Online ISSN: 2249-4618
Print ISSN: 0975-5888

Global Journal

of Medical Research: J

Dentistry and Otolaryngology

Otitis Media in Primary Suppurative Otitis Media

Highlights

Rural Setup of Wardha

Dental Extractions Antibiotics

Discovering Thoughts, Inventing Future

VOLUME 14 ISSUE 1 VERSION 1.0

Global Journal of Medical Research: J
Dentistry and Otolaryngology

Global Journal of Medical Research: J
Dentistry and Otolaryngology
Volume 14 Issue 1 (Ver. 1.0)

Open Association of Research Society

Incorporation No.: 0423089
License No.: 42125/022010/1186
Registration No.: 430374
Import-Export Code: 1109007027
Employer Identification Number (EIN):
USA Tax ID: 98-0673427

Global Journals Inc.

*(A Delaware USA Incorporation with "Good Standing"; **Reg. Number: 0423089**)*

Sponsors: Open Association of Research Society
Open Scientific Standards

Publisher's Headquarters office

Global Journals Headquarters
301st Edgewater Place Suite, 100 Edgewater Dr.-Pl,
Wakefield MASSACHUSETTS, Pin: 01880,
United States of America
USA Toll Free: +001-888-839-7392
USA Toll Free Fax: +001-888-839-7392

Offset Typesetting

Global Journals Incorporated
2nd, Lansdowne, Lansdowne Rd., Croydon-Surrey,
Pin: CR9 2ER, United Kingdom

Packaging & Continental Dispatching

Global Journals
E-3130 Sudama Nagar, Near Gopur Square,
Indore, M.P., Pin:452009, India

Find a correspondence nodal officer near you

To find nodal officer of your country, please email us at *local@globaljournals.org*

eContacts

Press Inquiries: *press@globaljournals.org*
Investor Inquiries: *investors@globaljournals.org*
Technical Support: *technology@globaljournals.org*
Media & Releases: *media@globaljournals.org*

Pricing (Including by Air Parcel Charges):

For Authors:
22 USD (B/W) & 50 USD (Color)
Yearly Subscription (Personal & Institutional):
200 USD (B/W) & 250 USD (Color)

Integrated Editorial Board
(Computer Science, Engineering, Medical, Management, Natural Science, Social Science)

Dr. Bart Lambrecht
Director of Research in Accounting and FinanceProfessor of Finance
Lancaster University Management School
BA (Antwerp); MPhil, MA, PhD (Cambridge)

Dr. Carlos García Pont
Associate Professor of Marketing
IESE Business School, University of Navarra
Doctor of Philosophy (Management), Massachusetts Institute of Technology (MIT)
Master in Business Administration, IESE, University of Navarra
Degree in Industrial Engineering, Universitat Politècnica de Catalunya

Dr. Fotini Labropulu
Mathematics - Luther College
University of ReginaPh.D., M.Sc. in Mathematics
B.A. (Honors) in Mathematics
University of Windso

Dr. Lynn Lim
Reader in Business and Marketing
Roehampton University, London
BCom, PGDip, MBA (Distinction), PhD, FHEA

Dr. Mihaly Mezei
ASSOCIATE PROFESSOR
Department of Structural and Chemical Biology, Mount Sinai School of Medical Center
Ph.D., Etvs Lornd University
Postdoctoral Training,
New York University

Dr. Söhnke M. Bartram
Department of Accounting and FinanceLancaster University Management SchoolPh.D. (WHU Koblenz)
MBA/BBA (University of Saarbrücken)

Dr. Miguel Angel Ariño
Professor of Decision Sciences
IESE Business School
Barcelona, Spain (Universidad de Navarra)
CEIBS (China Europe International Business School).
Beijing, Shanghai and Shenzhen
Ph.D. in Mathematics
University of Barcelona
BA in Mathematics (Licenciatura)
University of Barcelona

Philip G. Moscoso
Technology and Operations Management
IESE Business School, University of Navarra
Ph.D in Industrial Engineering and Management, ETH Zurich
M.Sc. in Chemical Engineering, ETH Zurich

Dr. Sanjay Dixit, M.D.
Director, EP Laboratories, Philadelphia VA Medical Center
Cardiovascular Medicine - Cardiac Arrhythmia
Univ of Penn School of Medicine

Dr. Han-Xiang Deng
MD., Ph.D
Associate Professor and Research
Department Division of Neuromuscular Medicine
Davee Department of Neurology and Clinical NeuroscienceNorthwestern University
Feinberg School of Medicine

Dr. Pina C. Sanelli
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

Dr. Roberto Sanchez
Associate Professor
Department of Structural and Chemical Biology
Mount Sinai School of Medicine
Ph.D., The Rockefeller University

Dr. Wen-Yih Sun
Professor of Earth and Atmospheric SciencesPurdue University Director
National Center for Typhoon and Flooding Research, Taiwan
University Chair Professor
Department of Atmospheric Sciences, National Central University, Chung-Li, TaiwanUniversity Chair Professor
Institute of Environmental Engineering, National Chiao Tung University, Hsin-chu, Taiwan.Ph.D., MS The University of Chicago, Geophysical Sciences
BS National Taiwan University, Atmospheric Sciences
Associate Professor of Radiology

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

Dr. Bassey Benjamin Esu
B.Sc. Marketing; MBA Marketing; Ph.D Marketing
Lecturer, Department of Marketing, University of Calabar
Tourism Consultant, Cross River State Tourism Development Department
Co-ordinator , Sustainable Tourism Initiative, Calabar, Nigeria

Dr. Aziz M. Barbar, Ph.D.
IEEE Senior Member
Chairperson, Department of Computer Science
AUST - American University of Science & Technology
Alfred Naccash Avenue – Ashrafieh

Contents of the Volume

i. Copyright Notice
ii. Editorial Board Members
iii. Chief Author and Dean
iv. Table of Contents
v. From the Chief Editor's Desk
vi. Research and Review Papers

1. Dental Extractions, Antibiotics and Curettage – First, Do no Harm. *1-6*
2. Estimation of age for Sudanese Adults using Orthopantomographs. *7-14*
3. Bioactive Implants in Cervical Spine Injury – Original Research(From 1995 To 2011). *15-26*
4. To Determine Prevalence of Chronic Suppurative Otitis Media with Reference to Unsafe Otitis Media in Primary School Going Children of Rural Setup of Wardha District. *27-36*

vii. Auxiliary Memberships
viii. Process of Submission of Research Paper
ix. Preferred Author Guidelines
x. Index

Global Journal of Medical research: J
Dentistry and Otolaryngology
Volume 14 Issue 1 Version 1.0 Year 2014
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 2249-4618 & Print ISSN: 0975-5888

Dental Extractions, Antibiotics and Curettage - First, Do no Harm

By Michael J. Wahl DDS, Jean A. Wahl DMD & Margaret M. Schmitt DMD
Wahl Family Dentistry, United States

Abstract- *Background:* Gentle curettage of the socket and/or postoperative antibiotics are standard protocols after an extraction of a tooth with a periapical radiolucency, but there are risks associated with these procedures.

Methods: A retrospective chart analysis of simple dental extractions of teeth with periapical radiolucencies and without postoperative curettage was conducted in a multidentist private practice. There were 31 cases that met the criteria, which included extraction site X rays at least three months postoperatively to check radiographic healing.

Results: Of 31 extractions with periapical radiolucencies and without socket curettage, all showed complete healing at least 3 months postoperatively. None was given preoperative antibiotics, and only three were given postoperative antibiotics for five or six days.

Conclusions: Complete radiographic healing occurs without postextraction curettage in teeth with periapical raidiolucencies and without preoperative or postoperative antibiotic therapy in most cases.

Keywords: *extraction, curettage, antibiotic.*

GJMR-J Classification : *FOR Code: QV 50, WU 20.5*

Strictly as per the compliance and regulations of:

Dental Extractions, Antibiotics and Curettage – First, Do no Harm

Michael J. Wahl DDS [α], Jean A. Wahl DMD [σ] & Margaret M. Schmitt DMD [ρ]

Abstract- ***Background:*** Gentle curettage of the socket and/or postoperative antibiotics are standard protocols after an extraction of a tooth with a periapical radiolucency, but there are risks associated with these procedures.

Methods: A retrospective chart analysis of simple dental extractions of teeth with periapical radiolucencies and without postoperative curettage was conducted in a multidentist private practice. There were 31 cases that met the criteria, which included extraction site X rays at least three months postoperatively to check radiographic healing.

Results: Of 31 extractions with periapical radiolucencies and without socket curettage, all showed complete healing at least 3 months postoperatively. None was given preoperative antibiotics, and only three were given postoperative antibiotics for five or six days.

Conclusions: Complete radiographic healing occurs without postextraction curettage in teeth with periapical raidiolucencies and without preoperative or postoperative antibiotic therapy in most cases.

Clinical implications: Socket curettage or antibiotic therapy in patients without significant swelling after simple extractions of teeth with periapical radiolucencies should not be routine. The risks of damage to adjacent structures, excessive bone removal, and postoperative pain exceed the benefits of postextraction curettage of the socket for teeth with periapical radiolucencies, and the risks of antibiotic therapy often exceed the benefits.

Keywords: extraction, curettage, antibiotic.

I. Introduction

A general principle of medicine and dentistry that dates back many centuries is the concept of *primum non nocere* or "first, do no harm."[1] The Code of Professional Conduct of the American Dental Association states, "The dentist has a duty to refrain from harming the patient."[2] In other words, before intervening with medical or dental care, a physician or dentist should consider the potential for harm from the intervention itself.

Gentle curettage of the socket is a standard protocol after a dental extraction. One oral surgery textbook states, "If a periapical lesion is visible on the preoperative radiograph and there was no granuloma attached to the tooth when it was removed, the periapical region should be carefully curetted to remove the granuloma or cyst."[3] Other authors make similar recommendations.[4-6]

Author α σ ρ: Private practice, Wilmington, Delaware.
e-mail: WahlDentistry@aol.com

The purpose of curetting an extraction socket with a radiographic lesion is at least theoretically to break up the granuloma or cyst to allow for better and/or faster healing, but there are potential risks with curettage. Adjacent anatomical structures can be disturbed. For example, excessive bone removal, sinus perforation, nerve injury, and increased postoperative pain can occur by curettage. Although good visibility is a hallmark of good extraction technique, postextraction "blind curettage" is typically the only option as the periapical area is usually too small, bloody, and distant from the coronal area of the socket to permit visibility. The tip of the curette must be small enough to reach through the periapex (often only 2mm or less) but large enough to break up the periapical granuloma or cyst, which is often much larger than the periapex itself. Sometimes it is impossible to curette the lateral aspects of the lesion without removing healthy periapical bone for access. If a smaller curette is used, more force can be concentrated in the smaller tip, but it is less likely to reach lateral aspects of the lesion. If a larger curette is used, it is less likely to reach into the periapical lesion because of its size.

Similarly, antibiotics carry inherent risks, including antibiotic resistance on an individual as well as global scale, and they should only be prescribed when necessary.[7-9]

In the authors' multidentist general dental practice, sockets are not curetted after extractions. Preoperative or postoperative antibiotic therapy is rarely administered. Antibiotics are administered based on the clinician's judgment if there is significant preoperative swelling (therapeutic antibiotics) or if there is a heart condition requiring prophylactic antibiotics to prevent endocarditis.

There are typically two choices when a patient presents with an infected tooth that shows a periapical radiolucency: root canal therapy or extraction. Usually, either treatment will lead to resolution of the periapical radiolucency. While postoperative curettage is possible with extractions, preoperative, perioperative, or postoperative curettage is virtually impossible with endodontic therapy. In spite of the impossibility of curettage, most periapical lesions heal after successful endodontic therapy. Our hypothesis was that if periapical lesions can heal after endodontic therapy and without curettage, then they should also be able to heal without postextraction curettage.

II. Methods

All patient charts were retrospectively reviewed in a multidentist private general dental practice between 1999 and 2011 of those who had undergone simple extractions of teeth with preoperative radiolucent lesions and who were seen at least three months postoperatively for a periapical radiograph in the course of receiving their routine dental care. After most extractions, patients were not routinely scheduled for postoperative X rays or even postoperative visits. The preoperative X rays were necessary for the extraction, but the postoperative X rays were coincidental with each patient's routine dental care. A full mouth X ray or a periapical X ray of an adjacent tooth on a patient several years after an extraction would qualify as a postoperative X ray of the extraction site. As a result, the median recall time was rather lengthy. Many patients may have moved away or gone to other dental practices before returning for a postoperative periapical radiograph.

III. Results

There were 31 patients who met the criteria, ranging in age from 17 to 85 years old (median age: 47 years; average age: 46.2 years). [See Table 1.] The lesions ranged from 1 mm^2 to 99 mm^2 (median: 15 mm^2; mode: 25.7mm^2).

Of the 31 patients, none was administered preoperative antibiotics, and only three were administered postoperative antibiotics. A 37-year-old man was given 21 tablets of Penicillin VK 500 mg after the extraction of tooth number two with a 4 mm^2 periapical radiographic lesion. Two patients were administered antibiotics for postoperative infections, one starting on the 2nd postoperative day and the other starting on the 6th postoperative day. All patients showed complete radiographic healing/bone fill at their recall appointments, which ranged from 4 months to 72 months (median 29 months; mode 30.2 months). [See Figures 1 through 4. Figure 1: preoperative #31 X ray showing periapial radiographic lesion. Figure 2: 5-month postoperative Xray #31 showing complete radiographic healing. Figure 3: #30 preoperative X ray showing periapical radiographic lesion, Figure 4: #30 48-month postoperative X ray showing complete radiographic healing.] In addition, two patients (a 24-year-old two days after #30 was extracted and a 62-year-old six days after #31 was extracted) were seen for postoperative fibrinolytic alveolitis and possible infections were prescribed amoxicillin 500 mg three times a day for 6 days.

IV. Discussion

The results clearly show that neither postextraction curettage nor preoperative, perioperative, or postoperative antibiotic therapy is necessary to achieve complete radiographic healing of periapical lesions. A weakness of our study is that it was retrospective, and as a result, patients were not scheduled back periodically to monitor the speed of healing. In a prospective study, it would have been possible to schedule patients periodically and measure the decrease in lesion size accordingly. It is possible that antibiotic therapy or postoperative curettage may speed healing time, but it does not appear to improve the healing itself as all our patients achieved complete healing without it.[10]

V. Conclusion

Postextraction curettage carries inherent risks but few benefits. As is the case after successful endodontic therapy, periapical radiographic lesions heal completely without postextraction socket curettage. Practitioners should consider eliminating postextraction curettage of the socket. Similarly, preoperative, perioperative, and postoperative antibiotic therapy does not improve healing of periapical lesions of erupted teeth, and practitioners should consider eliminating such antibiotics unless indicated by the patient's symptoms (eg, preoperative swelling) or medical condition (eg, artificial heart valve).[11,12]

Table 1 : Extractions without curettage

	Gender	Age	Tooth number	Recall (#months)	Antibiotic	Approximate lesion size (mm^2)
1	M	47	18	36	none	80
2	M	85	8	36	none	20
3	M	44	2	46	none	4
4	M	49	7	26	none	99
5	F	20	17	12	none	15
6	F	49	21	13	none	48
7	M	67	20	44	none	42
8	M	48	31	16	none	54
9	F	74	30	16	none	12
10	F	20	14	4	none	24
11	M	57	19	72	none	7.5
12	M	40	14	12	none	25

13	F	43	8	34	none	1
14	F	41	31	18	none	3
15	M	37	2	40	Penicillin VK 500 mg tablets were prescribed after the extraction for 5 days, four times a day for preoperative swelling.	4
16	M	47	30	24	none	2
17	F	38	30	41	none	7.5
18	M	23	19	35	none	20
19	M	32	30	50	none	5
20	F	25	19	29	none	7.5
21	F	39	18	3	none	4
22	M	62	31	12	On 6th postop day, patient was treated for postop infection and/or dry socket and given amoxicillin 500 mg three times per day for 6 days	5
23	M	75	2	20	none	41
24	F	27	18	17	none	11
25	F	51	19	10	none	64
26	F	24	30	9	On 2nd postop day, patient was treated for postop infection, swelling, and/or dry socket and given amoxicillin 500 mg three times a day for 6 days.	48
27	F	17	19	7	none	56
28	M	72	22	33	none	20
29	F	50	12	3	none	9
30	M	63	18	3	none	49
31	M	67	12	4	none	10

Figure 1 : preoperative #31 X ray showing periapial radiographic lesion

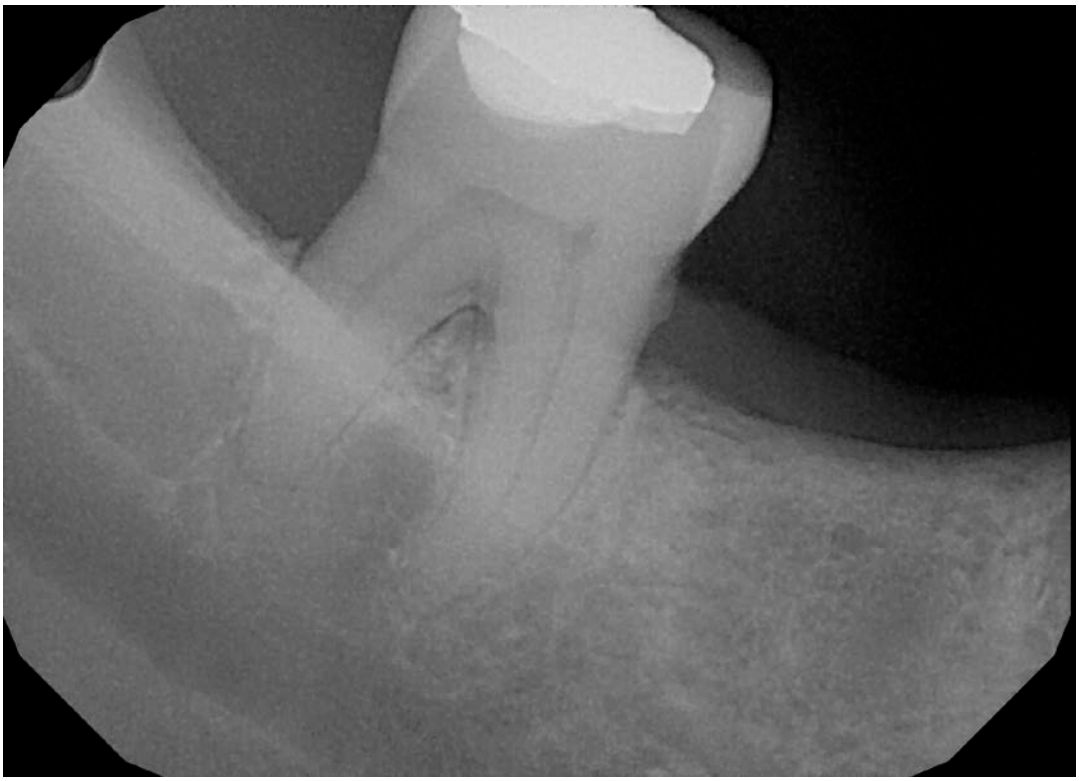


Figure 2 : 5-month postoperative Xray #31 showing complete radiographic healing

Figure 3 : #30 preoperative X ray showing periapical radiographic lesion

Figure 4 : #30 48-month postoperative X ray showing complete radiographic healing

References Références Referencias

1. Wikipedia. *Primum non nocere.* Available: http://en.wikipedia.org/wiki/Primum_non_nocere Accessed November 2, 2013.
2. American Dental Association. Principles of ethics and code of professional conduct. April 2012. Available: http://www.ada.org/1379.aspx Accessed November 2, 2013.
3. Peterson LJ. Principles of uncomplicated exodontia. *In:* Peterson LJ, Ellis E, Hupp JR, Tucker MR, eds. Contemporary oral and maxillofacial surgery, 4th ed. St. Louis: Mosby;2003:113-55.
4. Pogrel MA. Cysts. *In:* Laskin DM, Abubaker, AO. Decision Making in Oral and Maxillofacial Surgery. Chicago: Quintessence;2007:101-7.
5. Fragiskos FD. Simple tooth extraction. *In:* Oral Surgery. Berlin:Springer:2007:76?-93.
6. Halstead JH, Phinney DJ. Surgical scrub. *In:* Delmar's Dental Assisting: a comprehensive approach. Clifton Park, NY:Delmar Learning; 2004:422-441.
7. Dancer SJ. The effect of antibiotics on methicillin-resistant Staphylococcus aureus. J Antimicrob Chemother. 2008 Feb;61(2):246-53.
8. Dancer SJ. How antibiotics can make us sick: the less obvious adverse effects of antimicrobial chemotherapy. Lancet Infect Dis. 2004 Oct; 4 (10):611-9.
9. Gould IM. Antibiotic resistance: the perfect storm. Int J Antimicrob Agents. 2009 Aug;34 Suppl 3:S2-5.
10. Murali R. Controlled clinical trial to understand the need for antibiotics during routine dental extraction. e-J Dent 2011;1(4):87-90. Available: http:// www.ejournalofdentistry.com/articles/e-JOD7B722D5437-AD68-433B-A623-3E9C34C23E06.pdf Accessed February 20, 2012.
11. Larson EL, Schwartz AB. Antibiotic prophylaxis and postoperative complications after tooth extraction and implant placement: a review of the literature. J Dent 2007;35:881-8. Available: http:// www. cumc.columbia.edu/dept/nursing/CIRAR/articles/JJOD1131.pdf Accessed February 12, 2012.
12. Wilson W, Taubert KA, Gewitz M et al. Prevention of infective endocarditis: guidelines from the American Heart Association: a guideline from the American Heart Association Rheumatic Fever, Endocarditis and Kawasaki Disease Committee, Council on Cardiovascular Disease in the Young, and the Council on Clinical Cardiology, Council on Cardiovascular Surgery and Anesthesia, and the Quality of Care and Outcomes Research Interdisciplinary Working Group. J Am Dent Assoc. 2008 Jan;139 Suppl:3S-24S.

Global Journal of Medical research: J
Dentistry and Otolaryngology
Volume 14 Issue 1 Version 1.0 Year 2014
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 2249-4618 & Print ISSN: 0975-5888

Estimation of Age for Sudanese Adults using Orthopantomographs

By Caroline Edward Ayad, Hiba Mahgoub Hamid, Elsafi Ahmed Abdalla & Samih Awad Kajoak

College Of Medical Radiological Science, Sudan

Abstract- Background: Radiology plays an important role in human age determination. Radiological images are utilized in the process of age estimation.

Objectives: The aim of this study was to determine the usefulness of Orthopantomgraphs (OPGs) in the assessment of the Sudanese adult age compared to chronological age.

Materials and Methods: The study was obtained in Mursi Medical Center from the period of January to August 2011. The OPGs of 99 Sudanese individuals of both gender (49male and50 female) with known chronological age, ranging from 15 to 30 years, were selected .The pulp –root length ,root length, pulp/root ratio , total tooth length ,crown length of the mandibular canine were measured in mm and the estimated age was recorded using the mandibuler canine measurements .Patients were classified into three groups ,A was of age <20 years old ,B was of 20 to 27 and C was of age >27.

Results: the estimated age in A and C groups were well correlated with the chronological age in both genders and no significant difference was detected, but in B group there is a significant difference between the estimated and chronological age and between males and females measurements.

Keywords: age estimation, sudanese, orthopanto-mography.

GJMR-J Classification : NLMC Code: WU 300

Strictly as per the compliance and regulations of:

Estimation of Age for Sudanese Adults using Orthopantomographs

Caroline Edward Ayad [α], Hiba Mahgoub Hamid [σ], Elsafi Ahmed Abdalla [ρ] & Samih Awad Kajoak [ω]

Abstract- Background: Radiology plays an important role in human age determination. Radiological images are utilized in the process of age estimation.

Objectives: The aim of this study was to determine the usefulness of Orthopantomgraphs (OPGs) in the assessment of the Sudanese adult age compared to chronological age.

Materials and Methods: The study was obtained in Mursi Medical Center from the period of January to August 2011. The OPGs of 99 Sudanese individuals of both gender (49male and50 female) with known chronological age, ranging from 15 to 30 years, were selected .The pulp –root length ,root length, pulp/root ratio , total tooth length ,crown length of the mandibular canine were measured in mm and the estimated age was recorded using the mandibuler canine measurements. Patients were classified into three groups ,A was of age <20 years old ,B was of 20 to 27 and C was of age >27.

Results: the estimated age in A and C groups were well correlated with the chronological age in both genders and no significant difference was detected, but in B group there is a significant difference between the estimated and chronological age and between males and females measurements.

Mandibular canine measurements can be used significantly in ages < 20and > 27, but cannot give the exact age for ages between 20 to 27 for Sudanese adult subjects.

Keywords: age estimation, sudanese, orthopanto-mography.

I. Introduction

OPG is one of the imaging modalities that produce a complete view of both dental arches and their adjacent structures with minimal geometric distortion and with minimal overlap of anatomic details from the contra lateral side. [Allan E, 2010]

Age estimation, is necessary especially in a multicultural society [Nathalie Bosmansa, 2005], different methods for dental age calculation were used including morphological and radiological techniques. The morphology technique required extraction, which cannot be used in living individuals where it is not acceptable to extract teeth for ethical reasons. In such circumstances, a radiographic approach, offers a relatively nondestructive method and eliminates the need for extraction of teeth.[Ridhima Sharma and Anurag Srivastava,2010]

The dental pulp development and regressive changes can be related to chronological age.[Reppien K., Sejrsen B., Lynnerup N.,2006] The size of the pulp decreases with age due to the deposition of the secondary dentin, and this is a continuous process that occurs throughout life [Nanci A.,2008],dental pulp can be used as a parameter to assess the age of an individual during later periods of life.

Kvaal et al. reported a new method for estimating the chronological age of adults based on the relationship between age and the pulp size on periapical dental radiographs [Kvaal SI,et al1995] as well as on orthopantomographs (OPGs) for estimating the age of an individual.[Smans N.,2005]

Therefore the Objectives of this study are to assess the dental age for Sudanese population using OPG as one of the radiological methods as well as to determine the usefulness of OPG in dental morphology assessment for the age compared to chronological age using Kvaal's method and to evaluate the applicability of dental age in forensic sciences for Sudanese

II. Materials and Methods

The study was done at Mursi Medical Center during the period from March 2011 to August 2011.OPG machine GENDEX was used by applying 47 Kv, 10 mAs. 99 subjects with known chronological ages between (15-30 years old), from panoramic x-ray department were involved in this study, the best presented mandible canine on the orthopantomograph and suited for measurement were chosen. The subjects with impacted teeth, opaque fillings, crowns, pathological processes in the apical bone visible on the radiograph and extracted canine and ages more than 30 were not selected. Orthopantomograms showing badly positioned teeth or teeth with large areas of enamel overlap between neighboring teeth were also excluded. The ethics and research committee approved the study and consent was obtained from all patients prior to the examination.All subjects were examined in sitting position; and in proper manner to ensure that the teeth and jaws are within the image. All foreign objects, including dental appliances, spectacles and earrings were removed. The patient's head was positioned

Author α σ ω: Diagnostic Radiology, Associate Professor College Of Medical Radiological Science, Sudan University Of Science And Technology, P.o.Box 1908 ,Khartoum Sudan.
e-mail: carolineayad@yahoo.com
Author ρ: Medical Ultrasound Associate Professor, College Of Medical Radiological Science, Sudan University Of Science And Technology, P.o.Box 1908 ,Khartoum Sudan.

correctly; the patient rested the tongue against the palate to prevent a radiolucent band appearing above the maxillary teeth .Dental panoramic tomography was carried out with intensifying screens to limit the radiation dose. The Study chooses the mandible canine in both genders to apply the measurements. The variables were defined as: P= the length of the pulp, T= the length of the root from cervical area to the apical end, C= the length of the crown from the cervical area to the incisal edge, Total length of the tooth.The four variables were measured in (mm) and the pulp/tooth area ratio of the canine was calculated. Age was calculated using the Indian formula derived: (Age=64.413-(195.265 x PTR).where PTR is the pulp/tooth area ratio. The Indian specific equations [Babshet M.,et al2010] were applied for Sudanese subjects and examined its use in age prediction; the suspected age was compared to the known chronological age.

III. Statistical Analysis

The data were analyzed by using SPSS, version 16.0.The data are expressed using mean, standard deviations and percentages and p value at 0.05 to test the degree of significances.

IV. Results

The 99 Sudanese subjects studied consist of 50 (50.5%) female and 49(49.5%) male

The total sample is divided into three groups (A-B-C) according to age:

Group (A): age less than 19 years old.

Group (B): age more than 20 and less than 27 years old.

Group (C): age more than 26 years old.

a) Results of Group A (Age <20)

Table1 : The mean and standard deviation of the variables that collected from the sample (12 males, 16 females)

	Gender	Number	Mean	Std. Deviation
Chronological age	Male Female	12 16	16.533 15.469	1.5675 .6700
Estimated age	Male Female	12 16	16.600 15.562	1.5949 .8318
PRL(P)	Male Female	12 16	16.83 12.94	3.010 1.526
TRL (T)	Male Female	12 16	19.58 16.25	1.832 2.408
CIL(C)	Male Female	12 16	11.00 10.88	.853 .957
Total length	Male Female	12 16	30.67 26.50	2.535 3.795
PTR ratio	Male Female	12 16	85.1417 80.1250	7.78921 4.25167

Number of Subjects are 28 for both gender (Age < 20),(P) stands for the length of the pulp, (T)for the length of the root from cervical area to the apical end, (C)for the length of the crown from the cervical area to the incisal edge, Total length of the tooth. And (PTR) is the pulp/tooth area ratio

Table 2: The average mean and STDV of the variables collected from both males and females

	Chronological age	Estimated age	PRL (P)	TRL (T)	CILC (C)	Total length	PTR ratio
Number	28	28	28	28	28	28	28
Mean	15.925	16.007	14.61	17.68	10.93	28.29	82.2750
Std. Deviation	1.2403	1.3015	2.973	2.722	.900	3.876	6.41501

Number of Subjects are 28 for both gender (Age < 20)The ages are measured in years and the variables measurements are taken in (mm)

Table 3 : The Correlation between the Chronological and Estimated Age

	Number	Correlation	Significant
Chronological & Estimated age	28	.939	.000

Number of Subjects are 28, Age < 20 years, P-value is significant at 0.000

b) Results Of Group B (Age > 19 and age < 27)

Table 4 : The average mean and standard deviation of the variables collected from the sa mple B(24 males and 28 females)

	Gender	Number	Mean	Std. Deviation
Chronological age	Male Female	24 28	23.717 22.157	1.7307 1.2612
Estimated age	Male Female	24 28	23.850 22.532	1.5946 1.3389
PRL(P)	Male Female	24 28	20.50 16.61	.834 3.957
TRL (T)	Male Female	24 28	16.79 14.46	1.103 3.737
CIL(C)	Male Female	24 28	11.04 11.25	.690 .799
Total length	Male Female	24 28	27.75 25.71	1.359 3.886
PTR ratio	Male Female	24 28	122.5042 115.7700	8.08286 6.85635

Number of Subjects are 52 for both gender ,with Age > 19 and age < 27,(P) stands for the length of the pulp, (T)for the length of the root from cervical area to the apical end, (C)for the length of the crown from the cervical area to the incisal edge, Total length of the tooth. And (PTR) is the pulp/tooth area ratio

Table 5 : The average mean and STDV of the variables collected from both genders

	Chronological age	Estimated age	PRL (P)	TRL (T)	CIL (C)	Total length	PTR ratio
Number	52	52	52	52	52	52	52
Mean	22.877	23.140	18.40	15.54	11.15	26.65	118.8781
Std. Deviation	1.6761	1.5924	3.527	3.052	.751	3.143	8.11432

Number of Subjects are 52 both gender (Age > 19 and age < 27)
The ages are measured in years and the variables measurements are taken in (mm)

Table 6 : The correlation between the chronological and estimated age

	Number	Correlation	Significant
Chronological & Estimated age	52	.955	.182

Number of Subjects are 52, (Age > 19 and age < 27), P-value is significant at 0.000

c) Results Of Group C (Age > 26)

Table 7 : The average mean and standard deviation of the variable collected from the sa mple c (14 males and 5 females)

	Gender	Number	Mean	Std. Deviation
Chronological age	Male Female	14 5	30.229 30.320	1.6790 1.8130
Estimated age	Male Female	14 5	30.736 29.620	2.0167 1.3424
PRL(P)	Male Female	14 5	19.29 19.60	.726 1.140

TRL (T)	Male Female	14 5	12.29 13.00	1.069 1.225
CIL(C)	Male Female	14 5	10.71 10.60	.611 .548
Total length	Male Female	14 5	23.00 23.60	1.177 1.517
PTR ratio	Male Female	14 5	157.4143 151.0200	10.52096 6.83974
Number of Subjects are 19 for both gender ,(Age > 26) ,(P) stands for the length of the pulp, (T)for the length of the root from cervical area to the apical end, (C)for the length of the crown from the cervical area to the incisal edge, Total length of the tooth. And (PTR) is the pulp/tooth area ratio				

Table 8 : The average mean and STDV collectedfrom variables for both genders

	Chronological age	Estimated age	PRL (P)	TRL (T)	CIL (C)	Total length	PTR ratio
Number	19	19	19	19	19	19	19
Mean	30.253	30.442	19.37	12.47	10.68	23.16	155.7316
Std. Deviation	1.6638	1.8954	.831	1.124	.582	1.259	9.93518
Number of Subjects are (Age > 26) The ages are measured in years and the variables measurements are taken in (mm)							

Table 9 : The correlation between the chronological and estimated age

	Number	Correlation	Significant
Chronological & Estimated age	19	.894	.000
Number of Subjects are 19 (Age > 26) P-value is significant at 0.000			

d) Results of the Groups A and C (Age <= 20 or age > 26 years)

Table 10 : The average mean and standard deviation of the variables collected from the sample A&C

	Gender	Number	Mean	Std. Deviation
Chronological age	Male Female	26 21	23.908 19.005	7.1431 6.5579
Estimated age	Male Female	26 21	24.212 18.910	7.4081 6.2064
PRL(P)	Male Female	26 21	18.15 14.52	2.412 3.234
TRL (T)	Male Female	26 21	15.65 15.48	3.979 2.581
CIL(C)	Male Female	26 21	10.85 10.81	.732 .873
Total length	Male Female	26 21	26.54 25.81	4.329 3.586
PTR _ratio	Male Female	26 21	124.057 7 97.0048	37.87195 31.30921
Number of Subjects are 47 for both gender (Age <= 20 or age > 26 years),(P) stands for the length of the pulp, (T)for the length of the root from cervical area to the apical end, (C)for the length of the crown from the cervical area to the incisal edge, Total length of the tooth. And (PTR) is the pulp/tooth area ratio				

Table 11 : The average mean and STDV collected from variables for both genders

	Chronological age	Estimated age	PRL (P)	TRL (T)	CIL (C)	Total length	PTR ratio
Number	47	47	47	47	47	47	47
Mean	21.717	21.843	16.53	15.57	10.83	26.21	111.9702
Std. Deviation	7.2456	7.3262	3.322	3.393	.789	3.989	37.28985
Number of Subjects are 47 (Age <= 20 or age > 26/ years),the measurements are taken in (mm) for the variables							

Table12 : The correlation between the chronological and estimated age

	Number	Correlation	Significant
Chronological & Estimated age	47	.996	.000
Number of Subjects are 47, Age <= 20 or age > 26 years P-value is significant at 0.000			

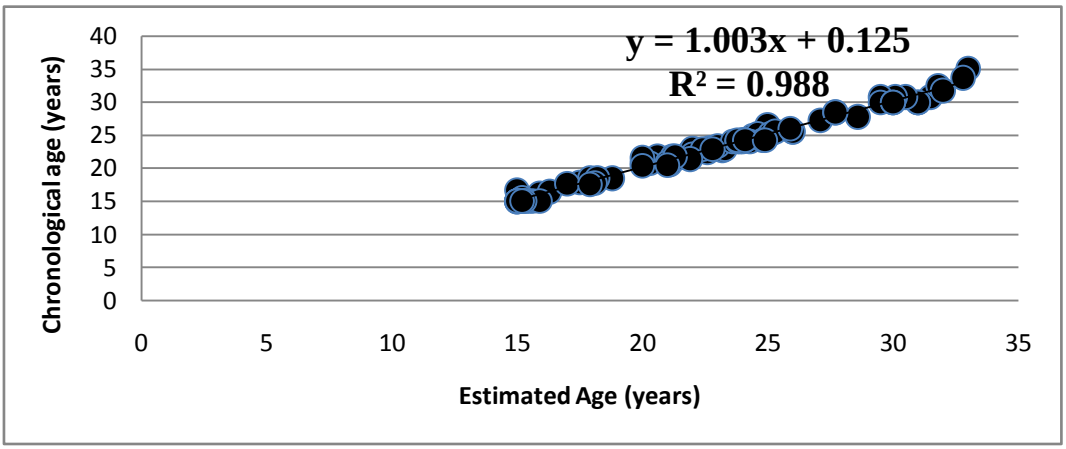


Fig. 1 : shows the relation between the chronological age and estimated age

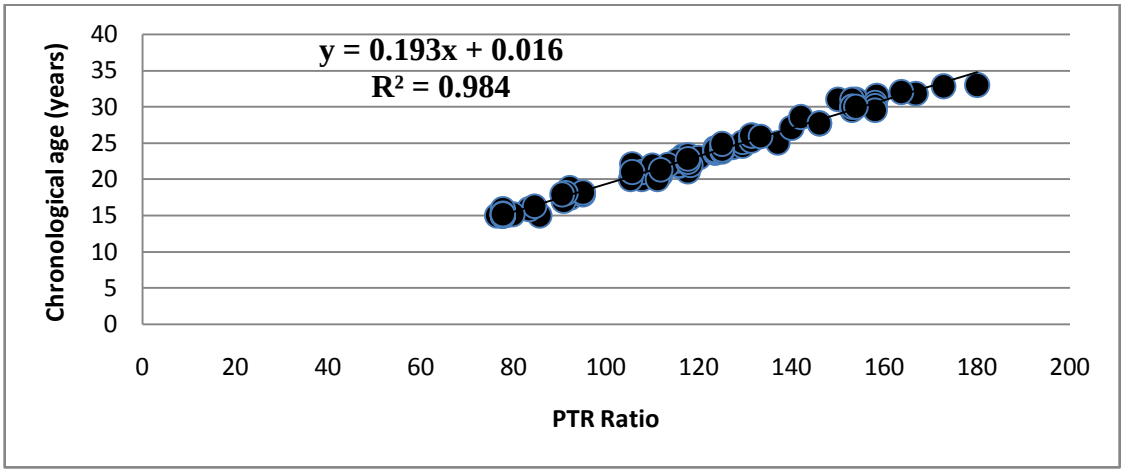


Fig. 2 : Shows the relation between the chronological age and PTR Ratio

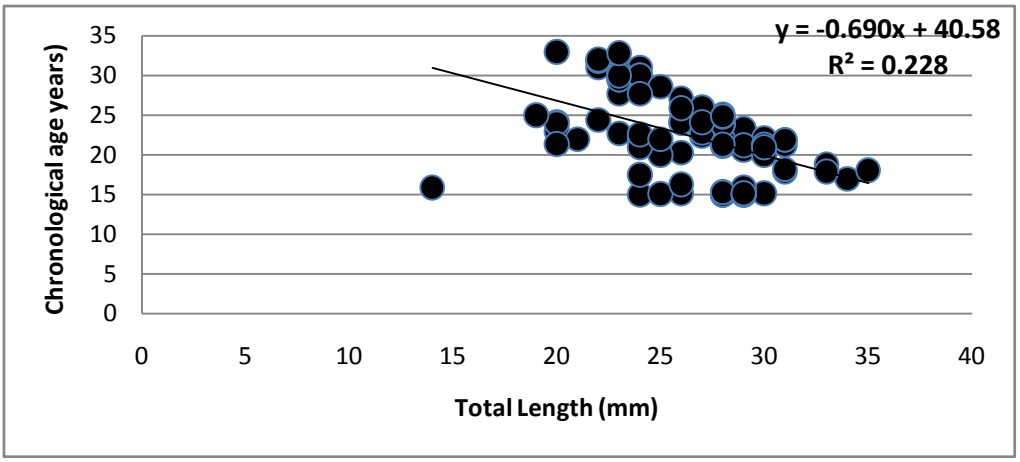


Fig. 3 : shows the relation between the chronological age and Total Length

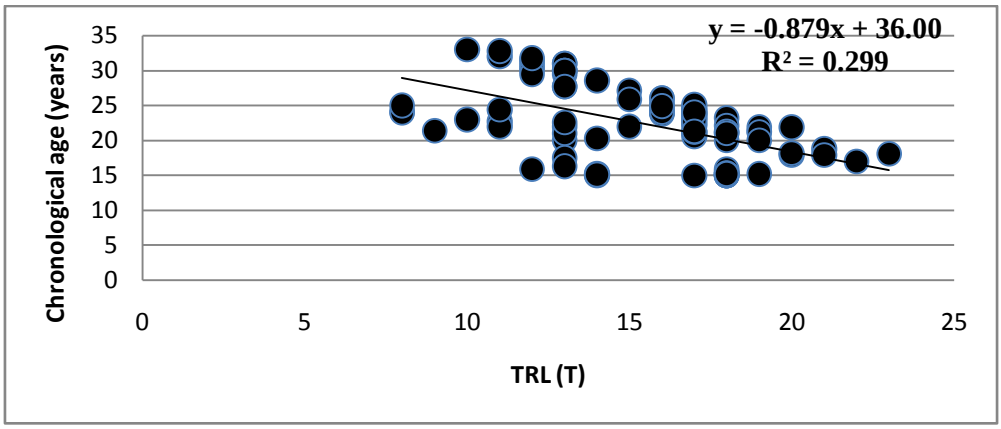


Fig. 4 : shows the relation between the chronological age and TRL

V. Discussion

Age estimation plays an important role in forensic medicine and dentistry.[Maber M,2006] Radiology plays an indispensable role in human age determination. Radiological age estimation in adults would be challenging as the development of dentition is completed.

In adulthood, teeth undergo time-related changes representing biological aging, and many studies have shown that several features of aging can be used for age determination [Paewinsky E.2005] including volume of pulp cavity and the third molar development as well as the morphology of the teeth.

The main objective of this study was to assess the dental age using OPG as a routine method used in dentistry. The study used five variables including: The pulp –root length, root length, pulp/root ratio, total tooth length, crown length of the mandibular canine in both genders using mean values and standard deviation.

The sample was divided into 3 groups, group A was of ages <20, [Table 1, 2] shows that the mean age and standard deviation were found to be For PRL (P) and TRL (T), CIL(C) it was found to be 14.6±2.9, 17.7±2.7, 10.9±.9, and the total length of the mandible canine was found to be 28.3±3.9 where the PTR ratio was found to be 82.3±6.4.

The Indian equation mentioned by [Babshet M. 2010] was applied using the PTR to calculate the subjects suspected age, the mean age and standard deviation were found to be 15.9±1.24, 16.0±1.30 for Chronological age and estimated age respectively. The correlation between the chronological and estimated age of this group was found to be 0.000 at p-value of 0.005. [Table3]

Results of Group B (Age > 19 and age < 27) were found to be: for PRL (P), TRL (T), CIL(C), were found to be 18.4±3.5, 15.5±3.1 and 11.2±.8 and the total length were found to be 26.7±3.1 and the PTR –ratio was 118.9±8.1.

The mean age and standard deviation were found to be 22.9±1.7, 23.1±1.6 for Chronological age and Estimated age respectively, and The correlation between the chronological and estimated age of this group was found to be 0.184 that means that a significant difference between the estimated and chronological age was detected in this group.[Table 4,5,6].This may be due to the different stages of dental development which should be associated with caution

to maturation stage or skeletal age as mentioned by[Carlos Estrela, José Valladares Neto, 2010]

Results of Group C (Age > 26) the results shows that the mean PRL-Pwas19.4±0.8 and TRL –T was 12.5±1.124 and CILC was10.7±0.6 where the total length was found to be 23.2±1.3, and PTR ratio was 155.7±9.9.the mean age and standard deviation were found to be 30.3±1.7, 30.4±1.9 for Chronological age and estimated age respectively, The result showed that there were significant relationships detected when calculating the estimated age in group (A and C) with the chronological age in both genders, but there is a significant difference between the estimated and chronological age in group (B).[Table7,8,9]

On similar grounds, a study was carried out to examine the application of the pulp/tooth area ratio by digital periapical images of upper and lower canines as an indicator of age. It was concluded that canines can serve to predict the age of an individual [Cameriere et al, 2007]

Results of the Groups A and C (Age <= 20 or age > 26 years) showed a significant relation between the chronological age and estimated age [tables 10, 11, 12]

The relation between the chronological age and PTR Ratio was studied, it was increased by 0.19±0.02,R2 was 0.98 this ;because of that with advancing age, secondary dentine is deposited along the wall of the dental pulp chamber, leading to a reduction in the size of the pulp cavity.[Prapanpoch S,1994] this ratio is good indicator for ages less than 20 and more than 26 it consigned with the estimated age gained by the Indian equation but in ages of twenties the exact age was not estimated significantly when using PTR ratio. [Figures 1,2].The relation between the chronological age and Total Length was also been evaluated, it was found that the total tooth (canine) length was decreased by increasing the age, and TRL was also decreased with age as it appears in [Figures 3,4]. Similar findings was found [Babshet M.2010, Kvaal S.I, Solheim T, 1994, Landa M.I.2009]

To conclude ;this study is an attempt to assess the age using OPG in Sudanese population in both gender using mandibuler canine for PTR, the result suggested that The Indian formula for mandibular canine measurements can be applied to estimate the dental age for Sudanese significantly with the chronological age in ages less than 20and more than 27 in both male and female, but in the ages between 20 to 27 there is a significant difference between chronological and estimated age as well as between males and females measurements.

Also it gives a scope for future studies on larger sample size, and measuring the molars and premolars as an age indicator.

References Références Referencias

1. Allan G. Farman .Panoramic Radiology Seminars on Maxillofacial Imaging and Interpretation. First Edition. ISBN-13: 9783642079658, November 2010, Publisher: Springer Berlin Heidelberg.
2. Nathalie Bosmansa, Peirs Annb, Medhat Alya, Guy Willemsa,The application of Kvaal's dental age calculation technique on panoramic dental radiographs, Forensic Science International 153 (2005) 208–212.
3. Ridhima Sharma and Anurag Srivastava, Radiographic evaluation of dental age of adults using Kvaal's method. J Forensic Dent Sci. 2010 Jan-Jun; 2(1): 22–26.
4. Reppien K, Sejrsen B, Lynnerup N. Evaluation of post-mortem estimated dental age versus real age: A retrospective 21-year survey. Forensic Sci Int. 2006; 159:S84–8.
5. Nanci A. 6th Ed. Elsevier Publishers; Tencate's Oral Histology, Development, Structure and Function; 2008 p. 225. Chapter 8.
6. Kvaal SI, Kolltveit KM, Thomsen IO, Solheim T. Age estimation of adults from dental radiographs. Forensic Sci Int. 1995;74:175–85.
7. Smans N, Ann P, Aly M, Willems G. The application of Kvaal's dental age calculation technique on panoramic dental radiographs. Forensic Sci Int. 2005;153:208–12.
8. Maber M, Liversidge HM, Hector MP. Accuracy of age estimation of radiographic methods using developing teeth. Forensic Sci Int. 2006; 159S:68–73.
9. Paewinsky E, Pfeiffer H, Brinkmann B. Quantification of secondary dentine formation from orthopant-omograms--a contribution to forensic age estimation methods in adults. Int J Legal Med. 2005; 119:27–30.
10. Babshet M, Acharya AB, Naikmasur VG Age estimation in Indians from pulp/tooth area ratio of mandibular canines. Forensic Sci Int. 2010 Apr 15;197(1-3):125.
11. Carlos Estrela, José Valladares Neto, Mike Reis Bueno, Orlando Aguirre Guedes; Olavo Cesar Lyra Porto; Jesus Djalma Pécora Linear measurements of human permanent dental development stages using Cone-Beam Computed Tomography: a preliminary study Dental Press J. Orthod. vol.15 no.5 Maringá Sept./Oct. 2010.
12. Cameriere R, Ferrante L, Belcastro MG, Bonfiglioli B, Rastelli E, Cingolani M. Age estimation by pulp/tooth ratio in canines by peri-apical X-rays. J Forensic Sci. 2007; 52:166–70.
13. Prapanpoch S, Dove SB, Cottone JA. Morphometric analysis of the dental pulp chamber as a method of age determination in humans. Am J Forensic Med Pathol. 1992;13:50–55.

14. Kvaal S.I, Solheim T. A nondestructive dental method for age estimation, T.forensic odontos-tomatol. 12(1994)6-11.
15. Landa MI, Gara mendi PM. Botella MC, Aleman I, Application of the method of Kvaal et al, to digital orthopantomograms. Int J legal Med. 2009 Mar 123(2), 123-8.

Global Journal of Medical research: J
Dentistry and Otolaryngology
Volume 14 Issue 1 Version 1.0 Year 2014
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 2249-4618 & Print ISSN: 0975-5888

Bioactive Implants in Cervical Spine Injury - Original Research(From 1995 To 2011)

By M.Filip, F. Šámal, P.Linzer, P.Jurek & J.Strnad
Neurosurgical department KNTB Zlín, Czech Republic

Abstract- Objectives: The paper deals with the development and clinical evaluation of a new bioactive implant designed for anterior cervical interbody fusion (ACIF) in the surgical treatment of unstable injury in subaxial part of cervical spine (type A2, 3 and B3 fractures according to Aebi and Nazarian classification).

Significance of the topic: In the middle of the nineties of the last century the glass-ceramic prosthesis BAS-0 made it possible to gain the first experiences in materials replacing allografts for ACIF. Its major disadvantage lay in insufficient resistance. Given these complications, we searched for a stronger material while maintaining the bioactive properties of the glass-ceramics. Bioactive titanium with a special surface treatment by the company LASAK proved to be such a material. New Implant suitable for ACIF was developed in the year 2003. This type was introduced into clinical practice in 2004 after experimental mathematical verification of the design and cadaver testing.

Brief methodology: The new implant has a basic shape of a full truncated prism narrowed by 1 degree towards the spinal canal; its length is 13-15 mm with a graded height of 8-5 mm and width of 13 mm. We have used this implant successfully in the treatment of patients with cervical spine injury in unstable fractures. It was indicated the anterior decompression of the spinal canal with interbody fusion together with plate systems.

GJMR-J Classification : NLMC Code:WE 725

BIOACTIVEIMPLANTSINCERVICALSPINEINJURYORIGINALRESEARCHFROM1995TO2011

Strictly as per the compliance and regulations of:

Bioactive Implants in Cervical Spine Injury – Original Research(From 1995 To 2011)

M.Filip [α], F. Šámal [σ], P.Linzer [ρ] P.J urek [ω] & J.Strnad [¥]

Abstract- *Objectives:* The paper deals with the development and clinical evaluation of a new bioactive implant designed for anterior cervical interbody fusion (ACIF) in the surgical treatment of unstable injury in subaxial part of cervical spine (type A2, 3 and B3 fractures according to Aebi and Nazarian classification).

Significance of the topic: In the middle of the nineties of the last century the glass-ceramic prosthesis BAS-0 made it possible to gain the first experiences in materials replacing allografts for ACIF. Its major disadvantage lay in insufficient resistance. Given these complications, we searched for a stronger material while maintaining the bioactive properties of the glass-ceramics. Bioactive titanium with a special surface treatment by the company LASAK proved to be such a material. New Implant suitable for ACIF was developed in the year 2003. This type was introduced into clinical practice in 2004 after experimental mathematical verification of the design and cadaver testing.

Brief methodology: The new implant has a basic shape of a full truncated prism narrowed by 1 degree towards the spinal canal; its length is 13-15 mm with a graded height of 8-5 mm and width of 13 mm. We have used this implant successfully in the treatment of patients with cervical spine injury in unstable fractures. It was indicated the anterior decompression of the spinal canal with interbody fusion together with plate systems.

Results: During the years 2006 – 2011 we operated 26 patients with unstable fractures in subaxial cervical spine. We performed successful surgery using new bioactive titanium implant in 12 patients. The outcomes were evaluated according to the standard criteria used in this kind of operations (clinical scoring schemes, radiological imaging) with a follow-up of at least 1 year.

Conclusion: When comparing the operation techniques using different types of implants to our implants we found one significant difference. Thanks to the new shape and bioactive properties of the surface it is not necessary to fill it with further material.

I. Introduction

Injuries of the lower cervical spine occurs as monotrauma or compound injury. They are rarely caused by only direct force on the spinal structures. Typically there is an indirect injury of spinal segment due to non-physiological forces (compression, flexion, extension or rotation). Cervical spine injuries result in the spine segment instability which poses a threat to the nerve structures of the spinal canal (spinal cord, roots) (Aebi 1991, Bohlman 1979, Caspar 1989). Modern classifications of lower cervical spine injuries respect these pathological anatomical characteristics and determine the level of injury severity and the prognosis. Detailed and frequently used classification by Aebi *and* Nazarian (Aebi 1987) divides injuries into type A, type B and type C and into groups and subgroups 1 to 3, and respects the extent of traumatic instability or residual stability, distinguishes anterior and posterior column of the spine and differentiates between mostly osseous, mostly ligamentous, and combined injury. Conventional X-ray and CT examinations are needed for the determination of injury classification. In many cases it is also necessary to add MRI examination to determine the damage to the soft tissues – ligaments, joint capsules and intervertebral discs. Depending on whether the injury is classified as stable or unstable, a decision is made about the management (surgery/conservative therapy). Surgical intervention is required for unstable spine injuries (Bohlman 1992, Fehlings 2005. Kandziora 2005, Osti 1989, Štulík 2003). It allows stabilization and decompression of the spinal cord and reconstruction of the anatomical structures of the spine to prevent secondary damage to the spinal cord and late post-traumatic changes. It is not possible to heal the "unstable" type of injury using conservative management. The most common surgical technique in ligamentous (A3, B3, C3) and osteoligamentous injuries (A2, C2) is anterior approach using a plate and the anterior cervical interbody fusion (ACIF) similarly as in degenerative cervical spine disease (Norrell 1970, Perret 1968, Caspar 1989, Connoly 1996).

In 1960 Bailey (Bailey 1960) and then Robinson and Southwick published their first experience with surgical treatment of lower cervical spine injuries using the anterior approach technique described between 1955 and1958 by Robinson and Cloward for the treatment of degenerative diseases (Cloward 1958). Standard surgical procedure includes decompression of the spinal canal (reduction of luxation, removal of damaged intervertebral disk, etc.), anterior cervical interbody fusion using bone grafts and fixating the operated segment with a plate and monocortical or bicortical screws. Because of problems associated mainly with bone graft harvest (Banvart 1994, Hrabálek 2007) implants designed for use in ACIF made of various materials (glass-ceramics, titanium, PEEK,

Author α σ ρ ω: Neurosurgical department KNTB Zlín, Czech Republic.
Author ¥: Research and Development Center for Dental Implantology and Tissue Regeneration, LASAK Ltd Prague, Czech Republic.
e-mail: strnad@lasak.cz

polylactide) have been developed since the 80´s of the last century (Yamamuro 1995, Matge 1998, Filip 2000, Cho D 2002, McConnell 2003,Vaccaro 2002). They should eliminate the problems inherent to bone grafts and copy as much as possible the biological properties of bone tissue. Based on biomechanical studies we have developed an implant made of bioactive glass-ceramics in the first half of 1990´s. Its strength parameters and bioactive properties simulated bone tissue (Kokubo 1982, Bienik 1991, Urban1992). In clinical practice it gradually replaced bone grafts in surgical treatment of degenerative disease (Filip 2000) and unstable, mainly osteoligamentous injuries to the lower cervical spine. At the Neurosurgical Department of the University Hospital in Ostrava we operated 10 patients with cervical spine injuries using this implant supplemented with a plate fixed by screws during the period of 1997 to 1999. Neurological findings improved by one grade on the Frankel scale in 3 patients. According to imaging examinations (RTG, CT) no dislocation of glass-ceramics implant occurred after a period of one year and more since the time of the operation. After two months, we observed in two operated that a screw in the plate became partially loose without a need for re-operation. The main advantages for the patients included mainly shorter time of the operation and elimination of complications associated with the bone graft harvest. Bioactive properties of the surface contributed to bone fusion without supplementing additional material. Implant fragility was the main disadvantage (Filip 2000). During the application there was a risk of damage to the implant by the contact with metal instruments. In 2003–2004 we eliminated this disadvantage by developing an implant made of a new material – bioactive titanium. It has shown several times higher strength while retaining its bioactive properties as a result of a special surface treatment [Strnad 2001]. We have gradually implemented this to the clinical practice for the same indications as in case of the preceding glass-ceramics implant. In 2007–2011 we used it at Neurosurgical Department of KNTB Zlín in 12 of 34 patients who underwent anterior approach surgery due to unstable injury to the lower cervical spine. Compared to the glass ceramic implant the new implant handling during the surgical procedure was easier without a risk of damage. Its shape and bioactive properties contributed to bone fusion without the need of additional material (Filip 2005, Filip 2010). In the monitored post-operative period of at least one year neither any dislocation nor deterioration in the clinical condition was observed in a set of all 34 operated patients. Cage implants made of polylactide or PEEK (Vaccaro 2002, Hacker 2000, ChoD 2002, Matge 2002, Suchomel 2004) were applied to the remaining 22 patients who were operated in the same period. Their cavity needed to be filled with additional material (bone, BCP, TCP) to initiate interbody fusion. Compared with the application of a titanium implant with bioactive surface, cage implants with filling material are more demanding with regards to their insertion, which prolongs the duration of the operation.

II. Material and Methodology

a) Implant for use in ACIF made of glass-ceramics BAS-O (1996–1999)

In 1997 we used an implant made of bioactive glass-ceramics for ACIF in unstable injury to the lower cervical spine as an equivalent replacement of autologous bone drafts (Kokubo 1982,Urban 1992,Yamamuro 1995). It imitated bone tissue properties by its mechanical strength and bioactive properties. In vertical compression glass-ceramics exceeded twice the strength of cortical bone tissue and it was identical in bending strength. Disadvantage of BAS-O glass-ceramics is its fragility causing problems in optimizing the implant shape during biomechanical modelling. Based on mathematical studies we have retained the implant´s shape as a tapered prism with the following dimensions: length 15mm, height 7.8mm ventrally and 6.9mm dorsally, and width 13mm. Strength parameters of this shape exceeded the strength of an autograft (see Figure 1, Figure 2).

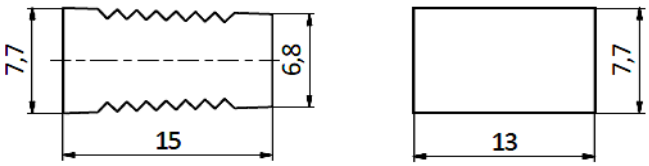


Figure 1 : Drawing of a cervical implant for use in ACIF made of bioactive ceramics (1994)

Figure 2 : Cervical implant for use in ACIF in clinical practice (1996)

Its bioactive properties were the result of an active chemical bond initiated by hydroxyapatite surface with surrounding bone tissue that developed within 48 hours and then the migration of osteoblasts over the surface to create bone fusion within 2 to 3 months by connecting the surrounding vertebral bodies (see Figure 3).

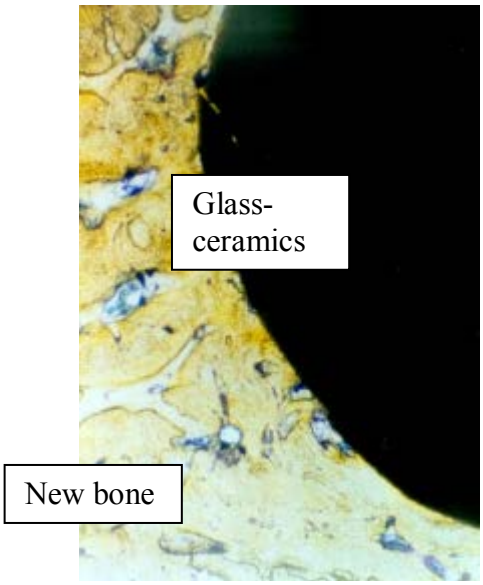


Figure 3 : Electron microscope: bone/glass-ceramics active interface (1992)

Figure 3 Histological cross-section of the interface between BAS-O glass-ceramics and newly created bone tissue 6 years after the implantation (original magnification 200x, stained with toluidine blue). The image demonstrates direct connection of the implant surface with bone tissue without intermediary layer of fibrous tissue.

Implant surfaces that face the vertebral bodies have small indentations of 1mm high. They are intended to secure a firm fixation immediately after the surgery before the fusion due to chemical bond occurs. During the insertion the implant had to be protected from a contact with the metal because of the risk of a damage. We used instruments covered with rubber for handling the implant.

b) *Implant for use in ACIF made of bioactive titanium 2007 - 2011*

Based on the experience with the application of the glass-ceramics implant (Filip 2000) we were looking for material with better strength parameters while maintaining the surface bioactive properties. The material was required to enable more convenient handling during the surgical procedure without the risk of a damage. Titanium with special treatment ensuring surface bioactive properties developed in 1998-2001 (Strnad 1999, 2001) appeared to be the material.

In 2004–2005 we developed an implant for use in ACIF made of bioactive titanium. After the surface treatment this material retains its osteoconductive properties similar to the BASO glass-ceramics while its strength increases significantly. This implant has a basic shape of a full truncated prism narrowed by 1 degree towards the spinal canal; its length is 13-15 mm with a graded height of 8-5 mm and width of 13 mm

It is made of technical pure titanium with a chemically-treated surface providing its bioactive properties. This enables it to form a firm bond with the bone tissue and features osteoconductive properties, see Figure 4.

Figure 4 : Electron microscope: bone/biotitanium active interface

Figure 4 Histological cross-section of the interface between the newly created bone tissue and bioactive surface 2 months after the implantation (original magnification 200x, stained with toluidine blue). The figure showing high value of Bone Implant Contact (BIC=91%) 2 months after the implantation indicating excellent osseoconductive properties of bioactive titanium.

The material is of black-gray color with a density of 4,500 kg*m^{-3} and its tensile strength is at least 450 MPa. On the prism´s opposite sides adjacent to vertebral bodies after the application, the implant is fitted with sharp wings of 0.5 mm in height and 30-degree angulation. These ensure primary stability for undisturbed healing and incorporation of the implant into the surrounding vital bone tissue. The shape and size was supported by biomechanical studies, see Figure 5.

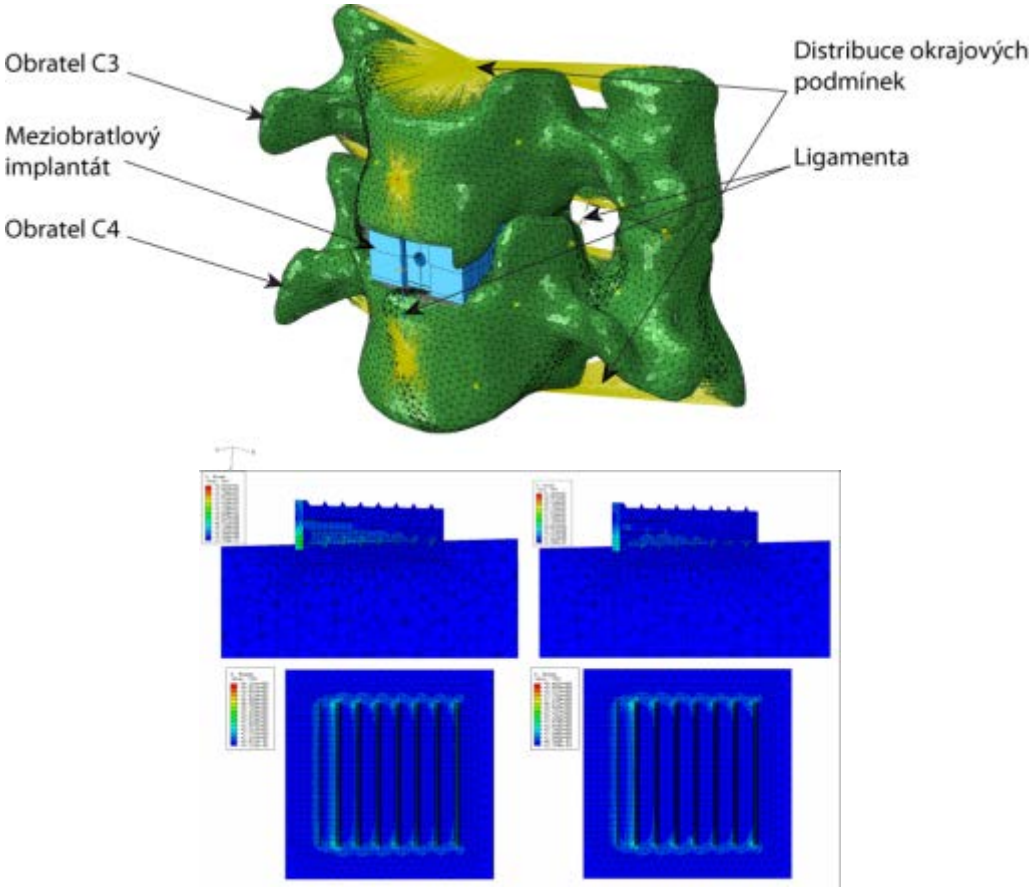


Figure 5 : Model evaluation of shape and strength of wings (2003)

These studies supplemented by clinical experience with the glass-ceramics implant resulted in the creation of a new implant for use in ACIF, see Figure 6.

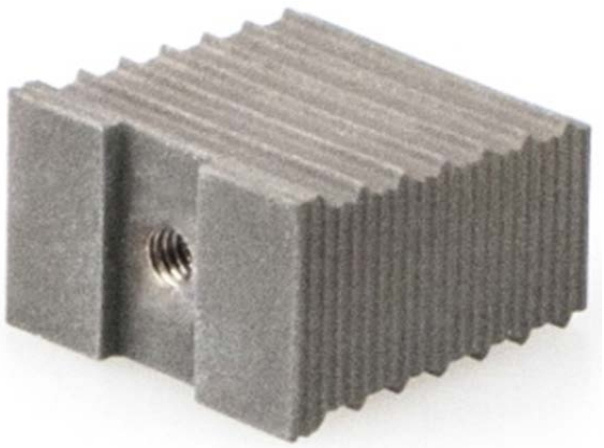


Figure 6 : Cervical implant made of bioactive titanium (2004)

III. Results

In both types of implants (glass-ceramics/bioactive titanium) developed by us we indicated patients for the operation according to the instability of the injured lower spine defined in the preoperational stage according to the imaging methods (X-ray, MRI, CT) and using the classification according to Aebi and Nazarian and according to the neurological findings using the Frankel scale. We carried out the surgery by the Caspar technique (Caspar 1989, Klézl 1999). Under general anesthesia from the prevertebral incision and after exposing anterior surface of the veretbral bodies we removed the structures compressing the spinal canal (intervertebral disk, posterior ligament residues, fragments of the edges of

the vertebral bodies, haematoma, etc.) using an operating microscope. Then we prepared a bed for inserting the implant into the interbody space. We removed the endplates from the vertebral bodies and exposed cancellous bone. In traction and using the Caspar´s instrumentarium we inserted the implant into the interbody space under the control of X-ray, see Figure 7.

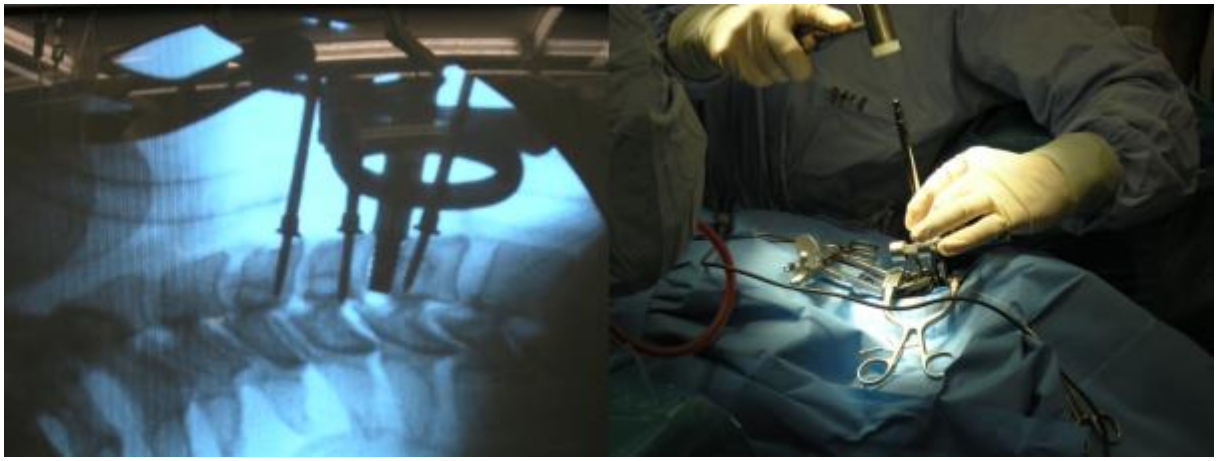


Figure 7 : Inserting the bio-titanium implant into the interbody space C5/6 using the X-ray control

After releasing traction and checking the position on X-ray we fixed the impaired segment by a plate secured with monocortical or bicortical screws into the neighboring vertebral bodies. Surgical procedure is similar for both the glass-ceramics implant and the bio-titanium implant. We used the same surgical procedure for other types of implants as well (polyactide/PEEK).

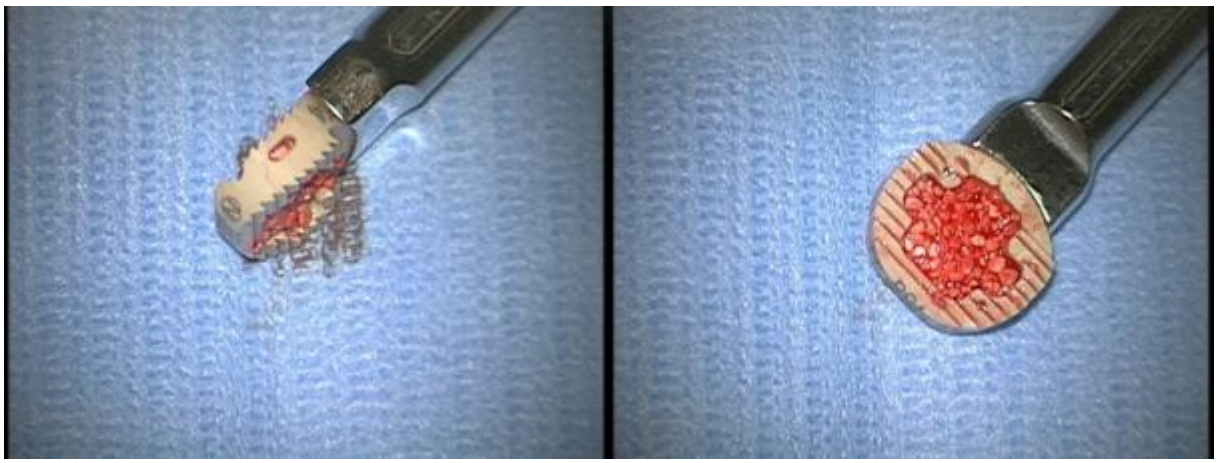


Figure 8 : Implant for use in ACIF (PEEK/TCP) 2010

We carried out verticalization in operated patients in case of all implants on the first post-operative day in a collar for a period of 6 weeks until the expected bone fusion occurrence.

At Neurosurgery Department of the University Hospital in Ostrava we operated 10 patients with unstable injury to the lower cervical spine using glass-ceramics implants between 1997 and 1999, see Figures 9 and 10.

Figure 9 : X-ray after fixation of C6/7 due to unstable injury (Aebi-Nazarian – A3) 12 months after the surgery – glass-ceramics BAS-O (1997)

Figure 10 : CT after fixation of C6/7 12 months following the surgery – glass-ceramics BASO (1998)

The implant for use in ACIF made of glass-ceramics fulfilled our expectations. It removed complications associated with bone graft harvest and due to its shape and bioactive properties it enabled a chemical bond with surrounding osseous tissue to create bone fusion without a need for filling with other material (Bienik 1991,Madawi 1996, Filip 2000). Its disadvantages included fragility in contact with metal and threshold bending strength. These disadvantages were eliminated by a new implant made of bio-titanium that we introduced into clinical practice for identical indications in 2004. In years 2007-2011 at the Neurosurgery Department of KNTB Zlín we operated 34 patients with unstable lower cervical spine injury. In 12 patients we used a bio-titanium implant in ACIF (Figures 11 and 12). In 22 patients we used an implant made of different materials (Figure 13).

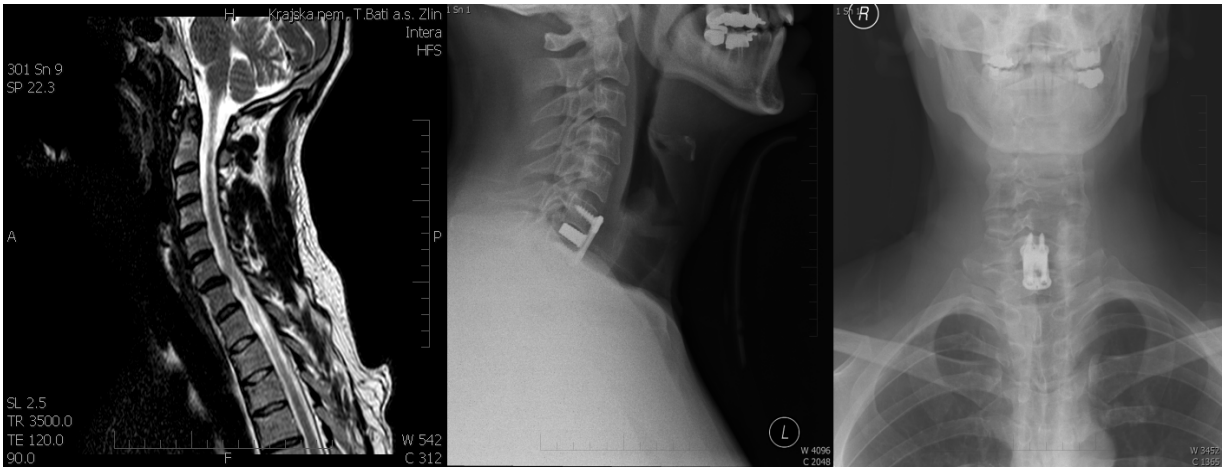


Figure 11 : Unstable injury C6/7 (Aebi-Nazarian – A3) (2009)

Trauma MRI- T2, X-ray 6 months after the surgery – bioactive titanium

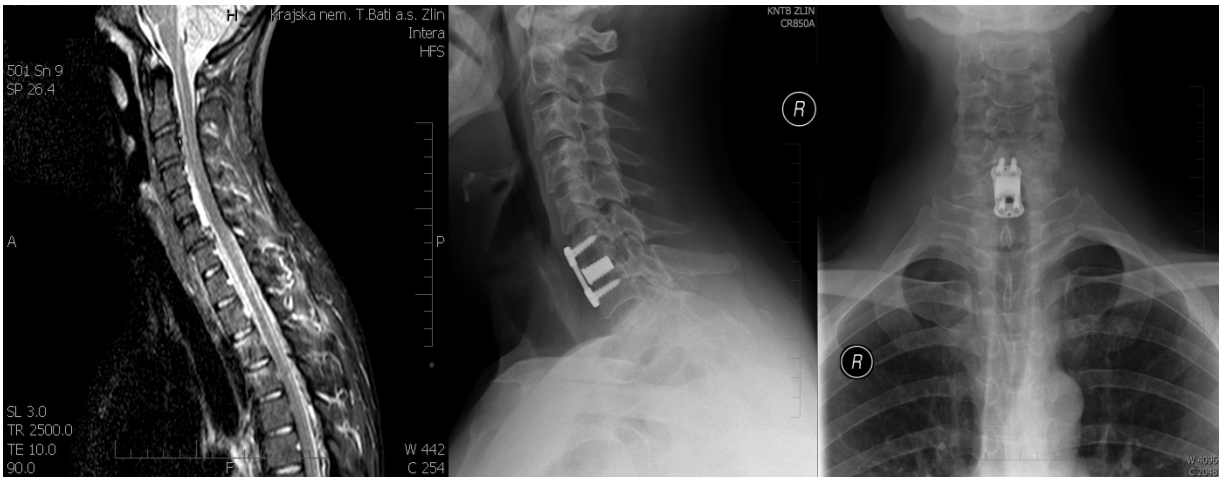


Figure 12 : Unstable injury C6/7 (Aebi-Nazarian – C3) (2010)

Trauma MRI-T X-ray 12 months after the surgery – bioactive titanium

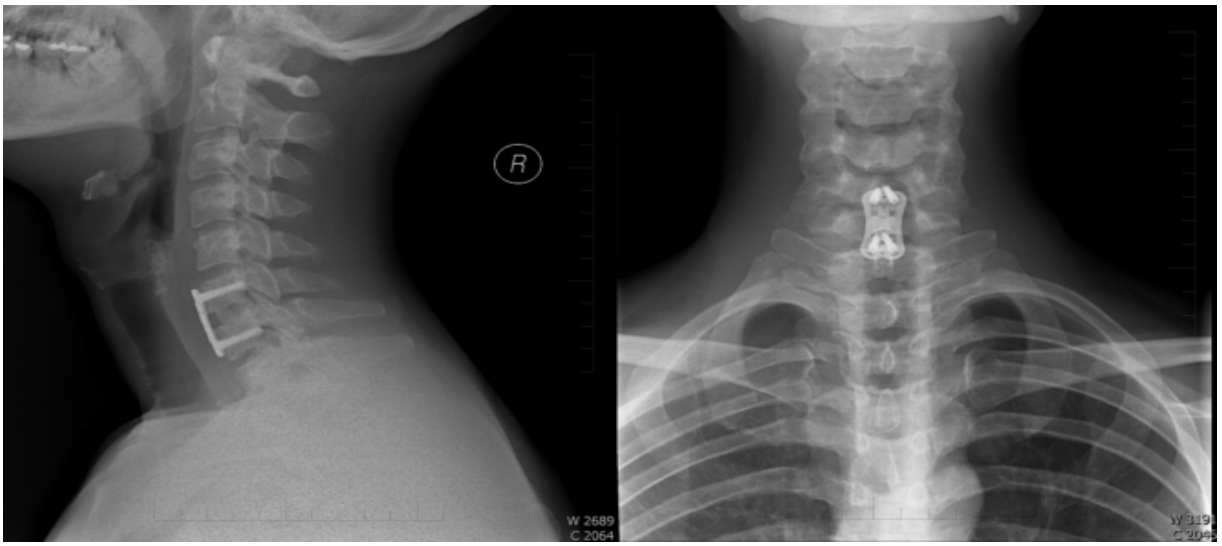


Figure 13 : X-ray image 6 months after the surgery on C6/7 –PEEK/BCP (2011)

In our own set of patients we evaluated the neurological finding according to the Frankel scale with a finding from the imaging methods (X-ray, CT, MRI) preoperative and 2, 6 and 12 months after the surgery.

We indicated the actual surgical approach (ACIF + plate) according to the type of traumatic instability from the imaging examinations evaluated according to Aebi-Nazarian (Table 1).

Table 1

Classification according to Aebi-Nazarian in our patients	Glass-ceramics + Aesculap plate (1996–1999)	Bioactive titanium + plate (Zephire,Venture, Reflex, Eagle) (2007–2011)	Polylactide/BCP + plate (Zephire, Eagle) (2007–2011)	PEEK/TCP + plate (Zephire, Reflex, Eagle) (2007–2011)
A2	1	3	1	2
A3	2	2	3	3
C2	3	2	4	1
C3	4	5	3	5

The most common type of unstable injury operated using the ACIF approach with a plate and all types of implants was diagnosed as osteoligamentous injury type A (about 35%) and type C (about 65%).

We evaluated the neurological finding according to the Frankel scale (A– Complete lesions, B – Preserved sensitivity only, C – Preserved non-functional motorics, D – Preserved sensitivity and functional motorics, E – No lesions) before the surgery and 12 months after the surgery (Table 2).

Table 2 shows that improvement in the neurological finding 12 months after the surgery occurred regardless of the implant type in 30% of patients (28–32%) by at least one grade of the Frankel scale, most frequently in incomplete spinal lesions.

Table 2

Neurological lesions according to the Frankel system preoperative/12 months postoperative	Glass-ceramics (1996–1999)	Bioactive titanium (2007–2011)	Polylactide/BCP (2007–2011)	PEEK/TCP (2007–2011)
A	2/2	2/1	1/1	2/1
B	3/1	2/2	2/1	2/2
C	2/3	2/1	3/3	3/3
D	1/2	3/4	4/4	2/3
E	2/2	3/3	1/2	2/2
Number of improved	**3 (30%)**	**4 (32%)**	**3 (28%)**	**3 (28%)**

In addition to the neurological finding we also evaluated findings from imaging examinations performed 2, 6 and 12 months after the surgery.

Here we focused on a change in the implant position (ventral or dorsal dislocation and sinking into the vertebral bodies) and signs of instability (reduced density of bone tissue surrounding the implant, plate loosening).

Using postoperative imaging methods (X-ray, CT) we did not observe any dislocation or instability signs in the used implants in the entire group of patients. In two patients (glass - ceramics) partial loosening of screws in the plate was observed without the implant or the plate being dislocated. Steady position of fixation on images correlates with postoperative evaluation of neurological lesion according to the Frankel scale (30% of improved patients).

Complications associated with the surgical procedure (secondary healing of surgical wound, temporary paresis of the recurrent laryngeal nerve, permanent partial paresis of the recurrent laryngeal nerve) which we observed in our group is shown in

Table 4

Complications associated with the surgical procedure	Glass-ceramics (1997–1999) 10 operated	Bioactive titanium (2007–11) 12 operated	Polylactide/BCP + plate (2007–2011) 11 operated	PEEK/TCP (2007–2011) 11 operated
Secondary wound healing	1	0	0	1
Temporary paresis of the recurrent laryngeal nerve	2	1	2	1
Permanent paresis of the recurrent laryngeal nerve	0	1	1	0

We observed permanent complications associated with the surgical technique in two patients of the group (4%), namely it was unilateral partial lesion of the recurrent laryngeal nerve, which slightly limits patients in loud vocal expression (Ebraheim 1997). We did not observe any other complications associated with the surgery.

IV. Discussion

Anterior interbody fusion with splint remains a verified standard treatment method of unstable injury in subaxial part of cervical spine fractures (An HS. 1998, Bohlman 1979,Fehlings 2005) and in the subaxial section of the cervical spine in mono- and bisegmental degenerative stenoses caused by posterior osteophytes and/or osteophytes combined with the intervertebral disc prolapse (Bailey 1960, Bohlamn 1992,Cloward 1958, Dunsker 1977).

Application of allografts made of artificial material for the interbody fusions started to be used globally in the second half of the 1980s. After many years of experience with the application of autograft we developed the first implant for use in ACIF made of bioactive glass-ceramics at the beginning of the 90s. We started to use it in the clinical practice in 1995 in surgical treatment of degenerative disease of the cervical spine (Filip 2000) and from 1997 also in the treatment of unstable ligamentous or osteoligamentous injuries to the cervical spine. Compared with the autograft the advantages of this implant include shortening the time of the surgical procedure, elimination of complications associated with bone graft harvest and active bonding of the implant with the surrounding osseous tissue within 48 hours. Bioactive properties of the implant (active hydroxyapatite layer) allows the migration of osteoblasts around its surface (Kokubu 1982, Yamamuro 1995). Implants made of bioinert materials started to appear in the market at the same time. They were mostly designed as a hollow cage (Matge 2002, Suchomel 2004). The cage had to be filled with bone grafts to initiate the fusion. As a result of its bioactive properties our implant had a solid design without a cavity and did not require any bone graft filling. Compared with other implants its disadvantage was that it was fragile. There was a danger of damage during insertion into the interbody space due to an inadvertent contact with metal instruments or a failure to fix it with the plate. This would have resulted in deterioration of the position in the postoperative period with a possible deterioration of the clinical finding. Therefore at the beginning of the 90s we developed a similar implant made of bioactive titanium and we gradually introduced it in the clinical practice for the same indications during the period of 2004–2006. In the treatment of unstable injuries to the lower cervical spine we use it simultaneously with the implants made of absorbable (polyactides) or bioinert (PEEK) materials. The evaluation was based on the recommended optimal properties for the allograft (ChoD 2002, Vaccaro 2002) which should, with a splint, meet the following criteria.

- Firm structure resistant against damage
- Active formation of fusion without the addition of other materials (bone, TCP, BMP. etc.)
- Compatibility with human tissue
- Radiological evaluation of bone fusion
- Physical properties of the bone tissue
- Affordability

At present, we can find a large number of implants made of various types of material on the market. According to the criteria, these materials meet the requirements for implants for the ACIF as shown in Table No. 5.

Table 5 : Comparison of material properties for ACIF

Material properties	PEEK	Glass-ceramics	Polylactide	Biotitanium
1. Rigid support	+/-	-	+/-	+
2.Active formation of fusion (Osteoconduction)	-	+	-	+
3. Compatibility with human tissue	+	+	+	+
4. Radiological rating of fusion	+	+	+	-
5. Physical and biochemical properties of bones	+	+/-	+/-	+/-
6. Affordability	+/-	+	+/-	+

From the table above it follows that, when compared to other materials, the properties of bioactive titanium make it a very-close-to-optimum material for ACIF.

Out of all the properties, the emphasis must be on the bioactivity of the overall surface of the biotitanium implant specified in point 2 of the table. Bioactivity enables the osteoconduction of bone cells at the implant/bone interface with their subsequent migration over the implant surface (Strnad 1999,2001 Filip 2010). Most of the other implants do not have this property. Only glass-ceramics have similar bioactive properties, however without sufficient strength parameters. The active formation of fusion is enabled by the surface treatment of the titanium using the technology, as mentioned in the Material and Methodology section. It enables the new formation of bone cells and their migration on the implant surface, as we have verified using the CT, see Figure 14.

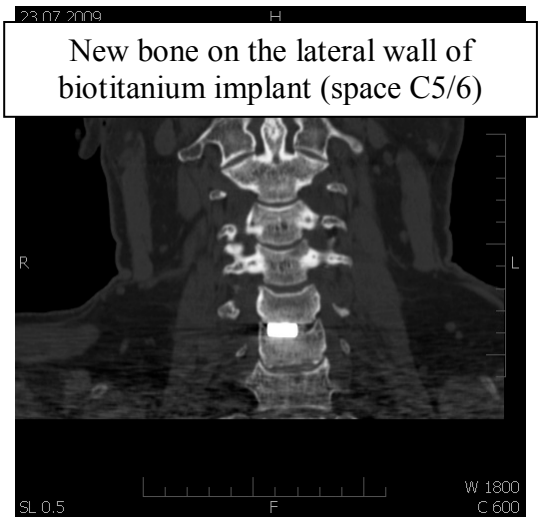


Figure 14 : CT after 12 months with signs of migration of osteoblasts along the anterior and lateral walls of the implant, section C5/6

Hence there is no necessity to fill the implant inside with supplementary material (bone / artificial material) as is the case with the other implants (Hacker 2000, Matge 2002, Suchomel 2004,Kandziora 2005). Its application is, therefore, made easier and the state of the operated-on patient is not impaired when expanding the surgery time by taking an autograft or preparing an implant with filling. This results in a lower surgical burden and better affordability. The other implants do not have this property. They are in the shape of hollow cages increasing only mechanical strength without any bioactivity of the material itself. To develop fusion the hollow of the cage must be filled with one of bioactive materials (BCP, TCP, BMP).

The chemical bond and the subsequent interbody fusion develop only in the contact area of bone/supplementary material outside the implant itself. If, for various reasons, the filling homogeneity is impaired, the fusion formation may be slowed down or stopped with the development of later instability in the operated-on region. Regarding the other properties, biotitanium is not significantly different from the other materials as seen in table No. 5.

Another benefit of our implant compared to the other ones is its shape of a full truncated prism in different sizes with surface treatment on the opposite sides. This provides primary stability minimizing the danger of migration in all directions. It gives a better chance to maintain the cervical spine lordosis in the postoperative period compared to some other implants of a shape without truncation. Implant dislocation endangers the operated-on patient by new instability with compression of the spinal canal and by worsening of the clinical findings. Due to its surface bioactivity, our implant has no hollow in the shape of an oval or square. When comparing the operation techniques using different types of implants to our implants we did not find any significant differences. Always the Smith-Robinson technique with splint with Caspar instrumentation is used. The only difference is seen in simpler handling during the surgery. Thanks to the bioactive properties of the surface it is not necessary to fill it with further material. This shortens the surgery time as well as the surgery burden on the operated-on patient.

V. Conclusion

It follows from the results above that the our implant from bioactive titanium is a good alternative for operation treatment of unstable injury in subaxial part of cervical spine to the anterior cervical interbody fusion with splint. Regarding the quality and price it successfully competes with the other products for ACIF. This has been proven by clinical evaluation of our group by Frankel scale (30%) improve surgery within the interval of 12 months after surgery in all types of implants supplemented by imaging examinations (X-ray, CT).

VI. Bibliography

1. Aebi M, Zuber K, Marchesi D. Treatment of Cervical Spine Injuries with Anterior Plating; Indications, Techniques, and Results. Spine 1991; 16(Suppl. 3): 38-45.
2. Aebi M., Nazarian S. Classification of injuries of the cervical spine. Orthopäde 1987; 16(1): 27-36.
3. An HS. Cervical Spine Trauma. Spine 1998; 23: 2713-2729.
4. Bailey RW., Badgley CE. Stabilization of the Cervical Spine by Anterior Fusion. J Bone Jt Surg 1960; 42-A: 565-594
5. BANVART, J., ASHER, M., HASSANEIN, R.: Iliac crest bone harvest donor site morbidity; a statistical evaluation. Spine. 1994;20:1055-1060
6. Bienik J,Swiecki Z.Porous and porous-compact ceramics in orthopedics.Clin Orthop 1991;27:88-94
7. Bohlman HH. Acute fractures and dislocations of the cervical spine. An analysis of three hundred hospitalized patients and review of the literature. J Bone Joint Surg Am 1979; 61 (8): 1119-1142.
8. Bohlman HH, Anderson PA. Anterior Decompression and Arthrodesis of the Cervical Spine: Long-Term Motor Improvement. J Bone Jt Surg 1992;74-A, 671-682.
9. Capen DA, Garland DE, Waters RL. Surgical Stabilization of the Cervical Spine. A Comparative Analysis of Anterior and Poterior Spine Fusions. Clin Orthop 1985; 196: 229-237.
10. Caspar W, Barbier DD, Klara PM. Anterior Cervical Fusion and Caspar Plate Stabilization for Cervical Trauma. Neurosurgery 1989; 25: 491-502.
11. Cloward RB: The anterior approach for removal of ruptured cervical discs. J Neurosurg. 1958;15: 602-617,.
12. Connoly PJ, Esses SI, Kostiuk JP. Anterior Cervical Fusion: Outcome Analysis of Patients Fused with and without Anterior Cervical Plates. J Spinal Disord 1996; 9: 202-206.
13. Dunsker SB: Anterior cervical discectomy with and without fusion. Clin Neurosurg. 24: 516-520, 1977.
14. Ebraheim NA, Lu J, Skie M, Heck B, Yeasting RA. Vulnerability of the Reccurent Laryngeal Nerve in the Anterior Approach to the Lower Cervical Spine. Spine 1997; 22: 2664-2667.
15. Fehlings MG, Perrin RG. The role and timing of early decompression for cervical spinal cord injury: Update with a review of recent clinical evidence. Injury 2005; 36: 13–26.
16. Filip M., Veselský P., Paleček T., Wolný E. Glass-ceramics Prosthesis of an intervertebral disc in the degenerative diseases of the cervical spine – initial experiences. Čes a Slov Neurol a Neurochir 2000; 1: 31-36
17. Filip M, Veselský P, Mrůzek M, Paleček T, Strnad Z, Strnad J: Bioactive cage Implaspin in treatment of degenerative disease of cervical spine – First experiences. NEURO3 01:A01, 2005
18. Filip M.,Linzer P.,Šámal F.,Jurek P.,Strnad Z.,Strnad J.: Bioactive titan cage Implaspin in treatment of degenerative disease of the cervical spine-the results from 2007till 2008 Chirurgia narzadów ruchu i Ortopedia Polska 75 (1),69-73,2010
19. Hacker RJ, Cauthen JC, Gilbert TJ, Griffith SL: A prospective randomized multicenter clinical evaluation of an anterior cervical fusion cage. Spine. 25:2646-2655, 2000.
20. Hrabálek L., Vaverka M., Křupka B., Houdek M: Komplikace operací z předního přístupu pro degenerativní onemocnění krční páteře. Česká a slovenská neurologie a neurochirurgie, 70/103 (2), 23-28, 2007
21. Cho D, Liau W, Lee W, et al: Preliminary experience using a polyetheretherketone (PEEK) cage in the treatment of cervical disk disease. Neurosurgery. 51:1343-1350, 2002
22. Kandziora F, Pflugmacher R, Scholz M, Schnake K, Putzier, M, Khodadadyan-Klostermann C, Hass NP. Treatment of traumatic cervical spine instability with interbody fusion cages: prospective controlled study with a 2-year follow-up. Injury 2005; 36: 27-35.
23. KOKUBO, T., SHIGEMATSU, M., NAGHASHIMA, Y.: Apatite wollastonite-containing glass-ceramic for prosthetic application. Bull. Inst. Chem. Res., Kyoto Univ., 60: 260-268, 1982
24. Madawi AA, Powell M, Crockard HA: Biocompatible osteoconductive polymer versus iliac graft. Spine. 21:2123-2130, 1996
25. Matge G: Anterior interbody fusion with the BAK-cage in cervical spondylosis. Acta Neurochir. 140:18, 1998
26. Matge G: Cervical cage fusion with 5 different implants: 250 cases. Acta Neurochir. 2002; 144:539-550.
27. McConnell J, Freeman B, Dabnath U, et al: A prospective randomized comparison of coralline hydroxyapatite with autograft in cervical interbody fusion. Spine. 28:317-323, 2003

28. McLellen D, Tew J, Mayfield FH: Complications of surgery of the anterior spine. Clin Neurosurg. 23:424-434,1976
29. Klézl Z, Fousek J, Pěkný I. Technika přední instrumentované spondylodézy krční páteře. Acta Chir orthop Traum čech 1999; 66: 158-164.
30. Norrell H, Wilson CB. Early Anterior Fusion for Injuries of the Cervical Portion of the Spine. J Am Med Assoc 1970; 214: 525-530.
31. Osti OL, Fraser RD, Griffiths ER. Reduction and Stabilization of Cervical Dislocations: An Analysis of 167 Cases. J Bone Joint Surg Br 1989; 71B: 275-282.
32. Perret G, Greene J. Anterior Interbody Fusion in the Treatment of Cervical Fracture Dislocation. Arch Surg 1968; 96: 530-539.
33. Strnad J.et al: Způsob úpravy povrchu titanových implantátů. Pat.CZ 291685;(2001)
34. Strnad J. et al: Secondary Stability Assessment of Titanium Implants with Alkali-Etched Surface: A Resonance Frequency Analysis Study in Beagle Dogs The International Journal of Oral & Maxillofacial Implants (2008) 23,502
35. Strnad J., Helebrant A., Mráz R. Effect of titanium processing on the bioactivity of sodium titanite gel layer, in Proceedings Euromat 99, Materials for Medical engineering, 1999; 2: 967
36. Suchomel P, BarsaP, Buchvald P, Svobodník A,Vaničková E.Autologus versus allogenic bone grafts in instrumented anterior cervical discectomy and fusion:a prospective study with respect to a bone union pattern.Eur Spine J. 13:510-515, 2004.
37. Štulík J, Krbec M, Vyskočil T. Poranění dolní krční páteře – monokortikální technika stabilizace. Acta Chir orthop Traum čech 2003; 70: 226-232.
38. Robinson RA, Smith GW: Anterolateral cervical disc removal and interbody fusion for cervical disc syndrome. Bull John Hopkins Hosp. 96: 223-224, 1955.
39. Yamamuro T: AW Glass-Ceramic in Spinal Repair, Bioceramics. Vol.8,p.123, Ed.:J.Wilson, L.Henche, D.Greenspan , Ponte Verda,Florida,USA,November 1995
40. Urban, K., Strnad, J.: Clinical Application of the Bioactive Glass-Ceramics BAS-O in Orthopaedics, Lékařské zprávy LF UK, Hradec Králové 37, 1992.
41. Vaccaro AR, Madigan L: Spinal applications of bioabsorbable implants. J Neurosurg. 2002 ; 97[Suppl 4]:407 - 412,

Global Journal of Medical research: J
Dentistry and Otolaryngology
Volume 14 Issue 1 Version 1.0 Year 2014
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 2249-4618 & Print ISSN: 0975-5888

To Determine Prevalence of Chronic Suppurative Otitis Media with Reference to Unsafe Otitis Media in Primary School Going Children of Rural Setup of Wardha District

By Dr. Abhinav. D. Wankar & Dr. Sanjiv Golhar
National Board of Education, India

Introduction- Chronic Suppurative otitis media is a long standing inflammation of mucoperiosteum of middle ear cleft. It is associated with intermittent, continuous, mucopurulent or purulent ear discharge, hearing impairment and tympanic membrane perforation. C.S.O.M. was defined by task force of Fourth International Symposium of otitis media held in June 1987in Bal Harbour, Florida as the condition "refer to a chronic discharge from middle ear through perforation of tympanic membrane."It usually leads to irreversible pathological changes. It is slow and insidious in nature. It is capable of causing irreversible sequel and fatal intracranial complications when medical and surgical inter venations are delayed. It is commonest cause of hearing impairment. It is often unnoticed (Zelhius et al1940).Presence of fluid attenuates sound transmission which may result in hearing loss (Paparella 1986).

Chronic suppurative otitis media is a global disease. It is one of the important health problems in our country. Serious complications may arise from it. It is seen in all the continents of world having different environmental and socio-economic background. It is more prevalent in developing countries.

Poverty illiteracy, crowding, malnutrition are root factors for the development of Chronic Suppurative otitis Media and a large group of society are suffering from it. The morbidity and mortality associated with otitis media is a really a challenge for health care systems. Surprisingly there are very few studies done in India to know the burden of disease on the society.

GJMR-J Classification : *NLMC Code: WD 700, WV 21*

Strictly as per the compliance and regulations of:

To Determine Prevalence of Chronic Suppurative Otitis Media with Reference to Unsafe Otitis Media in Primary School Going Children of Rural Setup of Wardha District

Dr. Abhinav. D. Wankar [α] & Dr. Sanjiv Golhar [σ]

I. Introduction

Chronic Suppurative otitis media is a long standing inflammation of mucoperiosteum of middle ear cleft. It is associated with intermittent, continuous, mucopurulent or purulent ear discharge, hearing impairment and tympanic membrane perforation. C.S.O.M. was defined by task force of Fourth International Symposium of otitis media held in June 1987in Bal Harbour, Florida as the condition "refer to a chronic discharge from middle ear through perforation of tympanic membrane."It usually leads to irreversible pathological changes. It is slow and insidious in nature. It is capable of causing irreversible sequel and fatal intracranial complications when medical and surgical inter venations are delayed. It is commonest cause of hearing impairment. It is often unnoticed (Zelhius et al1940).Presence of fluid attenuates sound transmission which may result in hearing loss (Paparella 1986).

Chronic suppurative otitis media is a global disease. It is one of the important health problems in our country. Serious complications may arise from it. It is seen in all the continents of world having different environmental and socio-economic background. It is more prevalent in developing countries.

Poverty illiteracy, crowding, malnutrition are root factors for the development of Chronic Suppurative otitis Media and a large group of society are suffering from it. The morbidity and mortality associated with otitis media is a really a challenge for health care systems. Surprisingly there are very few studies done in India to know the burden of disease on the society.

This is a small attempt to peep into magnitude of problem, where in school going children in Wardha District are studied.

II. Review of Literature

A thorough research of this research topic was done. Search was done from internet which was complemented by taking out the full research papers from library.

In April-june 2006, Dr P.T Wakode carried research relating to morbidity and mortality with otitis media. The study was a small attempt to look into magnitude of problem in society where in school going children in Yavatmal city were studied. The overall prevalence was found to be 3%.It was found commoner in students of lower socio economic strata. The research is related to my research as subjects selected are identical. Even environmental conditions are quite same. Same methodology is used.

Reports on prevalence of C.S.O.M. in African children by Okeowo in 1986 and Halama et al in 1986 showed that prevalence of C.S.O.M .was lower in African children than expected. Okeowo found prevalence to be 4.9% while Halama et al found it to be 3.8%.In both these reports the socio economic and living conditions were poor and this low incidence of C.S.O.M .was ascribed to genetic factors. My research was influenced by it as the target Population Selected were same. Socio economic strata and living conditions of which students selected were identical.

Indian Journal of otology in MARCH 1999 published work of Dr Arsi Saad. He studied Micro-biological evaluation and management of Chronic Suppurative Otitis Media among Saudi children. Study showed that medical management in children with dry mopping and topical antibiotics was effective in controlling otorrhea and minimizing the referrals for surgery. This basis was used for treatment of children detected with C.S.O.M. It also guided with careful selection of local and systemic antibiotics guided by culture and sensitivity to avoid resistance to community used systemic antibiotics. It also suggested use of local frequent ear toilet as an effective treatment modality. It proved out to be very useful for selecting management of students diagnosed with C.S.O.M.

Dr Gulati and Dr Sudesh kumar in Indian Journal of otology in June 1997 suggested that prevalence of C.S.O.M .was found more in male (61%) than in females (39%).It also suggested that majority of cases belonged to lower and middle socio economic

Author α σ: Jawaharlal Nehru Medical College Sawangi (Meghe), Wardha. e-mail: abhinav.wankar@gmail.com

strata with Rural:Urban ratio of 2:1(65%:35%)Unhygienic condition, poverty,illiteracy,malnutrition have also been suggested as a basis of wide spread prevalence of C.S.O.M..It proved out to be helpful for a comparative study of cases of C.S.O.M between male and female in my study.The study was related to our study as my study aimed at finding prevalence of C.S.O.M. in school children of different economic strata, different level of sanitation in rural setup of Wardha.

In 1997 Dr H.c. Rushton et al studied prevalence of otitis media with effusion in multicultural schools in Hong kong.In this study 177 students from multicultural schools between 5years to 7 years were studied with otoscopy.It was found that Chinese children had a significant lower prevalence (1.3%)than Caucasian children(9.5%).Reason for lower prevalence of C.S.O.M .in Chinese children needed further research This study related to my research as it was also cross sectional study as and study population was identical to my research.

III. Aim & Objectives

a) Aims and objectives

i. *Aim*

1. To find out prevalence of C.S.O.M. among primary school going children of rural setup in Wardha district.
2. To inform expert doctors about cases of C.S.O.M. and helping patients with treatment.
3. To carryout thorough research which can act as a pivot to future research in this topic.

ii. *Objectives*

1. To evaluate the comparative assessment of prevalence of C.S.O.M. among primary school going children of rural setup in Wardha district.
2. To reduce morbidity caused by C.S.O.M. among school going children.

IV. Materials and Methods

a) Study design

This is a descriptive, cross sectional materialistic study.

b) Methodology

Sample pattern and setting after obtaining the informed consent, 1000 students of primary school of villages in Wardha district were be studied.

Study was carried out over a period of 12 months. Primary school going children ranging from 5 years to 10 years were selected as study. Deaf and dumb schools were excluded from study. Schools were selected in such a way that students of all economic strata were included. Students were classified into age groups as:

5-6 years

6-7 years

7-8 years

8-9 years

9-10 years

The proforma was prepared to carry out the study.

The initial school survey was carried out and students were examined according to proforma, which were distributed to children or to respective class teachers. And the teachers were asked to fill up the primary information in consultation with parents regarding the main, place of residence, family income, living condition and if possible history of major illness in past, in students or family.

The proforma was distributed and were collected on the next day, or on next visit of student. The students were examined with help of otoscope and other standard instruments used for routine E.N.T check up. Cases of chronic suppurative otitis media were referred to our hospital. In our hospital they were examined by our expert doctors and be given proper treatment. After conducting the primary survey students were grouped according to age, socio-economic conditions (Revised Prasad classification),and level of sanitation. Message was conveyed to parents, teachers and students themselves. The prevalent chronic suppurative otitis media in students was classified into safe (tubotympanic) and unsafe (atticoantral) type.

After completion of study, a chart was prepared to carry out statistical work which was done with help of Department of Preventive and Social Medicine, J.N.M.C, Sawangi (M), Wardha.

c) Consent Approval: As enclosed here with

i. *Instruments*

1. Socio-demographic profile sheet
2. Clinical profile sheet
3. E.N.T. instruments set

ii. *Inclusion criteria*

1. Either sex
2. School going rural children between age group 5-10 year.
3. Informed consent

V. Observations and Results

Total of 5 schools were selected and 960 students were examined as per pro forma.

a) Sex Wise Distribution

Out of 960 students, 526(54.79%) were male and 434(45.20%) were female

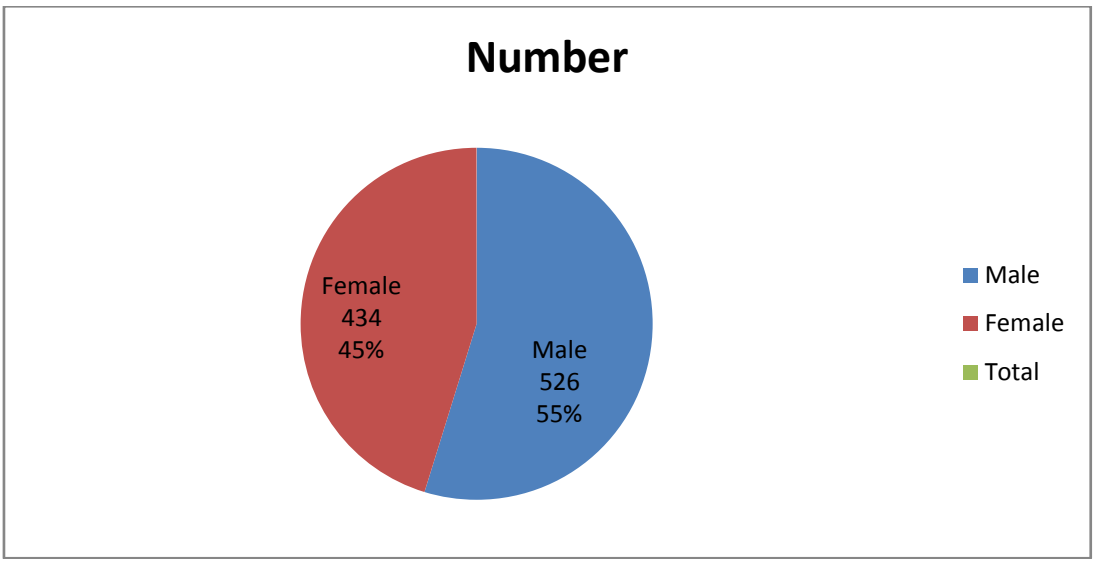


Figure 1

b) Age wise distribution

Table 1 : 960 students of different age groups were studied. Following were age wise distribution

Age of students	Number of students
5 years	73
6 years	157
7 years	131
8 years	181
9 years	161
10 years	257

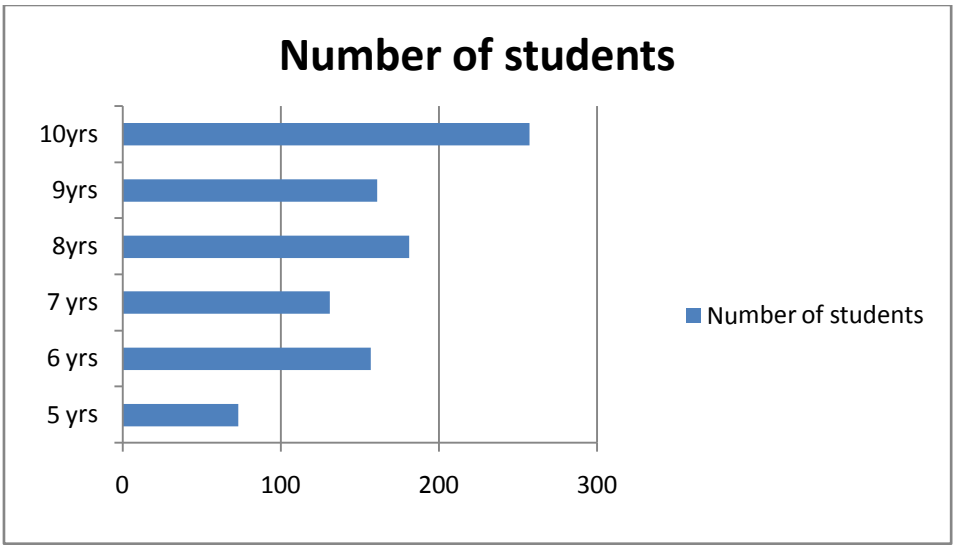


Figure 2

c) C.S.O.M .Findings

In first cross sectional examination, out of 960 students, 63 students (6.56%) were having chronic suppurative otitis media.

Out of 63 students suffering from chronic suppurative otitis media, 56(5.83) belonged to safe (tubo-tympanic) and 7(0.72) belonged to unsafe (atticoantral) category

Table 1

C.S.O.M cases	Number of students	% of students
Safe	56	5.83
Unsafe	7	0.72
Total	63	6.56

Figure 3

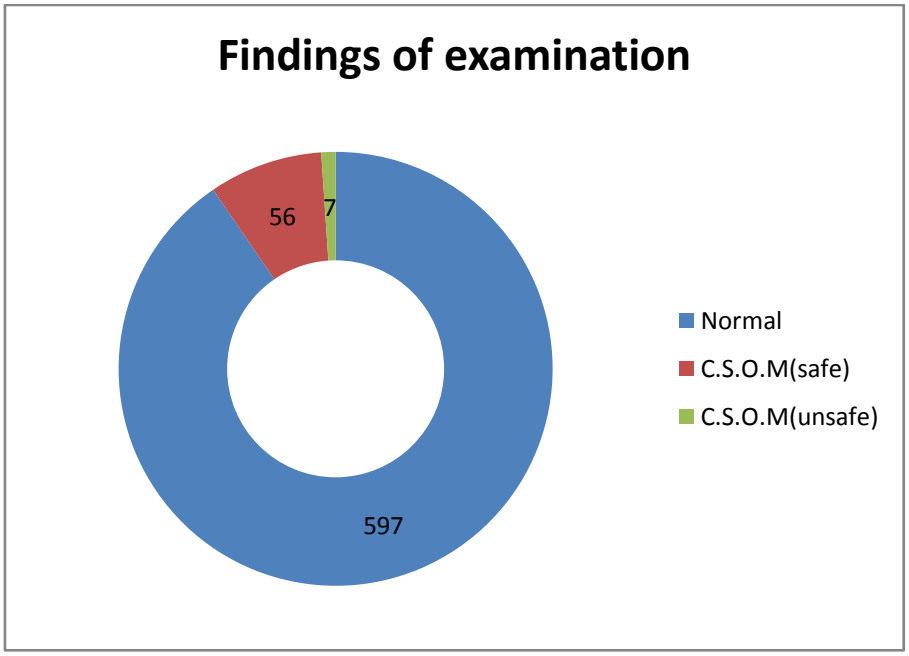


Figure 4

d) Relation of chronic suppurative otitis media with socio-economic status

Table 3

	CSOM Cases	Normal Cases	Total
Upper	5	83	88
Middle	16	365	381
Lower	42	449	491

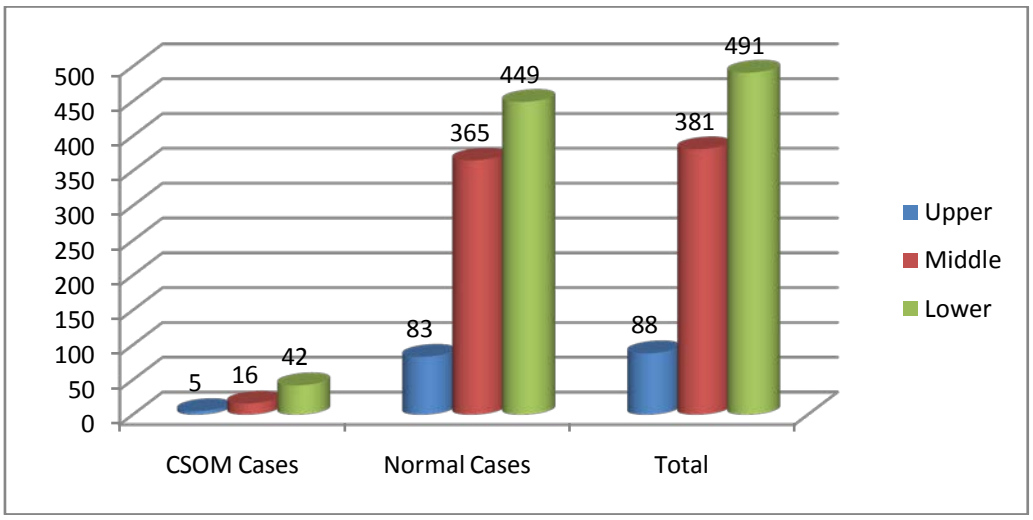


Figure 5

Chi-square- 6.714, Degree of freedom- 2, P = 0.034, Statistically significant

e) Relation of chronic suppurative otitis media with level of sanitation

Table 4

	CSOM Cases	Normal	Total
Good	6	115	121
Moderate	24	549	573
Bad	33	233	266

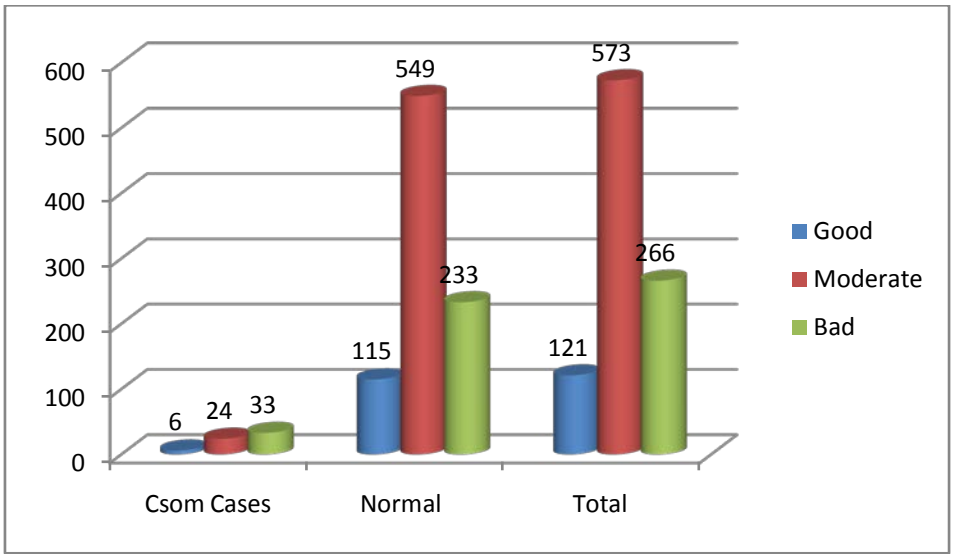


Figure 6 : Chi-square- 20.59 Degree of freedom- 2 P < 0.0001 Statistically significant

f) Sex wise distribution of chronic suppurative otitis media cases

Table 5 : It was found that out of 63 students suffering from C.S.O.M, 38 (60.31) students were male while 25 students(39.68) were female

Sex of student	Number of C.S.O.M Case	% of case
Male	38	60.31
Female	25	39.68

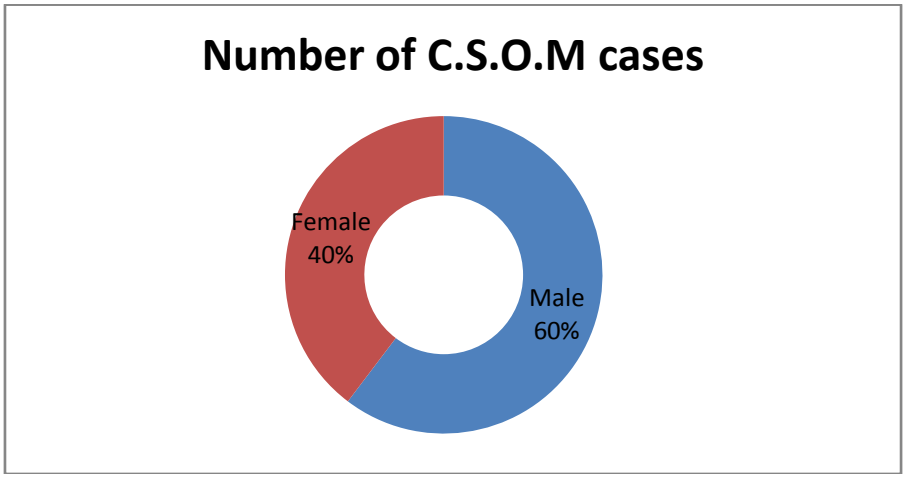


Figure 7

g) Distribution of different C.S.O.M .cases according to different socio-economic data

Table 6 : 63 cases of C.S.O.M. were distributed according to different socio-economic status. Following were results

Socio-economic status	Number of C.S.O.M cases	% of C.S.O.M cases
Upper	5	7.93
Middle	16	25.39
Lower	42	66.66

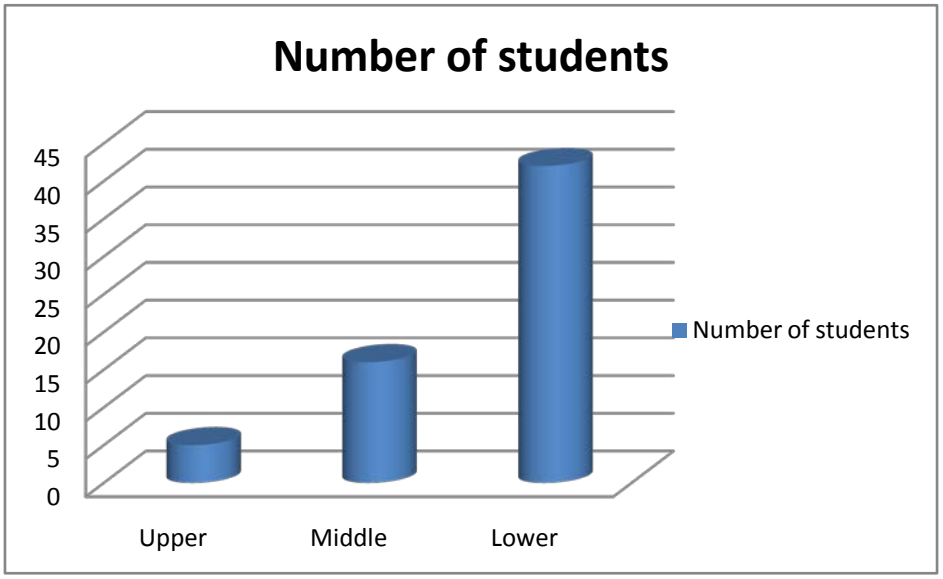


Figure 8

h) Distribution of students according to Level of sanitation

Table 7 : Level of sanitation being an important factor, 63 cases were distributed according to level of sanitation

Level of sanitation	Number of C.S.O.M cases	% of C.S.O.M cases
Good	6	9.52
Moderate	24	38.09
Bad	33	52.38

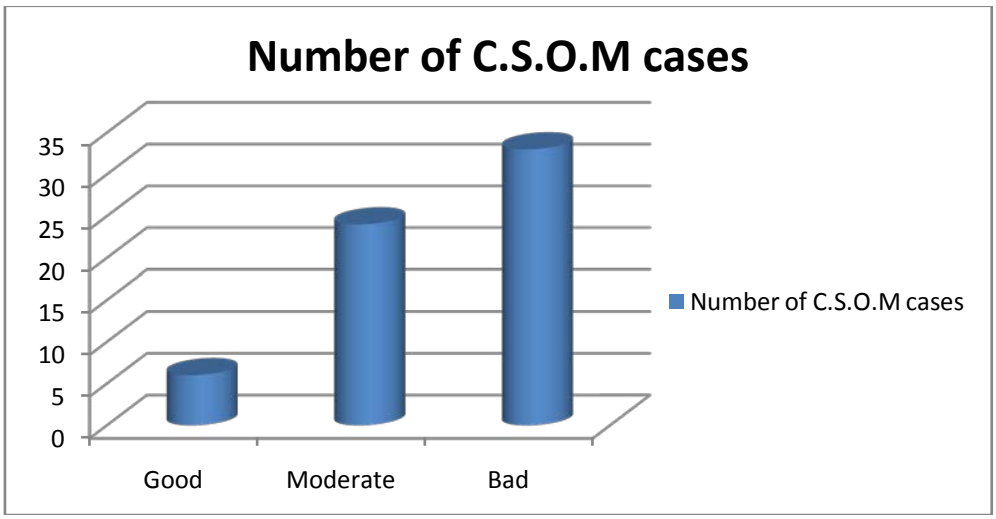


Figure 9

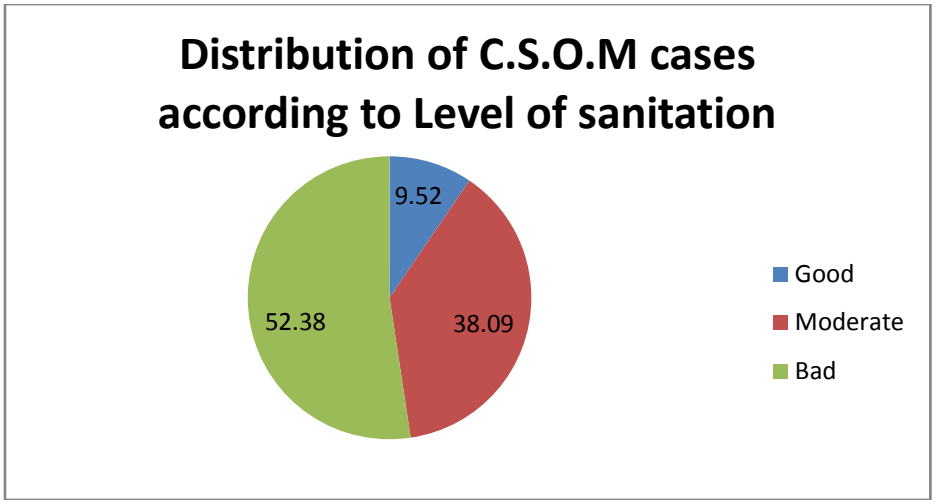


Figure 10

i) Distribution of C.S.O.M .cases according to different age groups

Table 8 : When C.S.O.M cases were distributed according to different age groups following were observations

Age of students	Number of students suffering from C.S.O.M
5	0
6	1
7	3
8	19
9	19
10	21

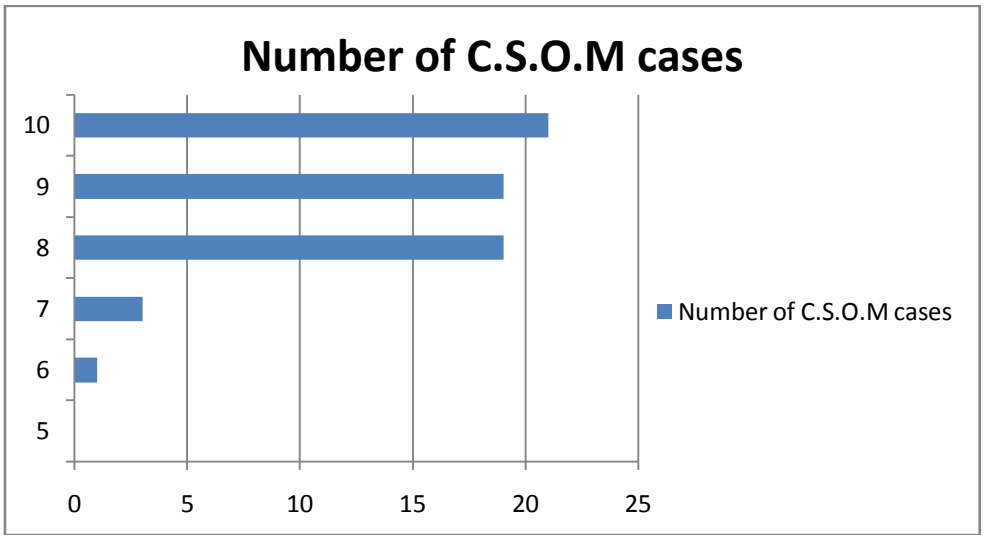


Figure 11

VI. Discussion

In present study it has been observed that overall prevalence of Chronic Suppurative Otitis media is 6.56%.

Out of this 6.56%, 5.83% were tubotympanic type while 0.72% Were attico antral type.

The literature on prevalence of disease is sparingly available particularly in recent years. Most of studies (table9) are from different ethnic environment background. With the advent of medical sciences, increase in general awareness, the prevalence rate of otitis media is bound to change. Hence it is difficult to

compare the present study with other workers. Still a few studies can be taken into consideration to compare with the present study.

Table 9

Year	Country	Worker	Prevalence
1965	British Columbia Canada	K.Cambon	15.50%
1970	Alaska-North America	Dwaynee Reed et al	15%
1985	Pohenpi-Island in Pacific Ocean	G Dever et al	3.97%
1993	Cairo,Egypt	Motta et al	2%
1996	Tanzania,Africa	Manja BM et al	2.60%
1985	Korea	Noh et al	6.24%
1991	Malaysia	Elango	4.36%
1993	Saudi Arabia	H.Mohammad	1.50%
!961	Lucknow(U.P)India	R.N.Mishra et al	14.65%
1965	Vellore south India	Kapur Y.P	7.43%
1974	Madurai South India	Rajendrakumar P.V	69.70% in patients of ear complaints
1974	Lucknow(UP) India	Pal et al	3.59%
1997	South India	Rupa et al	7.74%
1999	South India	Rupa et al	6%
2000	Yavatmal Maharashtra India	P.T Wakode et al	3%

The studies of Cambon[1] and Reed[2] show prevalence rate of 15.5% and 15% which differs from our present study. But they are old studies and nearer the North Pole (Canada and Alaska) where there is cold climate. The climate may be a contributory factor for increased prevalence of otitis media

Out of Indian workers Mishra et al [3](1961) showed prevalence rate of 14.65% but this work is quite old (1961) and done in Uttar Pradesh which is thickly populated state and hence the high figure is expected. Rajendra kumar PV [4](1974)69.70%did his work on O.P.D patients only. Hence figure does not represent true prevalence in the society.

Both studies of Rupa et al[5,6] in 1997and 1999 show prevalence of 7.4%and 6% .These studies were based on rural population in remote areas of Tamil Nadu.

However prevalence rate in our study matches with prevalence rate of Motta et al [7] (1993)2% at Cairo-Egypt, Minja et al[8] (1996)2.6%inTanzania, Pal et al[9] (1974)3.5%at Lucknow–India but none of above studies were carried out by taking samples directly from society.

Almost all of them are hospital based studies. However they give information regarding magnitude of disease.

Table 10 : Peak occurrence of otitis media in different parts of world

Year	Worker	Country	Month
1940	Heller George and Englewood	America	October and April
1969	Robert Brownlee et al	America	March
1970	Dwaynee Reed et al	Alaska,America	March and July
1979	Jerome o klein	America	October to March
1982	Pulender J.Coworkers	Finland	January
1996	Riquelme Parez.M	Spain	February
2000	P.T Wakode et ai	India	July and October

The literature shows peak occurrence of fresh cases of otitis media in different months in different countries (Table10).In America it is in October to April which are winter months in that country. Our study was carried in months of July and August; hence there is high incidence of cases of otitis media during this period.

Our study clearly indicates that the socio economic strata and prevalence of chronic suppurative otitis media are inversely proportional to each other.66.66% of cases suffering from Chronic Suppurative Otitis Media were from lower economic strata while only 7.93% of total cases of Chronic suppurative otitis media were from upper economic strata.

Our study indicates that level of sanitation has a major role to play in prevalence of chronic suppurative otitis media.

Level of sanitation is inversely proportional to prevalence of the disease.52.38% of total cases were having poor sanitation while 38.09%wwere having moderate sanitation. On the other hand only 9.52% of cases had good sanitation. Our subjects were mainly

school going children of rural setup hence there level of sanitation was bound to be low.

Our studies also indicates that prevalence of chronic suppurative otitis media was more in male(60.31%) than in female(39.68%).This is because level of sanitation among girls was better than boys in our study.

VII. Conclusion

1. The overall prevalence of chronic suppurative otitis media in school going children between 5 years to 10 years in rural setup of Wardha district was found to be 6.56%
2. Out of this 5.83% were safe type while 0.72% was unsafe type.
3. Association of chronic suppurative otitis media with low socio economic strata was found to be statistically significant. It is more prevalent in low socio economic strata (Chi-square- 6.714, Degree of freedom- 2, $P = 0.034$, statistically significant).
4. Association of chronic suppurative otitis media with low level of sanitation was found to be statistically significant. It is more prevalent in children having low level sanitation (Chi-square- 20.59, Degree of freedom- 2, $P < 0.0001$, statistically significant)
5. The prevalence of chronic suppurative otitis media was more in male than in female. The reason for this requires further research.

A large group of population suffers from morbidity of otitis media.It is really challenge for health care system .As my study was population based study this data can be of vital importance to planner of health care systems. The paucity of such studied in recent Indian literature speaks out the need of such studies in different parts of the country.

VIII. Summary

This study was carried to find out prevalence of Chronic Suppurative Otitis Media among primary school children of rural setup in Wardha District. In addition to it it aimed to inform expert doctors about cases of C.S.O.M and helping patients with treatment. C.S.O.M being global disease and important health problem in our country was chosen for research.

A descriptive, cross sectional materialistic study of 1000 students of age group from 5-10 from primary school of villages in Wardha district were studied. Proforma was prepared to carry out study. Cases of C.S.O.M. wer referred to our hospital where they were examined by our expert doctors and were given proper treatment.

The overall prevalence of C.S.O.M in school going children was 6.56%.Out of this 5.83% were safe(Tubotympanic)type while 0.72% were unsafe(attico antral) type.It had inverse relation with economic strata and level of sanitation.66.66% of lower socio economic strata and 52.39% were suffering from C.S.O.M. There was male predominance. Reason for it requires further study.

The magnitude of problem and its prevalence of Chronic Suppurative Otitis Media in our country depict a need of more studies in different parts of country

IX. Suggestion

Thorough research for C.S.O.M. in school going children, it depicted that C.S.O.M. can be prevented. It can lead to health promotion and improve overall improvement in health status of children. It can also limit disability.

Following are suggestions

1. Prevention of upper respiratory tract infection in children
2. Prevention of C.S.O.M. by improving level of sanitation among students.
3. Secretory Otitis Media being one of primary cause of C.S.O.M. periodic examination of students should be done.
4. Health education to children and teachers about C.S.O.M. This will enable early diagnosis of C.S.O.M.
5. Creating awareness among people about C.S.O.M.

X. Bibliography

1. Cambon K: Galbraith J.D; 'Middle ear disease in Indians of Mount Currie Reservation, British Columbia, 'Canad, Med. Ass. Journal. 18(1965) Vol93; 1301-1305.
2. Reed D. and Dunn W' Epidemologic studies of otitis media among Eskimos children[1]public health reports.Vol 85 No; 8(1970).699-705.
3. Mishra R.N; Bhatia M.L; Bhatia B.P.R 'Investigations of hearing in school children'. Indian journal of Otolaryngology. (1961); 13; 153-157.
4. Kumar P.V.R.'A study on incidence and etiology of deafness in South Indian population,'Indian journal of otolaryngology 1974; 3; 153-157.
5. V.Rupa; a Jacob; A. Joseph. 'Hearing impairment and Otitis media in a rural primary school in South India[1].Int Journal of Pediatric otorhinolaryngology. 39(1997)133-138.
6. V. Rupa; A Jacob; a Joseph[1].'Chronic Suppurative Otitis Media; Prevalence and practices among rural South Indian children.' Int Journal of pediatric otorhinolaryngo; ogy (1999)217-221.
7. Motta G.' Prevention and treatment of deafness. 'Hearing International (1993); 2(4); 7. -
8. Motta G.' Prevention and treatment of deafness. 'Hearing International (1993); 2(4); #Chaturvedi et al (1998).
9. Pal J Bhatia M.L. 'Prasad B.G.: Dayal D; Jain Pc., Deafness among urban community-an epidemio-

logical survey at Lucknow (U.P);Ind J.Med.Res.62(1974)857-868.
10. Heller G; Engelwood N.J.'A statistical study of otitis media of children' .Journal of Pediatrics (1940)17; 322-330.
11. Brownlee R.C; Cowan C.C; William R Deloache; Jackson H.P. Otitis Media in children.' Journal of Pediatrics (1969)75; 4;636-642.

Global Journals Inc. (US) Guidelines Handbook 2014

www.GlobalJournals.org

FELLOWS

FELLOW OF ASSOCIATION OF RESEARCH SOCIETY IN MEDICAL (FARSM)

Global Journals Incorporate (USA) is accredited by Open Association of Research Society (OARS), U.S.A and in turn, awards "FARSM" title to individuals.The 'FARSM' title is accorded to a selected professional after the approval of the Editor-in-Chief/Editorial Board Members/Dean.

- The "FARSM" is a dignified title which is accorded to a person's name viz. Dr. John E. Hall,Ph.D., FARSS or William Walldroff, M.S., FARSM.

FARSM accrediting is an honor. It authenticates your research activities. After recognition as FARSM, you can add 'FARSM' title with your name as you use this recognition as additional suffix to your status. This will definitely enhance and add more value and repute to your name. You may use it on your professional Counseling Materials such as CV, Resume, and Visiting Card etc.

The following benefits can be availed by you only for next three years from the date of certification:

FARSM designated members are entitled to avail a 40% discount while publishing their research papers (of a single author) with Global Journals Incorporation (USA), if the same is accepted by Editorial Board/Peer Reviewers. If you are a main author or co-author in case of multiple authors, you will be entitled to avail discount of 10%.

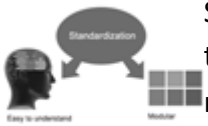
Once FARSM title is accorded, the Fellow is authorized to organize a symposium/seminar/conference on behalf of Global Journal Incorporation (USA). The Fellow can also participate in conference/seminar/symposium organized by another institution as representative of Global Journal. In both the cases, it is mandatory for him to discuss with us and obtain our consent.

You may join as member of the Editorial Board of Global Journals Incorporation (USA) after successful completion of three years as Fellow and as Peer Reviewer. In addition, it is also desirable that you should organize seminar/symposium/conference at least once.

We shall provide you intimation regarding launching of e-version of journal of your stream time to time.This may be utilized in your library for the enrichment of knowledge of your students as well as it can also be helpful for the concerned faculty members.

The FARSM can go through standards of OARS. You can also play vital role if you have any suggestions so that proper amendment can take place to improve the same for the benefit of entire research community.

As FARSM, you will be given a renowned, secure and free professional email addres with 100 GB of space e.g. johnhall@globaljournals.org. This will include Webmail, Spam Assassin, Email Forwarders,Auto-Responders, Email Delivery Route tracing, etc.



The FARSM will be eligible for a free application of standardization of their researches. Standardization of research will be subject to acceptability within stipulated norms as the next step after publishing in a journal. We shall depute a team of specialized research professionals who will render their services for elevating your researches to next higher level, which is worldwide open standardization.

The FARSM member can apply for grading and certification of standards of their educational and Institutional Degrees to Open Association of Research, Society U.S.A. Once you are designated as FARSM, you may send us a scanned copy of all of you credentials. OARS will verify, grade and certify them. This will be based on your academic records, quality of research papers published by you, and some more criteria. After certification of all your credentials by OARS, they will be published on your Fellow Profile link on website https://associationofresearch.org which will be helpful to upgrade the dignity.

The FARSM members can avail the benefits of free research podcasting in Global Research Radio with their research documents. After publishing the work, (including published elsewhere worldwide with proper authorization) you can upload your research paper with your recorded voice or you can utilize chargeable services of our professional RJs to record your paper in their voice on request.

The FARSM member also entitled to get the benefits of free research podcasting of their research documents through video clips. We can also streamline your conference videos and display your slides/ online slides and online research video clips at reasonable charges, on request.

The FARSM is eligible to earn from sales proceeds of his/her researches/reference/review Books or literature, while publishing with Global Journals. The FARSS can decide whether he/she would like to publish his/her research in a closed manner. In this case, whenever readers purchase that individual research paper for reading, maximum 60% of its profit earned as royalty by Global Journals, will be credited to his/her bank account. The entire entitled amount will be credited to his/her bank account exceeding limit of minimum fixed balance. There is no minimum time limit for collection. The FARSM member can decide its price and we can help in making the right decision.

The FARSM member is eligible to join as a paid peer reviewer at Global Journals Incorporation (USA) and can get remuneration of 15% of author fees, taken from the author of a respective paper. After reviewing 5 or more papers you can request to transfer the amount to your bank account.

MEMBER OF ASSOCIATION OF RESEARCH SOCIETY IN MEDICAL (MARSM)

The ' MARSM ' title is accorded to a selected professional after the approval of the Editor-in-Chief / Editorial Board Members/Dean.

The "MARSM" is a dignified ornament which is accorded to a person's name viz. Dr. John E. Hall, Ph.D., MARSM or William Walldroff, M.S., MARSM.

MARSM accrediting is an honor. It authenticates your research activities. Afterbecoming MARSM,you can add 'MARSM' title with your name as you use this recognition as additional suffix to your status. This will definitely enhance and add more value and repute to your name. You may use it on your professional Counseling Materials such as CV, Resume, Visiting Card and Name Plate etc.

The following benefitscan be availed by you only for next three years from the date of certification.

MARSM designated members are entitled to avail a 25% discount while publishing their research papers (of a single author) in Global Journals Inc., if the same is accepted by our Editorial Board and Peer Reviewers. If you are a main author or co-author of a group of authors, you will get discount of 10%.

As MARSM, you willbe given a renowned, secure and free professional email address with 30 GB of space e.g. johnhall@globaljournals.org. This will include Webmail, Spam Assassin, Email Forwarders,Auto-Responders, Email Delivery Route tracing, etc.

We shall provide you intimation regarding launching of e-version of journal of your stream time to time.This may be utilized in your library for the enrichment of knowledge of your students as well as it can also be helpful for the concerned faculty members.

The MARSM member can apply for approval, grading and certification of standards of their educational and Institutional Degrees to Open Association of Research, Society U.S.A.

Once you are designated as MARSM, you may send us a scanned copy of all of your credentials. OARS will verify, grade and certify them. This will be based on your academic records, quality of research papers published by you, and some more criteria.

It is mandatory to read all terms and conditions carefully.

AUXILIARY MEMBERSHIPS

Institutional Fellow of Open Association of Research Society (USA) - OARS (USA)

Global Journals Incorporation (USA) is accredited by Open Association of Research Society, U.S.A (OARS) and in turn, affiliates research institutions as "Institutional Fellow of Open Association of Research Society" (IFOARS).

The "FARSC" is a dignified title which is accorded to a person's name viz. Dr. John E. Hall, Ph.D., FARSC or William Walldroff, M.S., FARSC.

The IFOARS institution is entitled to form a Board comprised of one Chairperson and three to five board members preferably from different streams. The Board will be recognized as "Institutional Board of Open Association of Research Society"-(IBOARS).

The Institute will be entitled to following benefits:

The IBOARS can initially review research papers of their institute and recommend them to publish with respective journal of Global Journals. It can also review the papers of other institutions after obtaining our consent. The second review will be done by peer reviewer of Global Journals Incorporation (USA) The Board is at liberty to appoint a peer reviewer with the approval of chairperson after consulting us.

The author fees of such paper may be waived off up to 40%.

The Global Journals Incorporation (USA) at its discretion can also refer double blind peer reviewed paper at their end to the board for the verification and to get recommendation for final stage of acceptance of publication.

The IBOARS can organize symposium/seminar/conference in their country on behalf of Global Journals Incorporation (USA)-OARS (USA). The terms and conditions can be discussed separately.

The Board can also play vital role by exploring and giving valuable suggestions regarding the Standards of "Open Association of Research Society, U.S.A (OARS)" so that proper amendment can take place for the benefit of entire research community. We shall provide details of particular standard only on receipt of request from the Board.

The board members can also join us as Individual Fellow with 40% discount on total fees applicable to Individual Fellow. They will be entitled to avail all the benefits as declared. Please visit Individual Fellow-sub menu of GlobalJournals.org to have more relevant details.

We shall provide you intimation regarding launching of e-version of journal of your stream time to time. This may be utilized in your library for the enrichment of knowledge of your students as well as it can also be helpful for the concerned faculty members.

After nomination of your institution as "Institutional Fellow" and constantly functioning successfully for one year, we can consider giving recognition to your institute to function as Regional/Zonal office on our behalf.
The board can also take up the additional allied activities for betterment after our consultation.

The following entitlements are applicable to individual Fellows:

Open Association of Research Society, U.S.A (OARS) By-laws states that an individual Fellow may use the designations as applicable, or the corresponding initials. The Credentials of individual Fellow and Associate designations signify that the individual has gained knowledge of the fundamental concepts. One is magnanimous and proficient in an expertise course covering the professional code of conduct, and follows recognized standards of practice.

Open Association of Research Society (US)/ Global Journals Incorporation (USA), as described in Corporate Statements, are educational, research publishing and professional membership organizations. Achieving our individual Fellow or Associate status is based mainly on meeting stated educational research requirements.

Disbursement of 40% Royalty earned through Global Journals : Researcher = 50%, Peer Reviewer = 37.50%, Institution = 12.50% E.g. Out of 40%, the 20% benefit should be passed on to researcher, 15 % benefit towards remuneration should be given to a reviewer and remaining 5% is to be retained by the institution.

We shall provide print version of 12 issues of any three journals [as per your requirement] out of our 38 journals worth $ 2376 USD.

Other:

The individual Fellow and Associate designations accredited by Open Association of Research Society (US) credentials signify guarantees following achievements:

- The professional accredited with Fellow honor, is entitled to various benefits viz. name, fame, honor, regular flow of income, secured bright future, social status etc.

- In addition to above, if one is single author, then entitled to 40% discount on publishing research paper and can get 10%discount if one is co-author or main author among group of authors.
- The Fellow can organize symposium/seminar/conference on behalf of Global Journals Incorporation (USA) and he/she can also attend the same organized by other institutes on behalf of Global Journals.
- The Fellow can become member of Editorial Board Member after completing 3yrs.
- The Fellow can earn 60% of sales proceeds from the sale of reference/review books/literature/publishing of research paper.
- Fellow can also join as paid peer reviewer and earn 15% remuneration of author charges and can also get an opportunity to join as member of the Editorial Board of Global Journals Incorporation (USA)
- • This individual has learned the basic methods of applying those concepts and techniques to common challenging situations. This individual has further demonstrated an in–depth understanding of the application of suitable techniques to a particular area of research practice.

Note :

"

- In future, if the board feels the necessity to change any board member, the same can be done with the consent of the chairperson along with anyone board member without our approval.
- In case, the chairperson needs to be replaced then consent of 2/3rd board members are required and they are also required to jointly pass the resolution copy of which should be sent to us. In such case, it will be compulsory to obtain our approval before replacement.
- In case of "Difference of Opinion [if any]" among the Board members, our decision will be final and binding to everyone.

"

Process of submission of Research Paper

The Area or field of specialization may or may not be of any category as mentioned in 'Scope of Journal' menu of the GlobalJournals.org website. There are 37 Research Journal categorized with Six parental Journals GJCST, GJMR, GJRE, GJMBR, GJSFR, GJHSS. For Authors should prefer the mentioned categories. There are three widely used systems UDC, DDC and LCC. The details are available as 'Knowledge Abstract' at Home page. The major advantage of this coding is that, the research work will be exposed to and shared with all over the world as we are being abstracted and indexed worldwide.

The paper should be in proper format. The format can be downloaded from first page of 'Author Guideline' Menu. The Author is expected to follow the general rules as mentioned in this menu. The paper should be written in MS-Word Format (*.DOC,*.DOCX).

The Author can submit the paper either online or offline. The authors should prefer online submission.Online Submission: There are three ways to submit your paper:

(A) (I) First, register yourself using top right corner of Home page then Login. If you are already registered, then login using your username and password.

(II) Choose corresponding Journal.

(III) Click 'Submit Manuscript'. Fill required information and Upload the paper.

(B) If you are using Internet Explorer, then Direct Submission through Homepage is also available.

(C) If these two are not conveninet , and then email the paper directly to dean@globaljournals.org.

Offline Submission: Author can send the typed form of paper by Post. However, online submission should be preferred.

Preferred Author Guidelines

MANUSCRIPT STYLE INSTRUCTION (Must be strictly followed)

Page Size: 8.27" X 11'"

- Left Margin: 0.65
- Right Margin: 0.65
- Top Margin: 0.75
- Bottom Margin: 0.75
- Font type of all text should be Swis 721 Lt BT.
- Paper Title should be of Font Size 24 with one Column section.
- Author Name in Font Size of 11 with one column as of Title.
- Abstract Font size of 9 Bold, "Abstract" word in Italic Bold.
- Main Text: Font size 10 with justified two columns section
- Two Column with Equal Column with of 3.38 and Gaping of .2
- First Character must be three lines Drop capped.
- Paragraph before Spacing of 1 pt and After of 0 pt.
- Line Spacing of 1 pt
- Large Images must be in One Column
- Numbering of First Main Headings (Heading 1) must be in Roman Letters, Capital Letter, and Font Size of 10.
- Numbering of Second Main Headings (Heading 2) must be in Alphabets, Italic, and Font Size of 10.

You can use your own standard format also.
Author Guidelines:

1. General,

2. Ethical Guidelines,

3. Submission of Manuscripts,

4. Manuscript's Category,

5. Structure and Format of Manuscript,

6. After Acceptance.

1. GENERAL

Before submitting your research paper, one is advised to go through the details as mentioned in following heads. It will be beneficial, while peer reviewer justify your paper for publication.

Scope

The Global Journals Inc. (US) welcome the submission of original paper, review paper, survey article relevant to the all the streams of Philosophy and knowledge. The Global Journals Inc. (US) is parental platform for Global Journal of Computer Science and Technology, Researches in Engineering, Medical Research, Science Frontier Research, Human Social Science, Management, and Business organization. The choice of specific field can be done otherwise as following in Abstracting and Indexing Page on this Website. As the all Global

Journals Inc. (US) are being abstracted and indexed (in process) by most of the reputed organizations. Topics of only narrow interest will not be accepted unless they have wider potential or consequences.

2. ETHICAL GUIDELINES

Authors should follow the ethical guidelines as mentioned below for publication of research paper and research activities.

Papers are accepted on strict understanding that the material in whole or in part has not been, nor is being, considered for publication elsewhere. If the paper once accepted by Global Journals Inc. (US) and Editorial Board, will become the copyright of the Global Journals Inc. (US).

Authorship: The authors and coauthors should have active contribution to conception design, analysis and interpretation of findings. They should critically review the contents and drafting of the paper. All should approve the final version of the paper before submission

The Global Journals Inc. (US) follows the definition of authorship set up by the Global Academy of Research and Development. According to the Global Academy of R&D authorship, criteria must be based on:

1) Substantial contributions to conception and acquisition of data, analysis and interpretation of the findings.

2) Drafting the paper and revising it critically regarding important academic content.

3) Final approval of the version of the paper to be published.

All authors should have been credited according to their appropriate contribution in research activity and preparing paper. Contributors who do not match the criteria as authors may be mentioned under Acknowledgement.

Acknowledgements: Contributors to the research other than authors credited should be mentioned under acknowledgement. The specifications of the source of funding for the research if appropriate can be included. Suppliers of resources may be mentioned along with address.

Appeal of Decision: The Editorial Board's decision on publication of the paper is final and cannot be appealed elsewhere.

Permissions: It is the author's responsibility to have prior permission if all or parts of earlier published illustrations are used in this paper.

Please mention proper reference and appropriate acknowledgements wherever expected.

If all or parts of previously published illustrations are used, permission must be taken from the copyright holder concerned. It is the author's responsibility to take these in writing.

Approval for reproduction/modification of any information (including figures and tables) published elsewhere must be obtained by the authors/copyright holders before submission of the manuscript. Contributors (Authors) are responsible for any copyright fee involved.

3. SUBMISSION OF MANUSCRIPTS

Manuscripts should be uploaded via this online submission page. The online submission is most efficient method for submission of papers, as it enables rapid distribution of manuscripts and consequently speeds up the review procedure. It also enables authors to know the status of their own manuscripts by emailing us. Complete instructions for submitting a paper is available below.

Manuscript submission is a systematic procedure and little preparation is required beyond having all parts of your manuscript in a given format and a computer with an Internet connection and a Web browser. Full help and instructions are provided on-screen. As an author, you will be prompted for login and manuscript details as Field of Paper and then to upload your manuscript file(s) according to the instructions.

To avoid postal delays, all transaction is preferred by e-mail. A finished manuscript submission is confirmed by e-mail immediately and your paper enters the editorial process with no postal delays. When a conclusion is made about the publication of your paper by our Editorial Board, revisions can be submitted online with the same procedure, with an occasion to view and respond to all comments.

Complete support for both authors and co-author is provided.

4. MANUSCRIPT'S CATEGORY

Based on potential and nature, the manuscript can be categorized under the following heads:

Original research paper: Such papers are reports of high-level significant original research work.

Review papers: These are concise, significant but helpful and decisive topics for young researchers.

Research articles: These are handled with small investigation and applications

Research letters: The letters are small and concise comments on previously published matters.

5.STRUCTURE AND FORMAT OF MANUSCRIPT

The recommended size of original research paper is less than seven thousand words, review papers fewer than seven thousands words also.Preparation of research paper or how to write research paper, are major hurdle, while writing manuscript. The research articles and research letters should be fewer than three thousand words, the structure original research paper; sometime review paper should be as follows:

Papers: These are reports of significant research (typically less than 7000 words equivalent, including tables, figures, references), and comprise:

(a)Title should be relevant and commensurate with the theme of the paper.

(b) A brief Summary, "Abstract" (less than 150 words) containing the major results and conclusions.

(c) Up to ten keywords, that precisely identifies the paper's subject, purpose, and focus.

(d) An Introduction, giving necessary background excluding subheadings; objectives must be clearly declared.

(e) Resources and techniques with sufficient complete experimental details (wherever possible by reference) to permit repetition; sources of information must be given and numerical methods must be specified by reference, unless non-standard.

(f) Results should be presented concisely, by well-designed tables and/or figures; the same data may not be used in both; suitable statistical data should be given. All data must be obtained with attention to numerical detail in the planning stage. As reproduced design has been recognized to be important to experiments for a considerable time, the Editor has decided that any paper that appears not to have adequate numerical treatments of the data will be returned un-refereed;

(g) Discussion should cover the implications and consequences, not just recapitulating the results; conclusions should be summarizing.

(h) Brief Acknowledgements.

(i) References in the proper form.

Authors should very cautiously consider the preparation of papers to ensure that they communicate efficiently. Papers are much more likely to be accepted, if they are cautiously designed and laid out, contain few or no errors, are summarizing, and be conventional to the approach and instructions. They will in addition, be published with much less delays than those that require much technical and editorial correction.

The Editorial Board reserves the right to make literary corrections and to make suggestions to improve briefness.

It is vital, that authors take care in submitting a manuscript that is written in simple language and adheres to published guidelines.

Format

Language: The language of publication is UK English. Authors, for whom English is a second language, must have their manuscript efficiently edited by an English-speaking person before submission to make sure that, the English is of high excellence. It is preferable, that manuscripts should be professionally edited.

Standard Usage, Abbreviations, and Units: Spelling and hyphenation should be conventional to The Concise Oxford English Dictionary. Statistics and measurements should at all times be given in figures, e.g. 16 min, except for when the number begins a sentence. When the number does not refer to a unit of measurement it should be spelt in full unless, it is 160 or greater.

Abbreviations supposed to be used carefully. The abbreviated name or expression is supposed to be cited in full at first usage, followed by the conventional abbreviation in parentheses.

Metric SI units are supposed to generally be used excluding where they conflict with current practice or are confusing. For illustration, 1.4 l rather than 1.4 × 10-3 m3, or 4 mm somewhat than 4 × 10-3 m. Chemical formula and solutions must identify the form used, e.g. anhydrous or hydrated, and the concentration must be in clearly defined units. Common species names should be followed by underlines at the first mention. For following use the generic name should be constricted to a single letter, if it is clear.

Structure

All manuscripts submitted to Global Journals Inc. (US), ought to include:

Title: The title page must carry an instructive title that reflects the content, a running title (less than 45 characters together with spaces), names of the authors and co-authors, and the place(s) wherever the work was carried out. The full postal address in addition with the e-mail address of related author must be given. Up to eleven keywords or very brief phrases have to be given to help data retrieval, mining and indexing.

Abstract, used in Original Papers and Reviews:

Optimizing Abstract for Search Engines

Many researchers searching for information online will use search engines such as Google, Yahoo or similar. By optimizing your paper for search engines, you will amplify the chance of someone finding it. This in turn will make it more likely to be viewed and/or cited in a further work. Global Journals Inc. (US) have compiled these guidelines to facilitate you to maximize the web-friendliness of the most public part of your paper.

Key Words

A major linchpin in research work for the writing research paper is the keyword search, which one will employ to find both library and Internet resources.

One must be persistent and creative in using keywords. An effective keyword search requires a strategy and planning a list of possible keywords and phrases to try.

Search engines for most searches, use Boolean searching, which is somewhat different from Internet searches. The Boolean search uses "operators," words (and, or, not, and near) that enable you to expand or narrow your affords. Tips for research paper while preparing research paper are very helpful guideline of research paper.

Choice of key words is first tool of tips to write research paper. Research paper writing is an art.A few tips for deciding as strategically as possible about keyword search:

- One should start brainstorming lists of possible keywords before even begin searching. Think about the most important concepts related to research work. Ask, "What words would a source have to include to be truly valuable in research paper?" Then consider synonyms for the important words.
- It may take the discovery of only one relevant paper to let steer in the right keyword direction because in most databases, the keywords under which a research paper is abstracted are listed with the paper.
- One should avoid outdated words.

Keywords are the key that opens a door to research work sources. Keyword searching is an art in which researcher's skills are bound to improve with experience and time.

Numerical Methods: Numerical methods used should be clear and, where appropriate, supported by references.

Acknowledgements: Please make these as concise as possible.

References

References follow the Harvard scheme of referencing. References in the text should cite the authors' names followed by the time of their publication, unless there are three or more authors when simply the first author's name is quoted followed by et al. unpublished work has to only be cited where necessary, and only in the text. Copies of references in press in other journals have to be supplied with submitted typescripts. It is necessary that all citations and references be carefully checked before submission, as mistakes or omissions will cause delays.

References to information on the World Wide Web can be given, but only if the information is available without charge to readers on an official site. Wikipedia and Similar websites are not allowed where anyone can change the information. Authors will be asked to make available electronic copies of the cited information for inclusion on the Global Journals Inc. (US) homepage at the judgment of the Editorial Board.

The Editorial Board and Global Journals Inc. (US) recommend that, citation of online-published papers and other material should be done via a DOI (digital object identifier). If an author cites anything, which does not have a DOI, they run the risk of the cited material not being noticeable.

The Editorial Board and Global Journals Inc. (US) recommend the use of a tool such as Reference Manager for reference management and formatting.

Tables, Figures and Figure Legends

Tables: Tables should be few in number, cautiously designed, uncrowned, and include only essential data. Each must have an Arabic number, e.g. Table 4, a self-explanatory caption and be on a separate sheet. Vertical lines should not be used.

Figures: Figures are supposed to be submitted as separate files. Always take in a citation in the text for each figure using Arabic numbers, e.g. Fig. 4. Artwork must be submitted online in electronic form by e-mailing them.

Preparation of Electronic Figures for Publication

Even though low quality images are sufficient for review purposes, print publication requires high quality images to prevent the final product being blurred or fuzzy. Submit (or e-mail) EPS (line art) or TIFF (halftone/photographs) files only. MS PowerPoint and Word Graphics are unsuitable for printed pictures. Do not use pixel-oriented software. Scans (TIFF only) should have a resolution of at least 350 dpi (halftone) or 700 to 1100 dpi (line drawings) in relation to the imitation size. Please give the data for figures in black and white or submit a Color Work Agreement Form. EPS files must be saved with fonts embedded (and with a TIFF preview, if possible).

For scanned images, the scanning resolution (at final image size) ought to be as follows to ensure good reproduction: line art: >650 dpi; halftones (including gel photographs) : >350 dpi; figures containing both halftone and line images: >650 dpi.

Color Charges: It is the rule of the Global Journals Inc. (US) for authors to pay the full cost for the reproduction of their color artwork. Hence, please note that, if there is color artwork in your manuscript when it is accepted for publication, we would require you to complete and return a color work agreement form before your paper can be published.

Figure Legends: Self-explanatory legends of all figures should be incorporated separately under the heading 'Legends to Figures'. In the full-text online edition of the journal, figure legends may possibly be truncated in abbreviated links to the full screen version. Therefore, the first 100 characters of any legend should notify the reader, about the key aspects of the figure.

6. AFTER ACCEPTANCE

Upon approval of a paper for publication, the manuscript will be forwarded to the dean, who is responsible for the publication of the Global Journals Inc. (US).

6.1 Proof Corrections

The corresponding author will receive an e-mail alert containing a link to a website or will be attached. A working e-mail address must therefore be provided for the related author.

Acrobat Reader will be required in order to read this file. This software can be downloaded

(Free of charge) from the following website:

www.adobe.com/products/acrobat/readstep2.html. This will facilitate the file to be opened, read on screen, and printed out in order for any corrections to be added. Further instructions will be sent with the proof.

Proofs must be returned to the dean at dean@globaljournals.org within three days of receipt.

As changes to proofs are costly, we inquire that you only correct typesetting errors. All illustrations are retained by the publisher. Please note that the authors are responsible for all statements made in their work, including changes made by the copy editor.

6.2 Early View of Global Journals Inc. (US) (Publication Prior to Print)

The Global Journals Inc. (US) are enclosed by our publishing's Early View service. Early View articles are complete full-text articles sent in advance of their publication. Early View articles are absolute and final. They have been completely reviewed, revised and edited for publication, and the authors' final corrections have been incorporated. Because they are in final form, no changes can be made after sending them. The nature of Early View articles means that they do not yet have volume, issue or page numbers, so Early View articles cannot be cited in the conventional way.

6.3 Author Services

Online production tracking is available for your article through Author Services. Author Services enables authors to track their article - once it has been accepted - through the production process to publication online and in print. Authors can check the status of their articles online and choose to receive automated e-mails at key stages of production. The authors will receive an e-mail with a unique link that enables them to register and have their article automatically added to the system. Please ensure that a complete e-mail address is provided when submitting the manuscript.

6.4 Author Material Archive Policy

Please note that if not specifically requested, publisher will dispose off hardcopy & electronic information submitted, after the two months of publication. If you require the return of any information submitted, please inform the Editorial Board or dean as soon as possible.

6.5 Offprint and Extra Copies

A PDF offprint of the online-published article will be provided free of charge to the related author, and may be distributed according to the Publisher's terms and conditions. Additional paper offprint may be ordered by emailing us at: editor@globaljournals.org .

Before start writing a good quality Computer Science Research Paper, let us first understand what is Computer Science Research Paper? So, Computer Science Research Paper is the paper which is written by professionals or scientists who are associated to Computer Science and Information Technology, or doing research study in these areas. If you are novel to this field then you can consult about this field from your supervisor or guide.

TECHNIQUES FOR WRITING A GOOD QUALITY RESEARCH PAPER:

1. Choosing the topic: In most cases, the topic is searched by the interest of author but it can be also suggested by the guides. You can have several topics and then you can judge that in which topic or subject you are finding yourself most comfortable. This can be done by asking several questions to yourself, like Will I be able to carry our search in this area? Will I find all necessary recourses to accomplish the search? Will I be able to find all information in this field area? If the answer of these types of questions will be "Yes" then you can choose that topic. In most of the cases, you may have to conduct the surveys and have to visit several places because this field is related to Computer Science and Information Technology. Also, you may have to do a lot of work to find all rise and falls regarding the various data of that subject. Sometimes, detailed information plays a vital role, instead of short information.

2. Evaluators are human: First thing to remember that evaluators are also human being. They are not only meant for rejecting a paper. They are here to evaluate your paper. So, present your Best.

3. Think Like Evaluators: If you are in a confusion or getting demotivated that your paper will be accepted by evaluators or not, then think and try to evaluate your paper like an Evaluator. Try to understand that what an evaluator wants in your research paper and automatically you will have your answer.

4. Make blueprints of paper: The outline is the plan or framework that will help you to arrange your thoughts. It will make your paper logical. But remember that all points of your outline must be related to the topic you have chosen.

5. Ask your Guides: If you are having any difficulty in your research, then do not hesitate to share your difficulty to your guide (if you have any). They will surely help you out and resolve your doubts. If you can't clarify what exactly you require for your work then ask the supervisor to help you with the alternative. He might also provide you the list of essential readings.

6. Use of computer is recommended: As you are doing research in the field of Computer Science, then this point is quite obvious.

7. Use right software: Always use good quality software packages. If you are not capable to judge good software then you can lose quality of your paper unknowingly. There are various software programs available to help you, which you can get through Internet.

8. Use the Internet for help: An excellent start for your paper can be by using the Google. It is an excellent search engine, where you can have your doubts resolved. You may also read some answers for the frequent question how to write my research paper or find model research paper. From the internet library you can download books. If you have all required books make important reading selecting and analyzing the specified information. Then put together research paper sketch out.

9. Use and get big pictures: Always use encyclopedias, Wikipedia to get pictures so that you can go into the depth.

10. Bookmarks are useful: When you read any book or magazine, you generally use bookmarks, right! It is a good habit, which helps to not to lose your continuity. You should always use bookmarks while searching on Internet also, which will make your search easier.

11. Revise what you wrote: When you write anything, always read it, summarize it and then finalize it.

12. Make all efforts: Make all efforts to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in introduction, that what is the need of a particular research paper. Polish your work by good skill of writing and always give an evaluator, what he wants.

13. Have backups: When you are going to do any important thing like making research paper, you should always have backup copies of it either in your computer or in paper. This will help you to not to lose any of your important.

14. Produce good diagrams of your own: Always try to include good charts or diagrams in your paper to improve quality. Using several and unnecessary diagrams will degrade the quality of your paper by creating "hotchpotch." So always, try to make and include those diagrams, which are made by your own to improve readability and understandability of your paper.

15. Use of direct quotes: When you do research relevant to literature, history or current affairs then use of quotes become essential but if study is relevant to science then use of quotes is not preferable.

16. Use proper verb tense: Use proper verb tenses in your paper. Use past tense, to present those events that happened. Use present tense to indicate events that are going on. Use future tense to indicate future happening events. Use of improper and wrong tenses will confuse the evaluator. Avoid the sentences that are incomplete.

17. Never use online paper: If you are getting any paper on Internet, then never use it as your research paper because it might be possible that evaluator has already seen it or maybe it is outdated version.

18. Pick a good study spot: To do your research studies always try to pick a spot, which is quiet. Every spot is not for studies. Spot that suits you choose it and proceed further.

19. Know what you know: Always try to know, what you know by making objectives. Else, you will be confused and cannot achieve your target.

20. Use good quality grammar: Always use a good quality grammar and use words that will throw positive impact on evaluator. Use of good quality grammar does not mean to use tough words, that for each word the evaluator has to go through dictionary. Do not start sentence with a conjunction. Do not fragment sentences. Eliminate one-word sentences. Ignore passive voice. Do not ever use a big word when a diminutive one would suffice. Verbs have to be in agreement with their subjects. Prepositions are not expressions to finish sentences with. It is incorrect to ever divide an infinitive. Avoid clichés like the disease. Also, always shun irritating alliteration. Use language that is simple and straight forward. put together a neat summary.

21. Arrangement of information: Each section of the main body should start with an opening sentence and there should be a changeover at the end of the section. Give only valid and powerful arguments to your topic. You may also maintain your arguments with records.

22. Never start in last minute: Always start at right time and give enough time to research work. Leaving everything to the last minute will degrade your paper and spoil your work.

23. Multitasking in research is not good: Doing several things at the same time proves bad habit in case of research activity. Research is an area, where everything has a particular time slot. Divide your research work in parts and do particular part in particular time slot.

24. Never copy others' work: Never copy others' work and give it your name because if evaluator has seen it anywhere you will be in trouble.

25. Take proper rest and food: No matter how many hours you spend for your research activity, if you are not taking care of your health then all your efforts will be in vain. For a quality research, study is must, and this can be done by taking proper rest and food.

26. Go for seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.

27. Refresh your mind after intervals: Try to give rest to your mind by listening to soft music or by sleeping in intervals. This will also improve your memory.

28. Make colleagues: Always try to make colleagues. No matter how sharper or intelligent you are, if you make colleagues you can have several ideas, which will be helpful for your research.

29. Think technically: Always think technically. If anything happens, then search its reasons, its benefits, and demerits.

30. Think and then print: When you will go to print your paper, notice that tables are not be split, headings are not detached from their descriptions, and page sequence is maintained.

31. Adding unnecessary information: Do not add unnecessary information, like, I have used MS Excel to draw graph. Do not add irrelevant and inappropriate material. These all will create superfluous. Foreign terminology and phrases are not apropos. One should NEVER take a broad view. Analogy in script is like feathers on a snake. Not at all use a large word when a very small one would be sufficient. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Amplification is a billion times of inferior quality than sarcasm.

32. Never oversimplify everything: To add material in your research paper, never go for oversimplification. This will definitely irritate the evaluator. Be more or less specific. Also too, by no means, ever use rhythmic redundancies. Contractions aren't essential and shouldn't be there used. Comparisons are as terrible as clichés. Give up ampersands and abbreviations, and so on. Remove commas, that are, not necessary. Parenthetical words however should be together with this in commas. Understatement is all the time the complete best way to put onward earth-shaking thoughts. Give a detailed literary review.

33. Report concluded results: Use concluded results. From raw data, filter the results and then conclude your studies based on measurements and observations taken. Significant figures and appropriate number of decimal places should be used. Parenthetical remarks are prohibitive. Proofread carefully at final stage. In the end give outline to your arguments. Spot out perspectives of further study of this subject. Justify your conclusion by at the bottom of them with sufficient justifications and examples.

34. After conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium though which your research is going to be in print to the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects in your research.

Informal Guidelines of Research Paper Writing

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form, which is presented in the guidelines using the template.
- Please note the criterion for grading the final paper by peer-reviewers.

Final Points:

A purpose of organizing a research paper is to let people to interpret your effort selectively. The journal requires the following sections, submitted in the order listed, each section to start on a new page.

The introduction will be compiled from reference matter and will reflect the design processes or outline of basis that direct you to make study. As you will carry out the process of study, the method and process section will be constructed as like that. The result segment will show related statistics in nearly sequential order and will direct the reviewers next to the similar intellectual paths throughout the data that you took to carry out your study. The discussion section will provide understanding of the data and projections as to the implication of the results. The use of good quality references all through the paper will give the effort trustworthiness by representing an alertness of prior workings.

Writing a research paper is not an easy job no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record keeping are the only means to make straightforward the progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear

· Adhere to recommended page limits

Mistakes to evade

- Insertion a title at the foot of a page with the subsequent text on the next page
- Separating a table/chart or figure - impound each figure/table to a single page
- Submitting a manuscript with pages out of sequence

In every sections of your document

· Use standard writing style including articles ("a", "the," etc.)

· Keep on paying attention on the research topic of the paper

· Use paragraphs to split each significant point (excluding for the abstract)

· Align the primary line of each section

· Present your points in sound order

· Use present tense to report well accepted

· Use past tense to describe specific results

· Shun familiar wording, don't address the reviewer directly, and don't use slang, slang language, or superlatives

· Shun use of extra pictures - include only those figures essential to presenting results

Title Page:

Choose a revealing title. It should be short. It should not have non-standard acronyms or abbreviations. It should not exceed two printed lines. It should include the name(s) and address (es) of all authors.

Abstract:

The summary should be two hundred words or less. It should briefly and clearly explain the key findings reported in the manuscript--must have precise statistics. It should not have abnormal acronyms or abbreviations. It should be logical in itself. Shun citing references at this point.

An abstract is a brief distinct paragraph summary of finished work or work in development. In a minute or less a reviewer can be taught the foundation behind the study, common approach to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Yet, use comprehensive sentences and do not let go readability for briefness. You can maintain it succinct by phrasing sentences so that they provide more than lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study, with the subsequent elements in any summary. Try to maintain the initial two items to no more than one ruling each.

- Reason of the study - theory, overall issue, purpose
- Fundamental goal
- To the point depiction of the research
- Consequences, including definite statistics - if the consequences are quantitative in nature, account quantitative data; results of any numerical analysis should be reported
- Significant conclusions or questions that track from the research(es)

Approach:

- Single section, and succinct
- As a outline of job done, it is always written in past tense
- A conceptual should situate on its own, and not submit to any other part of the paper such as a form or table
- Center on shortening results - bound background information to a verdict or two, if completely necessary
- What you account in an conceptual must be regular with what you reported in the manuscript
- Exact spelling, clearness of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else

Introduction:

The **Introduction** should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable to comprehend and calculate the purpose of your study without having to submit to other works. The basis for the study should be offered. Give most important references but shun difficult to make a comprehensive appraisal of the topic. In the introduction, describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will have no attention in your result. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here. Following approach can create a valuable beginning:

- Explain the value (significance) of the study
- Shield the model - why did you employ this particular system or method? What is its compensation? You strength remark on its appropriateness from a abstract point of vision as well as point out sensible reasons for using it.
- Present a justification. Status your particular theory (es) or aim(s), and describe the logic that led you to choose them.
- Very for a short time explain the tentative propose and how it skilled the declared objectives.

Approach:

- Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done.
- Sort out your thoughts; manufacture one key point with every section. If you make the four points listed above, you will need a least of four paragraphs.

- Present surroundings information only as desirable in order hold up a situation. The reviewer does not desire to read the whole thing you know about a topic.
- Shape the theory/purpose specifically - do not take a broad view.
- As always, give awareness to spelling, simplicity and correctness of sentences and phrases.

Procedures (Methods and Materials):

This part is supposed to be the easiest to carve if you have good skills. A sound written Procedures segment allows a capable scientist to replacement your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt for the least amount of information that would permit another capable scientist to spare your outcome but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section. When a technique is used that has been well described in another object, mention the specific item describing a way but draw the basic principle while stating the situation. The purpose is to text all particular resources and broad procedures, so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step by step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

- Explain materials individually only if the study is so complex that it saves liberty this way.
- Embrace particular materials, and any tools or provisions that are not frequently found in laboratories.
- Do not take in frequently found.
- If use of a definite type of tools.
- Materials may be reported in a part section or else they may be recognized along with your measures.

Methods:

- Report the method (not particulars of each process that engaged the same methodology)
- Describe the method entirely
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures
- Simplify - details how procedures were completed not how they were exclusively performed on a particular day.
- If well known procedures were used, account the procedure by name, possibly with reference, and that's all.

Approach:

- It is embarrassed or not possible to use vigorous voice when documenting methods with no using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result when script up the methods most authors use third person passive voice.
- Use standard style in this and in every other part of the paper - avoid familiar lists, and use full sentences.

What to keep away from

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings - save it for the argument.
- Leave out information that is immaterial to a third party.

Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part a entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Carry on to be to the point, by means of statistics and tables, if suitable, to present consequences most efficiently.You must obviously differentiate material that would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matter should not be submitted at all except requested by the instructor.

Content

- Sum up your conclusion in text and demonstrate them, if suitable, with figures and tables.
- In manuscript, explain each of your consequences, point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation an exacting study.
- Explain results of control experiments and comprise remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or in manuscript form.

What to stay away from

- Do not discuss or infer your outcome, report surroundings information, or try to explain anything.
- Not at all, take in raw data or intermediate calculations in a research manuscript.
- Do not present the similar data more than once.
- Manuscript should complement any figures or tables, not duplicate the identical information.
- Never confuse figures with tables - there is a difference.

Approach

- As forever, use past tense when you submit to your results, and put the whole thing in a reasonable order.
- Put figures and tables, appropriately numbered, in order at the end of the report
- If you desire, you may place your figures and tables properly within the text of your results part.

Figures and tables

- If you put figures and tables at the end of the details, make certain that they are visibly distinguished from any attach appendix materials, such as raw facts
- Despite of position, each figure must be numbered one after the other and complete with subtitle
- In spite of position, each table must be titled, numbered one after the other and complete with heading
- All figure and table must be adequately complete that it could situate on its own, divide from text

Discussion:

The Discussion is expected the trickiest segment to write and describe. A lot of papers submitted for journal are discarded based on problems with the Discussion. There is no head of state for how long a argument should be. Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implication of the study. The purpose here is to offer an understanding of your results and hold up for all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of result should be visibly described. Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved with prospect, and let it drop at that.

- Make a decision if each premise is supported, discarded, or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."
- Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work
- You may propose future guidelines, such as how the experiment might be personalized to accomplish a new idea.
- Give details all of your remarks as much as possible, focus on mechanisms.
- Make a decision if the tentative design sufficiently addressed the theory, and whether or not it was correctly restricted.
- Try to present substitute explanations if sensible alternatives be present.
- One research will not counter an overall question, so maintain the large picture in mind, where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

- When you refer to information, differentiate data generated by your own studies from available information
- Submit to work done by specific persons (including you) in past tense.
- Submit to generally acknowledged facts and main beliefs in present tense.

Administration Rules Listed Before Submitting Your Research Paper to Global Journals Inc. (US)

Please carefully note down following rules and regulation before submitting your Research Paper to Global Journals Inc. (US):

Segment Draft and Final Research Paper: You have to strictly follow the template of research paper. If it is not done your paper may get rejected.

- The **major constraint** is that you must independently make all content, tables, graphs, and facts that are offered in the paper. You must write each part of the paper wholly on your own. The Peer-reviewers need to identify your own perceptive of the concepts in your own terms. NEVER extract straight from any foundation, and never rephrase someone else's analysis.

- Do not give permission to anyone else to "PROOFREAD" your manuscript.

- Methods to avoid Plagiarism is applied by us on every paper, if found guilty, you will be blacklisted by all of our collaborated research groups, your institution will be informed for this and strict legal actions will be taken immediately.)
- To guard yourself and others from possible illegal use please do not permit anyone right to use to your paper and files.

Criterion for Grading a Research Paper (Compilation) by Global Journals Inc. (US)

Please note that following table is only a Grading of "Paper Compilation" and not on "Performed/Stated Research" whose grading solely depends on Individual Assigned Peer Reviewer and Editorial Board Member. These can be available only on request and after decision of Paper. This report will be the property of Global Journals Inc. (US).

Topics	Grades		
	A-B	**C-D**	**E-F**
Abstract	Clear and concise with appropriate content, Correct format. 200 words or below	Unclear summary and no specific data, Incorrect form Above 200 words	No specific data with ambiguous information Above 250 words
Introduction	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
Methods and Procedures	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
Discussion	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

Index

B

Biotitanium · 18, 25

C

Curettage · 1, 2, 3

F

Fixation · 18, 21, 23
Flexion · 16

G

Granuloma · 1

H

Homogeneity · 25

K

Kandziora · 16, 25, 26

L

Lynnerup · 8, 14

O

Opaque · 8
Orthopantomgraphs · 8
Osteoligamentous · 16, 17, 23, 24

P

Paewinsky · 13, 14
Periapex · 1
Postextraction · 1, 2, 3
Postextraction · 3

S

Subaxial · 16, 24, 26

T

Tubotympanic · 36

Global Journal of Medical Research

Visit us on the Web at www.GlobalJournals.org | www.JournalofScience.org
or email us at helpdesk@globaljournals.org

ISSN 9755896