente, avaliação do docente pela coordenação, autoavaliação do discente, autoavaliação do docente, avaliação institucional discente, docente e técnico administrativo, que segundo a CPA (2015), o conjuntos desses instrumentos de avaliação:

Permite que a instituição tenha um sistema de diagnóstico sistêmico que subsidia a melhoria e o aperfeiçoamento da qualidade, incidindo sobre seus docentes, discentes, estrutura curricular, colaboradores, estrutura física, etc., identificando as potencialidades e oportunidades para um processo de melhoria contínua. Para a instituição, esses instrumentos são indispensáveis para que as decisões na busca desse aprimoramento dos cursos da Faculdade São Francisco de Assis e que estejam fundamentadas em informações de um cenário comprometido com a comunidade acadêmica. (CPA, 2015, p. 24).

Em 2015 e 2016 foram aplicados os mesmos instrumentos e no Relatório Trienal Integral 2015/2017 foi apresentado a consolidação das versões parciais. Desde então as avaliações são feitas em instrumentos aplicados pelo portal do aluno e do professor e também para os técnicos administrativos, para a sociedade civil organizada e para os egressos, caracterizando uma avaliação 360 graus onde todos avaliam todos contemplando as dimensões e eixos exigidos pela legislação.

III. PROCEDIMENTOS METODOLÓGICOS

Essa pesquisa é de abordagem qualiquantitativa que para Spratt, Walker e Robinson (2004), utilizar os dois métodos contribui muito para a investigação porque permite beneficiar-se das competências de cada um:

Combinar métodos qualitativos e quantitativos parece uma boa ideia. Utilizar múltiplas abordagens pode contribuir mutuamente para as potencialidades de cada uma delas, além de suprir as deficiências de cada uma. Isto proporcionaria também respostas mais abrangentes às questões de pesquisa, indo além das limitações de uma única abordagem (SPRATT, WALKER e ROBISON, 2004, p. 6).

O estudo de caso se caracteriza como uma pesquisa aplicada, onde o pesquisador estuda um caso específico, por exemplos: uma instituição, uma pessoa, um grupo ou uma família em sua realidade. O pesquisador fará uma análise dos documentos e buscará um embasamento teórico na bibliografia.

Para Yin (2001) um estudo de caso é “uma investigação empírica que investiga um fenômeno contemporâneo dentro do seu contexto da vida real, especialmente quando os limites entre o fenômeno e o contexto não estão claramente definidos.” (YIN, 2001 p. 33). Para Laville & Dione (1999):

A vantagem mais marcante dessa estratégia de pesquisa repousa, é claro, na possibilidade de aprofundamento que oferece, pois os recursos se veem concentrados no caso visado, não estando o estudo submetido às restrições ligadas à comparação do caso com outros casos (LAVILLE & DIONNE, 1999, p. 156).

De acordo com os autores o estudo de caso analisa os documentos que darão ao pesquisador o

embasamento teórico para a análise não interferindo no objeto, mas avaliando as compreensões dos envolvidos.

A pesquisa documental, de acordo com Gil (2008) é muito parecida com a bibliográfica. A diferença está na natureza das fontes, pois esta forma vale-se de materiais que não receberam ainda um tratamento analítico, ou que ainda podem ser reelaborados de acordo com os objetos da pesquisa. Fontelles (2009) afirma que a pesquisa documental é aquela que:

Visa apenas a observar, registrar e descrever as características de um determinado fenômeno ocorrido em uma amostra ou população, sem, no entanto, analisar o mérito de seu conteúdo. Geralmente, na pesquisa quantitativa do tipo descritiva, o delineamento escolhido pelo pesquisador não permite que os dados possam ser utilizados para testes de hipóteses, embora hipóteses possam ser formuladas a posteriori, uma vez que o objetivo do estudo é apenas descrever o fato em si. (FONTELLES, 2009, p. 8).

Além de analisar os documentos de "primeira mão", existem também aqueles que já foram processados, mas podem receber outras interpretações, como os relatórios.

IV. RESULTADOS E DISCUSSÕES

Para o objetivo aplicou-se os novos instrumentos de avaliação após campanha de motivação e sensibilização avaliando os índices de participação.

Segundo Ceribeli et. al (2013) a participação dos alunos promove o crescimento consolidado da instituição e reforça o sentimento de parceria:

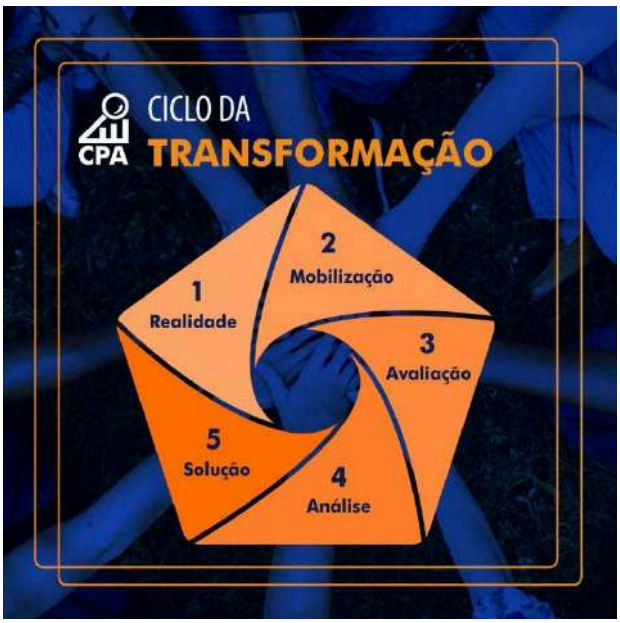
Fazendo com que haja um maior comprometimento por parte deste público que passa a se enxergar como parte de um importante processo de amadurecimento da IES e, assim, fortalecendo sua fidelização e engajamento com as causas da mesma. É preciso pensar a comunicação de marketing como uma grande aliada em ações onde o contato com o cliente é fator definitivo para o alcance de metas e objetivos. (CERIBELI, et. al 2013, p. 9).

A Comissão Própria de Avaliação e a pesquisadora tiveram a colaboração dos estudantes que estagiam na Frade Agência Experimental do curso de Publicidade e Propaganda para a identidade visual da campanha.

Após algumas reuniões para explicar as questões da avaliação institucional e da Comissão Própria de Avaliação, foi lançada a campanha "O Ciclo da Transformação" que teve início do mês de maio com o envio de e-mails conforme Figura 1 e Cards postados nas Redes Sociais, de acordo com a Figura 2.

Fonte: (Frade, 2019)

Figura 1: Email Para Alunos, Professores E Funcionários



Fonte: (Frade, 2019)

Figura 2: Card 1 – Redes Sociais

A campanha contou também com cartazes fixados nas salas de aula e em pontos estratégicos da instituição conforme Figura 3.

Fonte: (Frade, 2019)

Figura 3: Cartaz Divulgado Nas Salas De Aula

De acordo com a apresentação da equipe da Frade os cartazes devem ser distribuídos por toda a instituição com informações sobre a CPA já que a grande maioria dos alunos não sabe do que se

Através de toda a identidade visual da campanha os alunos devem conseguir associar os cartazes com os outros itens que estão circulando nos corredores e redes sociais da faculdade.

A campanha de motivação e sensibilização contou com muitas etapas para se seja possível analisar qual delas é a mais efetiva. Sendo assim o Banner (Figura 4) junto ao Cubo Mágico (Foto 1) foram pensados com intuito de promover a sensibilização visual do preenchimento dos formulários para manter os alunos, professores e funcionários envolvidos com o processo.

Fonte: (Frade, 2019)

Figura 4: Banner

Fonte: (Frade, 2019)

Foto 1: Banner e Cubo Mágico Expostos

De acordo com Moura (2017), a sensibilização é um ponto muito importante no processo de avaliação institucional.

A questão da sensibilização é um ponto crucial da avaliação institucional, aliás, é tão importante que está expresso nos documentos oficiais do SINAES que orientam os processos nas IES. Através da sensibilização busca-se o envolvimento da comunidade escolar na construção da proposta avaliativa por meio da realização de reuniões,

palestras, seminários, entre outros. Cabe ressaltar que a sensibilização deve estar presente tanto nos momentos iniciais quanto na continuidade das ações avaliativas, pois sempre haverá sujeitos novos iniciando sua participação no processo: sejam estudantes, professores, técnico-administrativo e demais representantes. (MOURA, 2017, p. 114).

Portanto, sensibilizar significa envolver todos no processo e assim a participação efetiva com as respostas que possam dar resultado e busca da melhoria no ensino e aprendizagem e infraestrutura. Por isso a campanha da Frade foi tão importante.

O ciclo da transformação contou com 5 etapas, sendo a primeira Realidade, a segunda Mobilização, a terceira Avaliação, a quarta Análise e a quinta Solução, de acordo com a Figura 5 esses cards foram compartilhados nas redes sociais oficiais da instituição.

Fonte: (Frade, 2019)

Figura 5: Etapas do Ciclo da Transformação

Para Kotler e Keller, usar as técnicas do Marketing para promover a coordenação auxilia no impacto que a mensagem causa no usuário.

O Mix de Comunicação de Marketing promove a interação e a coordenação dos esforços de comunicação (propaganda, publicidade, relações públicas, promoção de vendas, merchandising e qualquer outra ferramenta de comunicação de marketing) no intuito de maximizar o impacto da mensagem do anunciante sobre os consumidores (KOTLER; KELLER, 2006, p. 533)

De acordo com os autores é possível usar os caminhos da comunicação para motivá-los a colaborarem com o processo de avaliação, por isso considera-se essencial que as campanhas aplicadas em 2019 sejam efetivas no objetivo de fazer com que os discentes entendam a CPA e a avaliação institucional como primordial para a melhoria da qualidade no processo de ensino e aprendizagem e na infraestrutura.

A Figura 6 mostra a imagem enviada aos discentes, docentes e técnicos administrativos como ponto primordial no processo de sensibilização.

Fonte: (Frade, 2019)

Figura 6: Email Para Alunos, Professores e Funcionários

O cubo possui 6 lados e como um cubo mágico tem as cores laranja, verde, amarelo, vermelho, azul e branco. Cada quadrado de cada cor representa que 25 alunos preencheram o formulário de avaliação institucional. Conforme a Foto 5 em 21 de junho de 2019 quando havia 227 respostas.

Fonte: (Frade, 2019)

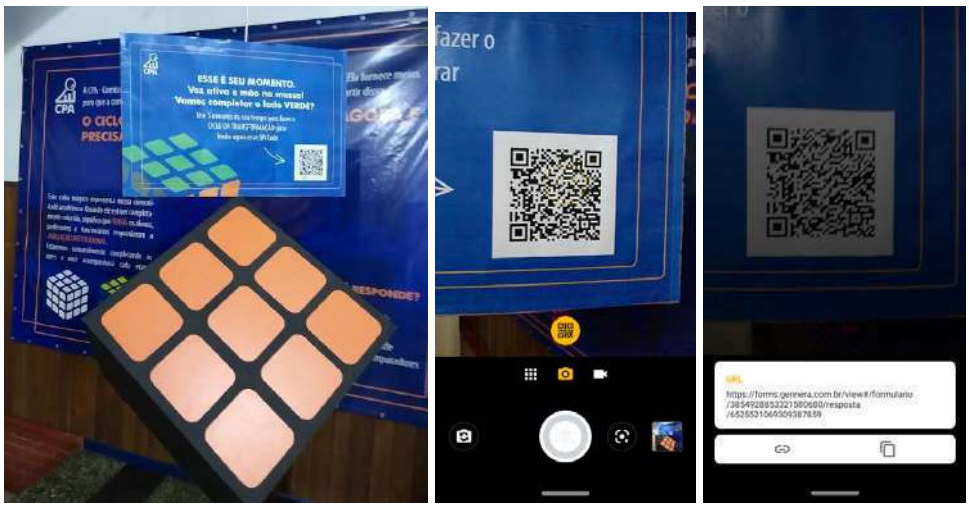
Foto 2: Cubo Parcialmente Preenchido

Em 26 de junho foi feita uma enquete via Instagram oficial da instituição para que os alunos participassem da escolha da próxima cor para o cubo e resolveu-se aguardar o próximo semestre porque eles estavam envolvidos com as provas e provavelmente não se interessariam em preencher a pesquisa. Em 21 de agosto de 2019 após os ajustes de matrícula, retornou-se a campanha enviando um e-mail com a motivação para preencher a cor escolhida na enquete, conforme Figura 7.

Fonte: (Elaborado pela autora, 2019)

Figura 7: Email Motivacional

A campanha visual continuou em elaboração e a equipe da Frade coordenada pela Profa. Andreia criou um display usando um QR Code que permite que qualquer estudante com seu celular acesse o formulário de forma mais rápida e eficiente. Como se pode observar na Foto 3.



Fonte: (Elaborado pela autora, 2019)

Foto 3: Display com QRCode

Além do QRCode no display acima do cubo também foram feitos os displays para as mesas da cantina com o intuito de facilitar o acesso ao formulário. Conforme a Foto 4 e pode-se visualizar a disposição dos displays nas mesas da cantina como demonstra a Foto 5.

Fonte: (Elaborado pela autora, 2019)

Foto 4: Os dois lados dos displays

Fonte: (Elaborado pela autora, 2019)

Foto 5: Os Displays Distribuídos Nas Mesas Da Cantina

Para reforçar a campanha com os técnicos administrativos foi proposto um café com conhecimento onde foi apresentada a importância da opinião deles como parte do sistema e do processo. Como se visualiza na Foto 6, o comparecimento foi de 72% dos colaboradores efetivos e estagiários.

Fonte: (Elaborado pela autora, 2019)

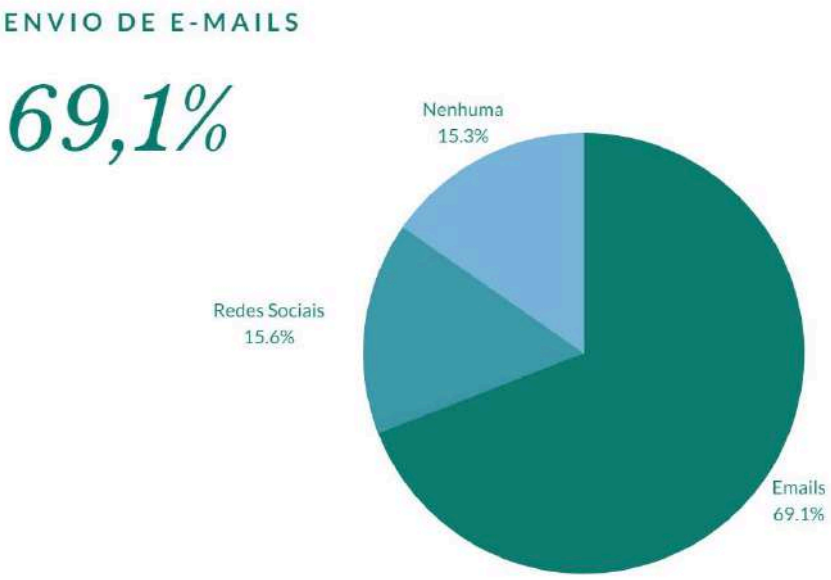
Foto 6: Café com Conhecimento – Técnicos Administrativos

Para melhor visualização da campanha motivacional aplicada de maio a novembro elaborou-se o infográfico conforme Figura 8.

Fonte: (Elaborado pela autora, 2019)

Figura 8: Infográfico da Campanha de Motivação

Com o infográfico se pôde visualizar a intensidade da campanha e com o Gráfico 1 se verifica a sua efetividade.



Fonte: (Elaborado pela autora, 2019)

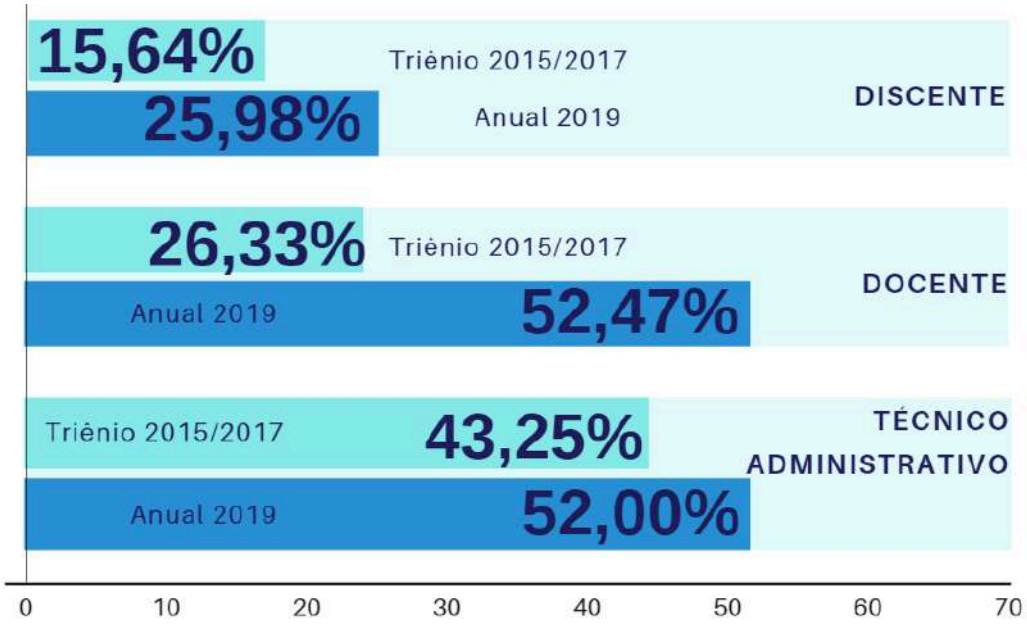
Gráfico 1: Resultado da Campanha Motivacional

A campanha visual e motivacional mostrou que realmente faz efeito quando é demonstrado através de imagens e ações o que é qual o objetivo da avaliação institucional, no entanto o envio de e-mails se tornou mais efetivo, pois foram enviados cinco e-mails nos dias 23/05 com 54 respostas, 29 de maio com 53 respostas, 14 de junho 34 respostas, 21 de agosto com 36 respostas e 08 de novembro com 27 respostas, totalizando 204 respostas. Sobre postagens nas redes sociais oficiais Facebook e Instagram as postagens foram dia 23 de maio, simultaneamente com o e-mail, que foi o card Ciclo da Transformação, dia 24 de maio o card Realidade, dia 25 de maio o card Mobilização, dia 28 de maio o card Avaliação e 30 de maio o card Análise.

A avaliação institucional respondida pelo discente em 2018 teve a participação de 46 discentes para uma média de 1.214, sendo apenas 3,79%. Em 2019 a média de alunos matriculados nos cursos da instituição é de 1.234 e a participação após campanha de mobilização e sensibilização alcançou 333 respostas, correspondendo a 25,98%.

A avaliação institucional aplicada aos docentes teve em 2018 a participação de 31 professores de 99, sendo 31,31% e em 2019 foram 53 professores de 101 professores significando 52,47% de participação.

Para o corpo técnico administrativo em 2018 se teve 13 participações de 25 técnicos, sendo 52%, em 2019 também foram 13 participantes de 25, mantendo os 52% de participação.



Fonte: (Elaborado pela autora, 2019)

Gráfico 2: Comparativo 2015/2017 e 2019

Como demonstrado no Gráfico 2 observa-se que a campanha de mobilização e conscientização gerou um pequeno aumento no índice de participação, no Gráfico 1 identifica-se que o envio do e-mail é o canal mais eficiente para aumentar o índice de participação da importância desse tipo de avaliação, porém ainda não é possível afirmar que essa melhora tenha sido sinônimo de eficácia, ou seja, aumentar o índice não significa ter conseguido o entendimento dos participantes da importância desse instrumento.

V. CONSIDERAÇÕES FINAIS

Percebeu-se que mesmo sendo amplamente divulgada a Avaliação Institucional ainda é desconhecida e não entendida por parte da comunidade acadêmica que não reconhece as etapas do processo, desconhece a legislação e não visualiza os resultados publicados através do site da instituição e dos murais.

A campanha contou com as informações sobre a CPA, sobre os instrumentos, sobre a legislação e sua importância e embora todos os esforços por parte de bolsistas e dos membros da CPA o resultado gerou apenas um pequeno aumento no índice de participação dos alunos, dos professores e dos colaboradores na avaliação institucional, sendo assim conclui-se que conhecer a opinião do discente sobre as ações tomadas a partir dos resultados da avaliação institucional foi imprescindível para subsidiar a instituição com medidas que busquem a melhoria da qualidade do ensino, da aprendizagem e da infraestrutura e do próprio processo de avaliação.

É necessário considerar sempre que as ações devem ser contínuas e inovadoras, mas ao mesmo tempo podem ser as mesmas já utilizadas pensando na renovação do quadro de discentes, docentes e técnicos administrativos. Essa investigação foi importante para encontrar os caminhos que levam a avaliação institucional ser um instrumento transformador.

REFERÊNCIAS

1. Brasil. Congresso Nacional. Lei 10.861 de 14 de abril de 2004. Institui o Sistema Nacional de Avaliação da Educação Superior - SINAES e dá outras providências. Diário Oficial da República Federativa do Brasil, Brasília, DF, 2004.
2. Ceribeli, João Paulo. As estratégias de comunicação institucional da CPA como mecanismo para o aumento da participação do corpo discente nas avaliações da FAGOC. João Paulo Ciribeli, et. al. Seminários INEP, 2013. Disponível em: <http://download.inep.gov.

br/educacao_superior/avaliacao_institucional/seminarios_regionais/trabalhos_regiao/2013/sudeste/eixo_1/estrategias_comunicacao_institucional_cpa_corpo_disc.pdf>. Acesso em 12 ago 2019.
3. Faculdade São Francisco De Assis. Plano de Desenvolvimento Institucional. Disponível em: <http://www.saofranciscodeassis.edu.br/Areas/Admin/Arquivos/PDI%20-%20maio%20de%202015.pdf>. Acesso em: 01 abr. 2019.
4. Faculdade São Francisco De Assis. Relatório de Autoavaliação da Comissão Própria de Avaliação. 2018. Disponível em: <http://www.saofranciscode assis.edu.br/wp-content/uploads/2018/03/relauto avalacao2015.pdf>. Acesso em: 10 mai 2019.
5. Fontelles, Mauro José. Metodologia da Pesquisa científica: diretrizes para a elaboração de um protocolo de pesquisa. Universidade Federal de Goiás, 2009. Disponível em: <https://cienciassaude.medicina.ufg.br/up/150/o/Anexo_C8_NONAME.pdf>. Acesso em 01 out 2019.
6. Gil, Antonio Carlos. Como elaborar projetos de pesquisa. 4. ed. São Paulo: Atlas, 2008.
7. Hoffmann, J. Avaliação: mito e desafio. Porto Alegre, Educação e Realidade Editora, Ia ed., 1992.
8. Instituto Nacional De Estudos E Pesquisas Educacionais Anísio Teixeira. Censo da Educação Superior 2018: Notas estatísticas. Disponível em: <http://download.inep.gov.br/educacao_superior/censo_superior/documentos/ 2019/ censo_da_educacao_ superior _2018-notas_estatisticas.pdf>. Acesso em 12 ago 2019.
9. Kotler, Philipi; KELLER, Kevin. Administração de Marketing. 12. ed. São Paulo: Pearson, 2006.
10. Laville, C.; Dionne, J. A construção do saber: manual de metodologia da pesquisa em ciências humanas. Belo Horizonte: UFMG, 1999.
11. Machado, Lucília R. S. Controle da qualidade total: uma nova gestão do trabalho, uma nova pedagogia do capital. Extra-classe em Revista, SINPRO-MG, Belo Horizonte, ano 2, n.º 1, out. 1994.
12. Meyer Jr., V. Novo conceito e as habilidades do administrador universitário. In: Meyer.
13. JR., V.; MURPHY, J. P. (orgs.). Dinossauros, gazelas & tigres: novas abordagens da administração universitária. Um diálogo Brasil e Estados Unidos. Florianópolis: Insular, 2000.
14. MOURA, Marcelo P. C. A Avaliação Institucional como Instrumento de Gestão Estratégica: Estudo de caso em uma Escola Estadual de Itabira/MG. Universidade Federal de Juiz de Fora. 2017. Disponível em: <http://www.mestrado.caedufjf.net/wp-content/uploads/2017/11/MARCELO-PINTO-COELHO-OURA_REVISADO.pdf>. Acesso em 05 ago 2019.
15. Palharini, Francisco de Assis. Tormento e paixão pelos caminhos do PAIUB. Avaliação. Rede de Avaliação institucional da Educação Superior - RAIES, Campinas, SP, v. 6, n.º 1, mar. 1996.
16. Spratt, C.; Walker, R.; Robinson, B. Mixed research methods. Practitioner Research and Evaluation Skills Training in Open and Distance Learning. Commonwealth of Learning, 2004. Disponível em: <http://www.col.org/Site Collection Documents/A5.pdf >. Acesso em: 10 mar 2019.
17. YIN, R. K. Estudo de caso: planejamento e métodos. 2.ed. Porto Alegre: Bookman, 2001.
18. We have gone through your last conversation with the Editors and are considering offering you an opportunity to publish your article entirely free of charge on our platform.
19. This suggestion is contingent upon a collaborative understanding and some expectations. As part of this arrangement, we would kindly ask you to support our platform by endorsing us within your scholarly network (e.g., recommending us to your scholars and colleagues) and providing a favorable review on social media, including Google Reviews.
20. We believe your endorsement, coupled with your exemplary work, would significantly enhance our platform's credibility, helping us reach a wider audience of scholars and readers.

21. Should you agree to this mutually beneficial cooperation, we will provide a simple guide to assist you in promoting our publishing service on various social media platforms.
22. We eagerly await your positive response and look forward to sending you the steps. With best regards.

Great Britain Journal Press Membership

For Authors, subscribers, Boards and organizations

Great Britain Journals Press membership is an elite community of scholars, researchers, scientists, professsionals and institutions associated with all the major disciplines. Great Britain memberships are for indivi - duals, research institutions, and universities. Authors, subscribers, Editorial Board members, Advisory Board members, and organizations are all part of member network.

Read more and apply for membership here:
https://journalspress.com/journals/membership

Author Membership provide access to scientific innovation, next generation tools, access to conferences/seminars/ symposiums/webinars, networking opportunities, and privileged benefits. Authors may submit research manuscript or paper without being an existing member of GBJP. Once a non-member author submits a research paper he/she becomes a part of "Provisional Author Membership".

Society flourish when two institutions Come together." Organizations, research institutes, and universities can join GBJP Subscription membership or privileged "Fellow Membership" membership facilitating researchers to publish their work with us, become peer reviewers and join us on Advisory Board.

Subscribe to distinguished STM (scientific, technical, and medical) publisher. Subscription membership is available for individuals universities and institutions (print & online). Subscribers can access journals from our libraries, published in different formats like Printed Hardcopy, Interactive PDFs, EPUBs, eBooks, indexable documents and the author managed dynamic live web page articles, LaTeX, PDFs etc.

PRINTED VERSION, INTERACTIVE PDFS, EPUBS, EBOOKS, INDEXABLE DOCUMENTS AND THE AUTHOR MANAGED DYNAMIC LIVE WEB PAGE ARTICLES, LATEX, PDFS, RESTRUCTURED TEXT, TEXTILE, HTML, DOCBOOK, MEDIAWIKI MARKUP, TWIKI MARKUP, OPML, EMACS ORG-MODE & OTHER