

ISSN: Print -0976-9234

Journal of Pharmaceutical Negative Results

Volume No. 16

Issue No. 1

January - April 2024



ENRICHED PUBLICATIONS PVT. LTD

**S-9, IInd FLOOR, MLU POCKET,
MANISH ABHINAV PLAZA-II, ABOVE FEDERAL BANK,
PLOT NO-5, SECTOR-5, DWARKA, NEW DELHI, INDIA-110075,
PHONE: - + (91)-(11)-47026006**

Journal of Pharmaceutical Negative Results

Aims and Scope

Journal of Pharmaceutical Negative Results (www.pnrjournal.com) [ISSN: Print -0976-9234, Online - 2229-7723] – (An official publication of Association of Indian pharmacist-AIP, Published by ResearchTrentz). The journal is a peer-reviewed journal developed to publish original, innovative and novel research articles resulting in negative results. This peer-reviewed scientific journal publishes a theoretical and empirical paper that reports the negative findings and research failures in pharmaceutical field. Submissions should have a negative focus, which means the outputs of research yielded in negative results are being given more preference. All theoretical and methodological perspectives are welcomed. We also encourage the submission of short papers/communications presenting counter-examples to usually accepted conjectures or to published papers. This Journal is a biannual publication.

Dr. Dhiren Shah

Professor, College of Pharmacy India

Editorial Board

<p>Dr. Chakradhara Rao Satyanarayana Uppugundur, B.Pharm., M.Sc., PhD, Pharmacology, Laboratoire de la Fondation CANSEARCH, Department of Pediatrics (University Hospital of Geneva), Batiament Tulipe, 64, Avenue De La Roseaie 1205, Geneve</p>	<p>Dr. Nachiappa Ganesh Rajesh, M.B.B.S., MD, Pathology, Department of Pathology, JIPMER, Pondicherry, India</p>
<p>Dr. V. Ravichandran Pharmaceutical Chemistry Unit, Faculty of Pharmacy, AIMST University, Bedong, Malaysia</p>	<p>Dr. Ramya S Kuna, Postdoctoral Research Fellow, Salk Institute for Biological Studies, California</p>
<p>Dr. K. Krishnaraj, M Pharm., PhD Pharmaceutical chemistry, Research Scientist Formulation & Development (Pharma), R&D, The Himalaya Drug Company, Makali, Bangalore, India Turkey</p>	<p>Prof. Jasmine Lukinac Department of Process Engineering, Faculty of Food</p>
<p>Dr. Nandha Kumar Subbiah, M.Sc., Ph.D., Medical Anatomy Medical University of the Americas, P.O. Box 701, Charlestown, Nevis, West Indies</p>	<p>Dr. Haidar K.A. Alsaedi Department of Basic Science, Faculty of Dentistry, Al- Qadisyah University, Iraq</p>
<p>Dr. Venugopala KN, Ph.D Pharm Chemistry Pharm Chemistry Pharm Chemistry Department of Biotechnology and Food Technology, Durban University of Technology,</p>	<p>K.S. Jaganathan Ph.D General Manager, Manufacturing Technology, Shantha Biotechnics Ltd (A Sanofi company), Medchal, Hyderabad. India.</p>
<p>A.V. Jayapala Reddy, Associate Vice President, & Global Head - Biologics, Business Development, Hetero Labs Ltd, Hyderabad, Telangana, India.</p>	<p>Dr. S. Rajasekaran, Ph.D Professor, Al-Ameen College of Pharmacy, Bangalore, India</p>
<p>Dr. Sandra Barbalho, Department of Biochemistry and Pharmacology, School of Medicine, University of Marília, Department of Biochemistry and Nutrition, Faculty of Food Technology of Marília, Marília - SP, Brazil</p>	<p>Dr. Syam Mohan, RPh, D.Pharm, B.Pharm, PhD (Pharmacology) Director, Central Laboratory, MRC, Head, Bio-Medical Research Unit, Medical Research Center Jazan University, Jazan Kingdom of Saudi Arabia</p>
<p>Dr. Fatima Samad. M.D., Aurora Cardiovascular Services, Aurora Sinai/Aurora St. Luke's Medical Centers, University</p>	<p>Dr. Manik, M. Pharm., Ph.D., Rph. Assistant Professor, Chief Editor - PHARMBIT (ISSN: 0973-6204) Department of Pharmaceutical Sciences & Technology, Birla Institute of Technology, Mesra, Ranchi (Jharkhand), India</p>
<p>Dr. Sudeep Gautam, Ph.D Diabetes section, Laboratory of Clinical Investigation (LCI), IRP (Intramural Research Program) NIA (National Institute on Aging), BRC (Biomedical Research Center), NIH (National Institute of Health), 251 Bayview Blvd. Baltimore, MD</p>	<p>Dr. Raghava Naidu, Ph.D Department of Human Oncology, University of Wisconsin, 1111, Highland Ave, Madison, Wisconsin 53705, USA</p>

<p>Dr. A.R. Suresh Babu, M.Pharm.Ph.D., Global Data and Safety Monitoring, Quintiles Research India Pvt Ltd, Bangalore, India</p>	<p>Dr. Maithili Karpaga Selvi. N, MS.c, Ph.D, Assistant Professor, Department of Biochemistry, All India Institute Of Medical Science (AIIMS), Jodhpur, Rajasthan. INDIA</p>
<p>Dr. Yujie Zhu, MD & Ph.D Exec. Editor-in-Chief, Journal of Cardiovascular Disease Research, Department of Medicine/Cardiology, University of Alabama at Birmingham, 1670 University Blvd Birmingham, AL 35294, USA</p>	<p>Dr. Madhavrao Chavan M.B.B.S, M.D., Associate Professor, Dept. of Pharmacology, Azeezia Institute of Medical Sciences & Research [AIMSR], Meeyannoor [Kollam District], Kerala - 691 537, India</p>
<p>Dr. Narmadha Balakrishnan, Government Hospital, Tambaram, Chennai, India.</p>	<p>Dr. Vanaja K, M.Pharm, Ph.D Formerly Asst Prof, Visveswarapura Institute of Pharmaceutical Sciences 22nd Main, 24th Cross, Opp to BDA Complex BSK 2nd Stage, Bangalore, Karnataka, India</p>

Journal of Pharmaceutical Negative Results

(Volume No. 16, Issue No. 1, January - April 2024)

Contents

Sr. No	Article/ Authors	Pg No
01	A Critical Analysis Of Detection In Bony Fractures Of Conventional Radiography With Ultrasound <i>-1Fouzia Rahman, 2Syed Roman Alam, 3Dr. Mahwash Shoaib, 4Dr Ayesha Khalil, 5Dr Naveed Gul, 6Zafreen Naz Gudaro</i>	1 - 10
02	Study Of Cancer Of Ovaries In Females And Its Linked With The Stem Cells Present In Body <i>- 1Dr Lata Kumari, 2Dr Narindar Kumar, 3Dr Fnu Kanwal, 4Fnu Vishal, 5Ms Chandni Essrani, 6Dr Chandni</i>	11 - 16
03	A Saliva's Physicochemical Characteristics And Total Salivary Antioxidants Ex Vivo Research Evaluating The Effect Of Probiotics <i>-1Ibtihag Siddig Elnaem Mohamed- Nour, 2Dr Hammad Ashiq, 3Dr Adnan Saleem Umar, 4Amina Javed, 5Dr Tehniat Qureshi, 6Dr Usama</i>	17 - 25
04	Noise Levels During Laparoscopic Procedures In Operation Theatres: An Observational Study In A Tertiary Care Hospital In Southern India <i>- Clement Prakash1, John Abraham2*, Eslavath Rajkumar3, Anieta Merin Jacob4, Namrata Nathwani5, Shrenik G6, John Romate7Abderzag</i>	26 - 35
05	A Total Proximal Interphalangeal Joint ArthroplastyOf The Hand With Secondary Destruction Of The Proximal Finger BoneResulting In Chondrosarcoma <i>-Huang Kunpeng,P.I.Bespalchuk</i>	36 - 41

A Critical Analysis Of Detection In Bony Fractures Of Conventional Radiography With Ultrasound

1Fouzia Rahman, 2Syed Roman Alam, 3Dr. Mahwash Shoaib, 4Dr Ayesha Khalil, 5Dr Naveed Gul, 6Zafreen Naz Gudaro

1Consultant Radiologist, Shifa International Hospital Islamabad

2Consultant Orthopedic Surgeon DHQ Hospital Bagh Azad Kashmir

3Assistant Professor Radiology PINS Lahore

4Tehsil Headquarters Hospital Shorkot

5Assistant Professor, Rawal Institute of Health Sciences. Islamabad

6Dr Sulaiman Alhabib Hospital, Olaya, Riyadh KSA

ABSTRACT

Background: Fractured bones are frequent injuries. When the continuity of the bone is broken, a surgical condition called a bone fracture results. When the bone breaks due to a significant force, they happen. Injuries are a leading source of mortality and disability around the globe.

Purpose: To compare the accuracy of ultrasonography and conventional radiography in detecting fractures in individuals who have a clinical suspicion of having them.

Methodology: The study was conducted in Central Park Hospital Lahore. Following a conventional radiograph (CR) examination of the patients, real-time ultrasonography was performed utilizing a high-frequency linear transducer in both the longitudinal and transverse planes. To examine the relative effectiveness of radiography and ultrasonography in identifying fractures, the findings from both techniques were compared. Settings and research design: Fifty patients with clinically suspected fractures from any age group and sex who visited our institution's emergency wing, orthopedic outdoor or indoor, and other departments were included in the study.

Results: The research shows that for the identification of long bone fractures, the accuracy, positive predictive value (PPV), negative predictive value (NPV), sensitivity, specificity, and accuracy of the CR versus USG are all 100%. Additionally, the accuracy, NPV, PPV, specificity, and sensitivity of the CR versus USG in the situation of a short bone fracture diagnosis are 66.67%, 33.3%, 100%, 100%, and 60%, respectively. Therefore, in this investigation, the overall accuracy, NPV, PPV, specificity, and sensitivity of CR against USG were 88%, 72.73%, 100%, 100%, and 82.35%, respectively. The accuracy, NPV, PPV, specificity, and sensitivity of the CR versus USG were, however, 60%, 33.3%, 100%, 100%, and 50%, respectively, in the case of flat bones.

Conclusions: It is discovered to be more sensitive than CR in detecting fractures of short and flat bones and comparable in sensitivity to fractures of long bones. USG is a radiation-free, readily accessible, portable, and cost-effective imaging approach for locating fractures that are only superficially placed.

Keywords: Ultrasonography, Radiography, Fractures.

INTRODUCTION:

Injuries are a leading source of mortality and disability around the globe. According to form, there are four main categories of bones: sesamoid, sesamoid, flat, and long [1]. First, radiographs were used to

identify every fracture [2]. Because of this, complementary imaging would be preferred to rule out or confirm the occurrence of a fracture in order to prevent both short and long-term consequences [3]. On standard radiographs, the fractures could sometimes be invisible, however, if they are too small or occult, covered by other structures, or not perpendicular to the X-ray beam. Particularly in skeletally immature youngsters, a fracture may potentially involve cartilage and be invisible [4, 5]. Among them, fractured bones are frequent injuries. When the continuity of the bone is broken, a surgical condition called a bone fracture results. When the bone breaks due to a significant force, they happen. Traumatic causes of bone fractures include falls, jolting impacts, and strong strikes. Pathological bone fractures may also be caused by diseases that weaken the bones and overuse [6].

The most frequent kind of carpal fracture, which may have long-term effects, is the scaphoid fracture. However, up 65% of scaphoid fractures are radiographically invisible straight soon after injury. Therefore, in patients who have suspected sesamoid bone fractures (also called as covert scaphoid fractures), the wrist must be immobilized in a scaphoid cast for at least 10 days, or until follow-up radiographs demonstrate that the scaphoid fracture is unrelated. However, this technique requires some patients to have their wrists immobilized for a number of days even when they don't have a fracture, which is inappropriate and raises both the expense of healthcare and the patient's quality of life [7]. Magnetic resonance imaging (MR imaging), which has been recommended as the preferred imaging modality for these patients due to its outstanding sensitivity (95-100%) and specificity (100%), is pricy and not generally used in poor nations.

However, patients with undetected scaphoid fractures may benefit from high-resolution ultrasonography (USG) as a different imaging technique. Because of technological advances in sonography that have increased the spatial resolution of this diagnostic tool, high-spatial-resolution US may reveal subtle post-traumatic changes of the cortex and/or periosteum that were present immediately following the injury but were not visible on conventional radiographs. High-resolution US is also simpler to get, takes less time, and costs significantly less than MR imaging [8].

In patients with blunt thoracic trauma admitted to outpatient clinics and emergency rooms, fractured ribs are the most common injury. When utilizing just direct radiography for diagnosis, non-displaced rib fractures may commonly go undetected. The literature has several studies that demonstrate improved sensitivity of ultrasonography (USG) fractures [9]. Because bone naturally prevents the transmission of sound at high frequencies and because there is a significant difference in the acoustic impedance between the soft tissue and bone, USG has shown excellent results in the diagnosis of sternal, facial, nasal and diaphyseal fractures. [11–14] As a result, USG offers the best possible environment for imaging the bone contour. This means that any flaws (such as steps, breaks, or periosteal responses) should be clearly obvious [15].

METHODS

The study was conducted in Central Park Hospital Lahore. Open, suspicious complex fractures, erratic individuals with abnormal vital signs, and pregnant women. Each patient had a thorough history review, a physical examination on the spot, and conventional radiography using the appropriate perspectives. The next stage was an ultrasound, which used a high-frequency linear transducer with a real-time scanner in both the longitudinal and transverse planes. To examine the relative effectiveness of ultrasonography and radiography in identifying fractures, the findings from both techniques were compared. The research comprised 50 patients from any age group and sex who presented to our institution's emergency wing, orthopedic outdoor or indoor, and other departments with clinically suspected fractures. With a 5–12 MHz Broad Band linear array probe and a musculoskeletal setup, ultrasounds were performed using a real-time scanner (Philips Envisor C and Esaote). The patient examination was given to the suspected region in both the transverse and longitudinal axes. The site was carefully scanned with a very delicate touch. Rupture in the integrity of the bone's cortex was adopted as the USG criteria to imply a fracture since it is the most conclusive and reliable way to make the diagnosis of a fracture. One to two millimeters of cortical bone were clearly disrupted. The USG probe also detected movement of the fractured ends as step-off deformities or luxation of a bone segment. A threshold of about 2 mm was used as the criteria for determining whether displacement was there or not.

RESULTS:

50 patients from any age group and gender who visited our hospital's emergency wing, orthopedic indoor or outdoor, and included fractures from these and other departments that had a clinical suspicion for fractures. Pregnant ladies, unpredictable people with aberrant vital signs, and open, suspected complicated fractures. Each patient had a full assessment of their medical history, an immediate physical examination, and standard radiography performed from the right angles. The next step used ultrasonography employing a real-time scanner and a high-frequency linear transducer in both the transverse and longitudinal planes (Philips Envisor C and Esaote). The results from both procedures were compared in order to assess the relative efficacy of ultrasonography and radiography in detecting fractures.

Real-time scanners (Philips Envisor C and Esaote) were used to conduct the ultrasounds, and a 5–12 MHz Broad Band interferometric probe with a neuromuscular preset was used. Both the transverse and longitudinal axes of the suspicious area were subjected to patient examination. With great care and delicacy, the site was scanned. The most reliable and definitive technique to diagnose a fracture is via a rupture in the integrity of the bone's cortex, which was approved as the USG criterion to infer a fracture. There was a one- to two-millimeter disruption of the cortical bone. The USG probe also identified

luxation of a bone segment or step-off abnormalities in the movement of the fractured ends. The criterion for judging whether or not there was displacement involved a 2 mm threshold.

While USG was positive in 5 (83.55%) instances and verified no fracture in 1 (16.45%) case, CR detected small bone fractures in 3 (50%) individuals while being negative in the other 3 (50%) participants (Table 1).

Table 1: The connection between radiographic and USG findings in various bone types.

Bone Type	Short Bone			Flat Bone			Long Bone		
Positive	2	3	5	4	4	8	0	21	21
Negative	1	0	1	2	0	2	13	0	13
Radiography Result	Negative	Positive	Total	Negative	Positive	Total	Negative	Positive	Total
Total	3	3	6	6	4	10	13	21	34

The results of the current investigation show that, for the purpose of detecting long bone fractures, the sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and accuracy values of the CR versus USG were all 100%. The accuracy = 60%, NPV = 33.33, PPV = 100%, specificity = 100%, and sensitivity = 50% of the CR versus USG, in the case of flat bones. Additionally, the accuracy = 66.67%, NPV = 33.33%, PPV = 100%, specificity = 100%, and sensitivity = 60% of the CR versus USG in the situation of a short bone fracture diagnosis. Therefore, in this investigation, the overall accuracy = 88%, NPV = 72.73%, PPV = 100%, specificity = 100%, and sensitivity = 82.35% of CR against USG (Table 3).

Table 2: Comparing radiography's sensitivity, specificity, PPV, NPV, and accuracy to USG in various bone types.

	False - ve	True - ve	False +ve	True +ve	Total	NPV	PPV	Specificity	Sensitivity	Accuracy
Short Bone	2	1	0	3	6	33.33%	100%	100%	60%	66.67%
Flat Bone	4	2	0	4	10	33.33%	100%	100%	50%	60%
Long bone	0	13	0	21	34	100%	100%	100%	100%	100%

Table 3: Radiography's overall accuracy, NPV, PPV, specificity, and sensitivity when compared to USG.

Accuracy	88%
NPV	72.73%
PPV	100%
Specificity	100%
Sensitivity	82.35%

DISCUSSIONS:

Traditionally, radiographic imaging and clinical examination have been used to examine injuries. However, there are several circumstances, such as with pregnant women, when radiography may be contraindicated [16]. Due to the limited sensitivity of conventional radiography for certain kinds of fractures as well as improper indications for bone X-rays, there are a large number of negative conventional radiography findings. It results in missed diagnoses, inadequate treatment, financial burden, and unwarranted exposure of the patients to dangerous ionizing radiation [17]. This shows the necessity for other techniques that accurately diagnose fractures without radiation exposure danger. This job could be filled by ultrasound [18]. A promising diagnostic method for identifying fractures is ultrasound. Therefore, the development of handheld ultrasound equipment may make it possible to diagnose clinically significant fractures more rapidly via faster picture gathering and concurrent analysis at the bedside. These are practical in places where standard radiography and knowledgeable doctors are unavailable because of their compact size [19].



Figure 1: X- ray forearm showing comminuted and displaced fracture of the ulna.

Conventional radiography and ultrasonography both identified long bone fractures in 21 instances and excluded them in 13 cases, indicating that both modalities had comparable accuracy, NPV, PPV, specificity, and sensitivity in those cases (Figure 1). In comparison to conventional radiography and CT, research indicated that the USG had greater specificity and sensitivity for the diagnosis of long bone fractures [20]. In a previous study, emergency USG demonstrated 100% sensitivity for the identification of pediatric long-bone fractures [21]. According to research, USG may play a larger part in situations involving large numbers of infants, children, and pregnant people [22].

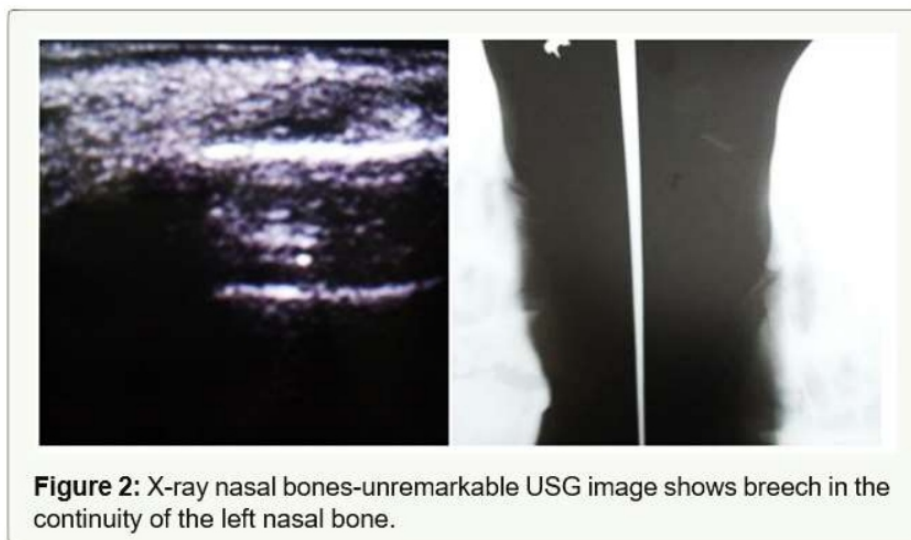


Figure 2: X-ray nasal bones-unremarkable USG image shows breach in the continuity of the left nasal bone.

Three individuals with possible nasal bone damage participated in the current investigation. Out of them, one instance tested positive on CR while the other two tested negative. Two instances tested positive for fracture while on USG, whereas one case tested negative. Conventional radiography is insufficient for diagnosing facial bone fractures due to the complexity of the facial bones and the density of the cranial base. Nasal bone radiographs often have a poor accuracy rate since there are so many false-positive and false-negative outcomes (Figure 2). According to another study, the diagnosis of nasal bone fractures by ultrasonography was 100% accurate, sensitive, specific, NPV, and PPV [23].

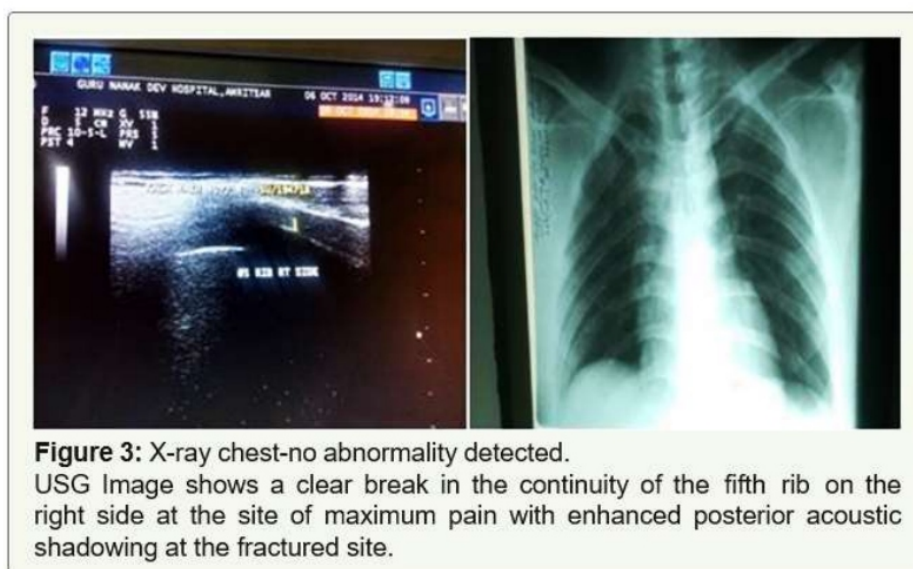


Figure 3: X-ray chest-no abnormality detected. USG Image shows a clear break in the continuity of the fifth rib on the right side at the site of maximum pain with enhanced posterior acoustic shadowing at the fractured site.

Four individuals with chest injuries and possible rib fractures were included. RTA was the mode of injury. One instance was found to be negative in both investigations, whereas two cases were found to be positive in both modalities. Although a chest X-ray was inconclusive in one instance, USG detected the breach in the cortex at the location of the greatest discomfort, which was later confirmed by a CT scan. One instance of rib fracture with USG also revealed minimal pleural effusion in addition to the

breach in the cortex. A third finding that encouraged search for the concealed fracture was pleural effusion. Furthermore, unless the fracture affects heavily calcified cartilage, chondral rib fractures are virtually undetectable on chest x-rays. According to prior research, sonography detects 10 times as many fractures as radiography (Figure 3). In terms of identifying rib fracture, PPV, NPV, the specificity, and sensitivity of CR were 100%, 20%, 100%, and 15%, compared to 100%, 69%, 100%, and 90% with USG [24]. In two instances where radiography was negative in the current investigation, high-resolution ultrasonography was able to detect the discontinuity of the frontal bone's cortex [25]. In comparison to USG, this research showed that CR is less sensitive and has a lower negative predictive value when it comes to showing cortical discontinuity in minor bone fractures. Another research found that high-resolution sonography had a global sensitivity of 100% and a specificity of 79% for detecting occult scaphoid fractures [26]. (Figure 4). The sample size was modest, and there were relatively few fractures at joints (ankles, knees, and elbows) in this research [27].



Figure 4: X-ray four views for scaphoid bone-unremarkable USG image shows the fracture of the scaphoid bone with minimal periosteal reaction.

CONCLUSIONS:

In order to prevent the patient from being exposed to radiation, the ultrasonographic examination may serve as a replacement for radiography in the identification of bone fractures. The regular use of ultrasonography in the identification of fractures should be the subject of further investigation.

REFERENCES:

1. Gilbertson, J., Pageau, P., Ritcey, B., Cheng, W., Burwash-Brennan, T., Perry, J. J., & Woo, M. Y. (2022). Test characteristics of chest ultrasonography for rib fractures following blunt chest trauma: a systematic review and meta-analysis. *Annals of Emergency Medicine*.
2. Shrimal, P., Bhoi, S., Sinha, T. P., Murmu, L. R., Nayer, J., Ekka, M., ... & Aggarwal, P. (2022).

Sensitivity and specificity of waterbath ultrasound technique in comparison to the conventional methods in diagnosing extremity fractures. The American Journal of Emergency Medicine, 53, 118-121.

3. Kozaci, N., Avci, M., Yuksel, S., Donertas, E., Karaca, A., Gonullu, G., & Etli, I. (2022). *Comparison of diagnostic accuracy of point-of-care ultrasonography and X-ray of bony injuries of the knee. European Journal of Trauma and Emergency Surgery, 1-7.*

4. Astaraki, P., Baghchi, B., & Ahadi, M. (2022). *Diagnosis of acute nasal fractures using ultrasound and CT scan. Annals of Medicine and Surgery, 103860.*

5. Quek, S. E., James, V., Castillo, L., Tan, R. M. R., & Ong, G. Y. K. (2022). *Point of Care Ultrasound Identification of Multiple Rib Fractures in a Pediatric Patient with Osteogenesis Imperfecta Type 3. Children, 9(6), 864.*

6. Dumitriu, D., Menten, R., & Clapuyt, P. (2022). *Ultrasonography of the bone surface in children: normal and pathological findings in the bone cortex and periosteum. Pediatric Radiology, 1-12*

7. Alvarez, P. M., Fideler, K. L., Iobst, C. A., & Klamar, J. E. (2022). *Fracture of an unossified medial epicondyle: a case report of an unusual presentation diagnosed utilizing ultrasonography. Current Orthopaedic Practice, 33(3), 311-314.*

8. Mobasseri, A., & Noorifard, P. (2022). *Ultrasound in the diagnosis of pediatric distal radius fractures: does it really change the treatment policy? An orthopedic view. Journal of Ultrasonography, 22(90), e179-e182.*

9. Thejeel, B., & Endo, Y. (2022). *Imaging of total hip arthroplasty: Part I—Implant design, imaging techniques, and imaging of component wear and fracture. Clinical Imaging.*

10. Azizkhani, R., Hosseini Yazdi, Z., & Heydari, F. (2022). *Diagnostic accuracy of ultrasonography for diagnosis of elbow fractures in children. European Journal of Trauma and Emergency Surgery, 48(5), 3777-3784.*

11. de Borja, C., Watkins, R., & Woolridge, T. (2022). *Common Ultrasound Applications for Pediatric Musculoskeletal Conditions. Current Reviews in Musculoskeletal Medicine, 1-9.*

12. Snelling, P. J., Keijzers, G., & Ware, R. S. (2022). *Point-of-care ultrasound pronator quadratus hematoma sign for detection of clinically non-angulated pediatric distal forearm fractures: a prospective cohort study. Journal of Ultrasound in Medicine, 41(1), 193-205.*

13. Kanyana, R., Olaniyan, A. O., & Uzorka, A. (2022). *Investigation on Ultrasound Long Bone Fracture Imaging Using the Migration Method. Biophysical Reviews and Letters, 17(01), 19-32.*

14. Lawson, M., Tully, J., Ditchfield, M., Metcalfe, P., Qi, Y., Kuganesan, A., & Badawy, M. K. (2022). *A review of current imaging techniques used for the detection of occult bony fractures in young children suspected of sustaining non-accidental injury. Journal of Medical Imaging and Radiation Oncology, 66(1), 68-78.*

-
-
15. Menger, M. M., Körbel, C., Bauer, D., Bleimehl, M., Tobias, A. L., Braun, B. J., ... & Histing, T. (2022). Photoacoustic imaging for the study of oxygen saturation and total hemoglobin in bone healing and non-union formation. *Photoacoustics*, 28, 100409.
 16. Syrop, I., Fukushima, Y., Mullins, K., Raiser, S., Lawley, R., Bosshardt, L., ... & Fredericson, M. (2022). Comparison of Ultrasonography to MRI in the Diagnosis of Lower Extremity Bone Stress Injuries: A Prospective Cohort Study. *Journal of Ultrasound in Medicine*.
 17. Cognet, J. M., Bauzou, F., Louis, P., & Mares, O. (2022). Using Ultrasonography During the Fixation of Distal Radius and Finger Fractures. *Hand Clinics*, 38(1), 109-118.
 18. Spriet, M., Arndt, S., Pige, C., Pye, J., O'Brion, J., Carpenter, R., ... & Dowd, J. P. (2022). Comparison of skeletal scintigraphy and standing ¹⁸F-NaF positron emission tomography for imaging of the fetlock in 33 Thoroughbred racehorses. *Veterinary Radiology & Ultrasound*.
 19. Sepuya, R. G., Dozeman, E. T., Prittie, J. E., Fischetti, A. J., & Weltman, J. G. (2022). Comparing diagnostic findings and cost of whole body computed tomography to traditional diagnostic imaging in polytrauma patients. *Journal of Veterinary Emergency and Critical Care*, 32(3), 334-340.
 20. Shelmerdine, S. C., White, R. D., Liu, H., Arthurs, O. J., & Sebire, N. J. (2022). Artificial intelligence for radiological paediatric fracture assessment: a systematic review. *Insights into Imaging*, 13(1), 1-17.
 21. Scheier, E., Fuchs, L., Taragin, B. H., Balla, U., & Shavit, I. (2022). Use of Point-of-Care Ultrasound to Identify Occult Fractures of the Tibia in the Pediatric Emergency Department: A Case Series. *The Journal of Emergency Medicine*, 62(4), 559-565.
 22. Cauvin, E. R., & Smith, R. K. (2022). Ultrasonography of the fetlock. *Atlas of equine ultrasonography*, 49-84.
 23. Weingrow, D. (2022). Under What Situations is Ultrasound Beneficial for the Detection of Rib Fractures?. *Annals of Emergency Medicine*, 79(6), 540-542.
 24. Pourmoosa, R., Pourmoosa, J., Taheri, A., Khademloo, M., & Majidi, H. (2022). Comparative evaluation of ultrasonography and lateral radiography in nasal fractures diagnosis. *American Journal of Otolaryngology*, 43(3), 103439.
 25. Iacob, R., Stoicescu, E. R., Cerbu, S., Iacob, D., Amaricai, E., Catan, L., ... & Iacob, E. R. (2022, May). Could Ultrasound Be Used as a Triage Tool in Diagnosing Fractures in Children? A Literature Review. In *Healthcare* (Vol. 10, No. 5, p. 823). Multidisciplinary Digital Publishing Institute.
 26. Lentge, F., Jehn, P., Zeller, A. N., Moysich, H. C., Gellrich, N. C., & Tavassol, F. (2022). Quantitative ultrasonographic diagnostics for midface and mandible fractures. *Journal of Stomatology, Oral and Maxillofacial Surgery*.
 27. Tripathi, N., Sharma, A., Khatri, G., Chawla, S., Kaul, A., & Sharma, Y. (2022). An analytical cross-sectional study to evaluate the diagnostic accuracy of ultrasonography in detecting nasal bone
-
-

fractures compared with CT as the reference standard. European Journal of Molecular and Clinical Medicine, 9(1), 1130-1135

Study Of Cancer Of Ovaries In Females And Its Linked With The Stem Cells Present In Body

1Dr Lata Kumari, 2Dr Narindar Kumar, 3Dr Fnu Kanwal, 4Fnu Vishal, 5Ms Chandni Essrani, 6Dr Chandni Davi

1People university of medical and health sciences, Nawabshah,
lata_jeswani@outlook.com

2Liaquat national hospital and medical college, Karachi, narindar_jes@yahoo.com

3CMC (Chandka medical College) M.B.B.S, Resident medical officer (RMO)
dr.kanwalvr@gmail.com

4CMC (Chandka medical College) M.B.B.S, Resident medical officer (RMO)
dr.vishal196@gmail.com

5Student at United medical and dental college, Karachi, chandniessrani@gmail.com

6Ziauddin University, Karachi, Chandni.davi152@gmail.com

ABSTRACT

Aim: Cells which initiate cancer cells in the body are somehow known as stem cells. They help to initiate cancer or tumor cells in the body, after initiation further division occur and a full-fledged disease formed as cancer/tumor.

Methods: These cells are not homogeneous to each other and after development they start their division into groups. These cells have several qualities which help them to grow in the body and make their roots stronger. They have characteristics as they can grow and replicate by themselves and also nourish themselves.

Results: They did not need any other stimuli to feed them. They started continuously growing and finally a tumor occurs in the human body. Different researches have done to check the main cause of cancer and how stem cells get generated.

Conclusion: They were unable to find the reason, now another research has made to find out the reason of cancer cells which are increasing day by day in ovaries of female which we called as cancer of ovaries. Here its initiation level and characteristics will be discussed.

INTRODUCTION

In the western countries, cancer of ovaries in females is increasing more rapidly and lead to malignant tumor [1]. About 80-90% of stem cells or tumor cells are present on the epithelium cells or tissues [2]. They many start generating on even a small, single layer of epithelial or on the tube which is present in ovary [3]. In most of the cases, ovarian tubes or ovaries got torn up at the time of ovulation.

These cells are resistant to chemicals and their therapies. In the last few years, about 68-70% ladies were those who was suffering from ovarian cancer [4]. They got different symptoms are feeling pain in their intestines, vomits, morning sickness, abdominal pains etc. [5]. They were not aware that these are symptoms of ovary cancer, they were taking it as minor disease and was taking normal medication for this [6]. In the past few years, ratio of successful treatment and cure from this disease was just 55% because as we have discussed that they were resistant to chemical therapies [7]. Stem cells get

METHODOLOGY:

An effective tissue accumulates and gradually formed malignant tumor. These tumors are significantly formed. These cells at the start of accumulation, they do not have to ability to generate their bodies by themselves and after they diagnosed the disease, they started treatment for this disease and try to overcome its effects on a healthy body. Stem cells inhibit DNA damage and these cells spend a long time of their lives here, so they easily move their and help our body to survive from tumor attacks. They get divided in a proper symmetrical manner and help the body to survive it self more easily. They resist cancer or tumor cells to reach to the body and resist certain cells which attack on body to generate cancer cells. Tumor cells have opposite symmetry to stem cells to start generating cancer cells. These tumor cells some present in patient's body genetically or due to the long-term life period staying at one place may initiate the development of cancer cells in the body. As we know that cancer cells initiate and regenerate by themselves as breast cancer in women may occur due to specific type of stem cells. The process in which certain division of cells occur and a tumor generate. In table 1 it is shown that how stem cells and cancer cells are interlinked with each other. Transfer of cancer or tumor cells to the body occur through stem cells and it is accepted in world wide. In this research we got strong evidence that cancer cells are initiated with stem cells and they are regenerated by tumor cells present in the body which cause cancer.

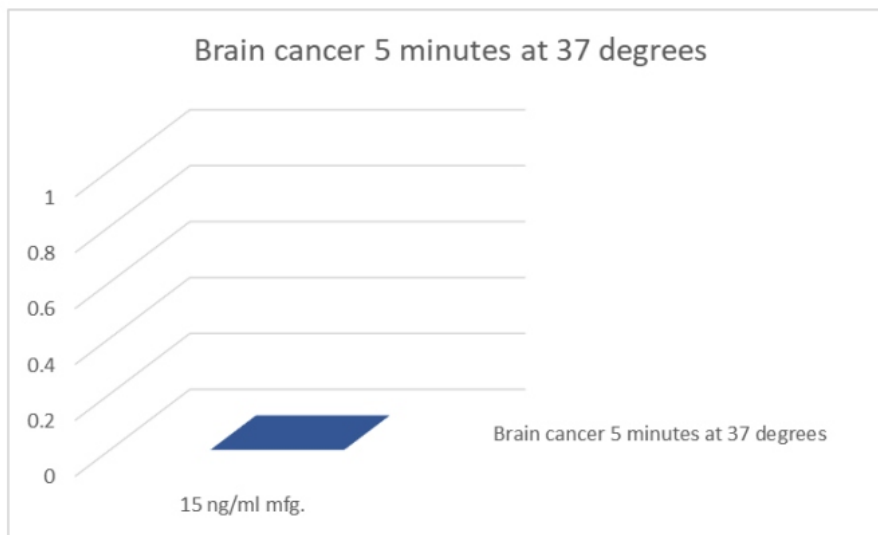
If we classify stem cells then we will be able to know about some certain characteristics of stem cells as they can regenerate them and have the ability of certain cells to develop layer by layer in human body but it did not penetrate into any other organ of the body. As we have mention in the table number 1 that every type of cancer cells and its type of penetration is different as it depends upon it temperature and required time, area where it penetrate and accumulate itself is different, they make different types of colonies which are also not same in numbers and location. Their in vivo appearance is also different. At certain time some of them show positive behavior and positive response but other did not show any response in specific area. In this table it is shown that how stem cells can initiate the tumor cells in the body and a little bit amount of stem cells can generate tumor cells as easily as proper cancer cells develop, so they are properly involved in the development of cancer cells in the body

RESULTS:

Resulted that there are no rules to separate out the cells which are spreading tumor cells or in short from this research they said that we are not able to separate them out but we can clarify the issue that either they are spreading this deadly disease or not. They concluded that they can grow by themselves and initiate tumor. Primarily these cells are present and them after spending a long time in any body they regenerate themselves and start development, first they start from making small group of cells then move towards large groups of tumor cells that can cause severe type of cancers as breast cancer seen in

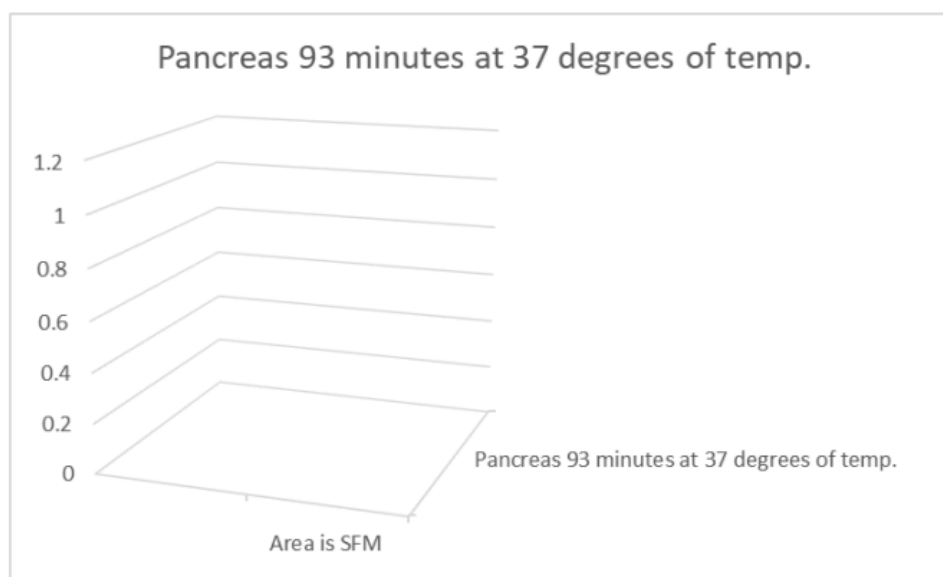
women, colon cancer not with much percentage, brain cancer and blood cancer etc.

Type of cancer Antigen	Time and temp	Area of tumor	Colony of tumor	ALDH	Characteristics of In vivo
Breast cancer	95 minutes at 37 degrees	15 n g/ml mfg. 25 n g/ml EFG Insulin 5ml	Single celled colonies are formed	Positive results	They are SCLD
Blood cancer	4 hours at 37 degrees	Intraleukocytic 30 n g/ml 101 n g/ml stem cells	One sixth of colonies are formed in leukemia	Did not done	They are non SCLD
Colon cancer	2-3 hours at 37 degrees	Progesterone level 6.5 n g/ml Glucose 5.6 n g/ml	Also, single celled colonies are formed	Did not done	SCLD
Brain cancer	5 minutes at 37 degrees	23 n g/ml BFG 13 n g/ml FGF	Colonies formed from 202/1.5 cells at palate	Did not done	They are non SCLD
Endothelial cancer	92 minutes at 37 degrees			Did not done	SCLD



All these types of cancers are harmful for human health which can lead to death in most of cases. Most of the reasons of people reaching the death level is that they are less likely aware with symptoms and its causes. They did not start their treatment on proper time and face unbearable pain and most of them reached to death. Results of various studies about stem cells may be misleading as disease arise from every single cell of the stem cell but it also depends upon conditions going on. Many other studies have shown some different results as density of all cells will increase in the start as it will be 1200/ml in the start but with further procedure its value will be lower down. When their density will be low, they will start making their colonies.

Neck and head	CD 45*	Area is SFM	Single celled colony	Did not done
Prostate gland	CD112*	Area is GFP	Single celled but are coated	Did not done
Ovarian	CD134*	Insulin 25ng/ml	Dilute factor is limited	Did not done
Pancreas	93 minutes at 37 degrees of temp.	B 26		Did not done



DISCUSSION:

Overall, it is estimated that different type of therapies should applied on it to check out the changes that occur in cells causing cancer [9]. First if we check out the link between stem cells and cancer cells, both of these are interlinked with each other [10]. Cancer cells are not able to develop in certain body without the presence of stem cells. They first attack on stem cells and handle all their activities and by using single cell they start making tumor in the body [11]. The major cause of skin ovary cancer is still understudy because most of studies are going on this issue to calculate the exact reason of developing these tumors. They are also still confused about the main reason of ovary cancer because not much points are getting related with the cancer stem cells [12]. By using different phenotype effects, they also take some cells from ovary to study the level of cancer cells present. They want to check out that either they are primarily present there as genetic base or got injected from out through any virus or linked with any other cells [13]. Some promoters are used to stimulate the phenotype effects. Cloning occurs in the stem cells which produce tumor cells but separating the cells of ovary and then these tumor cells after further divisions make groups and start their development [14]. It may occur due to the presence of extra cells, area where exactly these cancer cells are developing and medication or therapies [15].

CONCLUSION:

It is concluded that phonetically both cancer cells and stem cells are not same. They are showing their opposite impacts. In this study we have seen that first they initiate from a single cell and then start replicating and make groups. There are many other ways through which tumor cells can generate themselves so it is not easy to say that they are growing from stem cells. We can say that these stem cells are involved in the development of many tumor cells but not totally. For further studies, all these points should be added to know the main cause of cancer. These points included as they generate by themselves and also replicate and how they start their fir development in the ovary. Therapies are also needed as either it is any chemical therapies or any other to calculate the mean value to cancer cells and their initiation area.

REFERENCES:

1. Chen, L. Y., Huang, R. L., Su, P. H., Chu, L. H., Weng, Y. C., Wang, H. C., ... & Wen, K. C. (2022). *Epigenomic Profiling of Epithelial Ovarian Cancer Stem-Cell Differentiation Reveals GPD1 Associated Immune Suppressive Microenvironment and Poor Prognosis. International journal of molecular sciences, 23(9), 5120.*
2. Long, H., Chen, H., Yan, J., & Cheng, H. (2022). *Emodin exerts antitumor effects in ovarian cancer cell lines by preventing the development of cancer stem cells via epithelial mesenchymal transition. Oncology Letters, 23(3), 1-10.*
3. Guo, F., Yang, Z., Sehouli, J., & Kaufmann, A. M. (2022). *Blockade of ALDH in Cisplatin-Resistant Ovarian Cancer Stem Cells In Vitro Synergistically Enhances Chemotherapy-Induced Cell Death. Current Oncology, 29(4), 2808-2822.*
4. Sharbatoghli, M., Shamshiripour, P., Fattahi, F., Kalantari, E., Habibi Shams, Z., Panahi, M., ... & Saeednejad Zanjani, L. (2022). *Co expression of cancer stem cell markers, SALL4/ALDH1A1, is associated with tumor aggressiveness and poor survival in patients with serous ovarian carcinoma. Journal of Ovarian Research, 15(1), 1-17.*
5. YIN, J., PAN, L. Y., WEN, Y. P., HUANG, H., ZENG, J., LI, X. Y., ... & LI, Y. (2022). *Identification of bio-functions of cancer stem like cells and differentially expressed membrane proteins in side population cells from human epithelial ovarian cancer cell lines. Basic & Clinical Medicine, 42(2), 221.*
6. Claudio, P. P., Howard, C. M., Valluri, A. P., Lawrence, L., Bush, S., Bou Zgheib, N., ... & Valluri, J. (2022). *Cancer stem cell assay for identification of effective treatments for platinum-resistant recurrent ovarian cancer.*
7. Parte, S. C., Ponnusamy, M. P., Batra, S. K., & Kakar, S. S. (2022). *Ovarian Cancer Stem Cells and Their Regulatory Mechanisms: Potential Targets for Therapy. In Stem Cells in Reproductive Tissues*

and Organs (pp. 87-108). Humana, Cham.

8. Keyvani, V., Nezhad, S. R. K., Moghbeli, M., Mollazadeh, S., & Abbaszadegan, M. R. (2022). Isolation and eradication of ovarian CD44⁺ cancer stem cells via Notch signaling pathway mediated by ectopic silence of MAML1. *Iranian Red Crescent Medical Journal*, 24(4).

9. Thomas, E., Thankan, R. S., Purushottamachar, P., Huang, W., Kane, M. A., Zhang, Y., ... & Njar, V. C. (2022). Transcriptome profiling reveals that VNPP433-3 β , the lead next-generation galeterone analog inhibits prostate cancer stem cells by downregulating epithelial–mesenchymal transition and stem cell markers. *Molecular Carcinogenesis*.

10. Wang, L., Zhi, X., Lu, Y., Cong, Y., Fu, Z., Cao, J., ... & Ruan, H. (2022). Identification of microRNA expression profiles of CD44⁺ ovarian cancer stem cells. *Archives of Gynecology and Obstetrics*, 1-12.

11. Vasefifar, P., Motafakkerazad, R., Maleki, L. A., Najafi, S., Ghrobaninezhad, F., Najafzadeh, B., ... & Baradaran, B. (2022). Nanog, as a key cancer stem cell marker in tumor progression. *Gene*, 827, 146448.

12. Pandrangi, S. L., Chittineedi, P., Chalumuri, S. S., Meena, A. S., Neira Mosquera, J. A., Sánchez Llaguno, S. N., ... & Mohammad, A. (2022). Role of Intracellular Iron in Switching Apoptosis to Ferroptosis to Target Therapy-Resistant Cancer Stem Cells. *Molecules*, 27(9), 3011.

13. Wilczyński, J. R., Wilczyński, M., & Paradowska, E. (2022). Cancer Stem Cells in Ovarian Cancer—A Source of Tumor Success and a Challenging Target for Novel Therapies. *International Journal of Molecular Sciences*, 23(5), 2496.

14. Rezaayatmand, H., Razmkhah, M., & Razeghian-Jahromi, I. (2022). Drug resistance in cancer therapy: the Pandora's Box of cancer stem cells. *Stem Cell Research & Therapy*, 13(1), 1-16.

15. Motohara, T., Yoshida, G. J., & Katabuchi, H. (2021, December). The hallmarks of ovarian cancer stem cells and niches: Exploring their harmonious interplay in therapy resistance. In *Seminars in Cancer Biology* (Vol. 77, pp. 182-193). Academic Press

A Saliva's Physicochemical Characteristics And Total Salivary Antioxidants Ex Vivo Research Evaluating The Effect Of Probiotics

1Ibtihag Siddig Elnaem Mohamed- Nour, 2Dr Hammad Ashiq, 3Dr Adnan Saleem Umar, 4Amina Javed, 5Dr Tehniat Qureshi, 6Dr Usama Qayyum
1Assistant Professor Oral and Maxillofacial surgery, Institute- College of Dentistry, University of Ha'il Saudi Arabia.
2Mohtarma Benazir Bhutto Shaheed Medical College , Mirpur AJK
3ENT Specialist, HOD ENT, PAC Hospital Kamra Cantt.
4Sheikh Zayed Medical College Rahim Yar Khan, 600.mbbs.5@gmail.com
5Female Medical Officer DHQ Hospital BAGH AJK
6Medical Officer , DHQ Hospital Bhimber AJK

ABSTRACT

BACKGROUND: It has long been proven that oxidative stress plays a role in the pathogenesis of several illnesses. In addition to acting as free radical scavengers and preventing cell damage, antioxidants also have an impact on the metabolism of a number of pathogenic bacteria. Alternative therapeutic treatment alternatives are becoming more prevalent as antibiotic resistance rates rise. Probiotics, according to the WHO, are the second-most important immune defense mechanism after antibiotic resistance. Probiotics' specific mode of action is still up for debate, despite several research emphasizing their beneficial effects on illnesses. The goal of the current research was to reveal the probiotics' antioxidant properties in saliva as well as how they affected the pH and buffering power of the saliva.

METHODS: The study was conducted in PAC Hospital Kamra. Before and after consuming probiotics for two weeks, unstimulated saliva from 10 people was tested for total antioxidant content, pH, and buffering capacity using a spectrophotometer, pH paper, and buffer strips, respectively. For this research, healthy adults between the ages of 20 and 35 were included; those who often smoked or drank alcohol as well as those with any systemic diseases were excluded. After 14 days of probiotic use, the whole procedure for determining the pH, buffering capacity, and total antioxidant content in saliva was carried out, and comparisons between the three parameters were made.

RESULTS: To check for changes, the total antioxidant content, pH, and buffering capacity were tested before and after for the whole sample. While pH and buffering capacity showed negligible findings with p-values of 1.00 and 0.08, respectively, total antioxidant level demonstrated significant outcomes with a p-value of 0.003. The overall findings demonstrated that probiotic consumption increased the amount of total salivary antioxidants without significantly affecting pH or buffering capacity. The "paired t-test" was used to statistically assess the results.

CONCLUSIONS: Probiotics are useful for boosting antioxidant levels, which reduces cellular damage and makes them less likely to cause illness. Additionally, an increase in antioxidant levels may be readily detected in saliva, making it a useful diagnostic tool.

KEYWORDS: saliva, probiotics, antioxidant level.

INTRODUCTION:

An imbalance between the quantities of pro- and antioxidants in the cell leads to the homeostatic

phenomena known as oxidative stress. (1) As a result of this imbalance, free radicals are created, which later cause DNA hydroxylation, protein denaturation, lipid peroxidation, and cell death. (2) An excessive quantity of these reactive radicals impairs cell viability and is a factor in a number of disorders, including those that affect the mouth, such as oral precancerous lesions, periodontitis, and dental caries. (3) With the spread of illness over the last several years and the understanding that oxidative stress plays a significant role in their pathogenesis, the antioxidant modality has been the focus of our preventative and therapeutic efforts. (4) Bacteriotherapy utilizing probiotics is one of these cutting-edge methods. Probiotics are living non-pathogenic bacteria that, when given in sufficient quantities, have positive effects on health. (5) This time-tested idea of bacteriotherapy is renowned for its positive outcomes and is thought to help minimize harm by lowering oxidative stress. (6) The precise process hasn't yet been figured out. Probiotic microorganisms have considerable antioxidant properties both in vitro and in vivo, according to evidence. However, the clinical trials looked at probiotics' antioxidant capacity in plasma (7–10). Since the extremely contentious Vipeholm research, which was done in the 1950s, it has been recognized that frequent carbohydrate ingestion has negative long-term clinical effects (11,12). Less is known about the immediate effects of sugar stress on oral homeostasis, and there aren't any well-powered in vivo studies describing how excessive carbohydrate consumption affects the makeup of the oral microbiota in otherwise healthy people. In reality, saliva, which can be retrieved quickly and painlessly, shows how the oral microbiota is made up and includes useful inflammatory markers. (13,14) Importantly, research has shown that the composition of the salivary microbiota and salivary levels of inflammatory markers not only reflect the state of oral health (15,16), but are also susceptible to outside stressors such as poor diet, smoking, and dental hygiene. (17,18,19) In order to study the impact of coordinated perturbations on oral homeostasis, analysis of salivary microbiota and inflammatory marker levels provides a wonderful model system. However, to our knowledge, this model system has never been used to evaluate the short-term effects of frequent carbohydrate consumption on oral homeostasis and to ascertain whether concomitant probiotic administration has any protective effects when dental homeostasis is hampered by frequent sugar intake.

The use of saliva as a diagnostic technique has a number of benefits over plasma. It is the best method for screening, diagnosing, and monitoring a variety of illnesses since it is readily available, simple to collect, allows for repeated non-invasive samples, requires a simpler procedure, and provides results more quickly. (20) The pathophysiology of oxidative stress in saliva has been the subject of a very small number of research, and probiotics' possible influence on salivary antioxidant levels has never been investigated. Additionally, it is unclear how probiotics affect the pH and salivary buffering capacity. Thus, the study's objective was to assess how probiotics affected the amount of total salivary antioxidants and the physical characteristics of saliva (pH and buffering capacity).

RESOURCES AND METHODS:

The study was conducted in PAC Hospital Kamra. Among the tools used in this experiment were a sterile saliva bottle, Yakult probiotic drink, glass tube, pipettes, centrifuge, buffering strips, pH strips (GC Saliva Check Kit), hot water bath, and spectrophotometer.

The study was carried out in September over a two-week period after receiving institutional ethical approval. The research only included people who agreed to participate willingly and knowingly. Healthy people between the ages of 20 and 35 were recruited for this study; those who smoked or drank often were excluded, as did those with any systemic disorders. Subjects were told not to eat or drink anything for at least an hour before saliva collection on the study day. To minimize circadian variations, samples were collected between 9 and 10 in the morning. Subjects were told to collect the accumulated saliva into sterile saliva vials after saliva was allowed to build on the mouth's floor (Passive drool method). After collection, samples were delivered to the lab in less than 30 minutes. Within an hour, salivary samples were analyzed for pH, buffering ability, and total antioxidant content. Then, for the following two weeks, subjects received one serving of Yakult, a probiotic beverage.

Table 1: Before and after probiotic delivery, buffering capacity, pH, and total salivary antioxidant content

Sample	Total antioxidant capacity		Buffering capacity		pH	
	Before	After	Before	After	Before	After
1	0.869	1.328	4	4	7.2	7.4
2	1.124	1.435	3	3	7.2	7.2
3	1.097	1.269	4	4	6.8	6.8
4	0.983	1.225	4	4	7.2	7.4
5	0.809	0.783	4	4	7	6.8
6	0.71	1.377	4	3	7.4	7.2
7	0.814	1.002	3	3	7.6	7.6
8	0.746	1.224	4	4	7.4	7.2
9	0.988	1.492	4	3	6.8	6.8
10	1.283	1.257	4	4	7	7.2

After 14 days of probiotic consumption, the same technique for measuring salivary total antioxidant level, pH, and buffering capacity was performed, and comparisons were conducted between the three parameters. A test tube containing 100 microliters of saliva and 5% trichloroacetic acid was used. After 5 minutes of settling, it underwent 10 minutes of centrifugation. 100 microliters of the supernatant saliva were mixed with 1 mL of the total antioxidant reagent. For 90 minutes, this combination was

incubated at 90°C in a hot water bath. A spectrophotometer was used to read the optical density at 695 nm. Estimation of buffering capacity and pH: Buffering strips were coated with an adequate quantity of saliva, and a noticeable color shift was seen. The leftover spit in the vial was applied on pH paper, and a color shift was seen. The GC Salivary Check kit's color guide served as the basis for interpretation.

DATA ANALYSIS:

IBM SPSS version 26 was used to statistically analyze the data that were collected. By using a "paired samples t-test," differences between variables were analyzed. Means and standard deviations were recorded so that a descriptive analysis could be performed (Table 2). Variables were displayed on a statistical graph to compare pH, buffering capacity, and total antioxidant level before and after probiotic treatment.

RESULTS:

The total antioxidant content, pH, and buffering capacity were measured before and after for the whole sample to see whether any changes occurred (Table 1). A paired samples t-test was used to detect any significant changes (Table 2). With p-values of 0.003 and a t-test value of -4.08, the findings of the paired samples t-test show that there is a significant difference in the number of total antioxidants before and after probiotic treatment. Total antioxidant levels had a mean value of 0.94 with a standard deviation of 0.19 before and a mean value of 1.24 with a standard deviation of 0.21 after. The average difference in the number of total antioxidants was -0.13. With p-values of 1.00 and 0.08, respectively, the findings for pH and buffering capacity indicated no statistically significant differences. The pH T-stat value was 0, but the buffering capacity T-stat value was 1.96. The pH had a mean value of 7.16 before, with a standard deviation of 0.26, and a mean value of 7.16 after, with a standard deviation of 0.28. For pH, the average difference was 0. The buffering capacity had a mean value of 3.8 with a standard deviation of 0.42 before and a mean value of 3.5 with a standard deviation of 0.53 after. The average pH difference was 0.3.

Table 2: Statistical analysis and results of paired samples t-test with mean and standard deviation values.

	Different parameters (n)	Average	S.D	Mean difference	Confidence Interval (95%)		t-stat	df	prob value
					Lower Limit	Upper Limit			
Total antioxidant level	Before (10)	0.94	0.19	-0.3	-0.46	-0.13	-4.08	9	0.003
	After (10)	1.24	0.21						
pH	Before (10)	7.16	0.26	0	-0.12	0.12	0	9	1.00
	After (10)	7.16	0.28						
Buffering capacity	Before (10)	3.8	0.42	0.3	-0.05	0.65	1.96	9	0.08
	After (10)	3.5	0.53						

Consuming probiotics enhanced the number of total antioxidants in saliva while having little to no effect on pH or buffering capacity, according to the findings of the paired samples t-test. The pH of the saliva in the current investigation did not change as a result of probiotic administration (Figure 1). After consuming probiotics for two weeks, there was no change in the saliva's capacity to serve as a buffer (Figure 2). Not least of all, probiotic supplementation raised the content of all antioxidants in saliva (Figure 3).

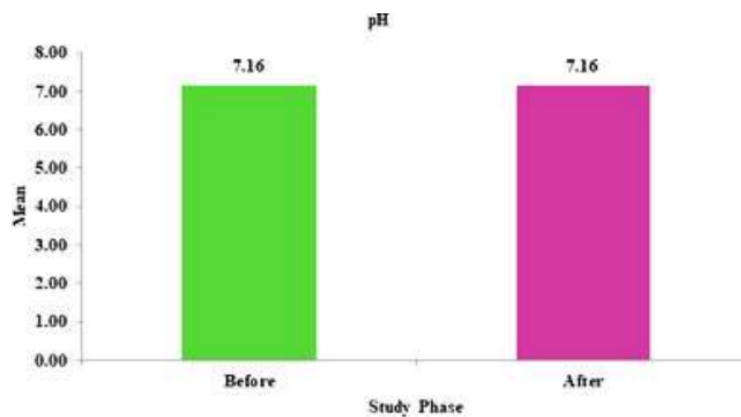


Figure 1: pH variation before and after probiotic use

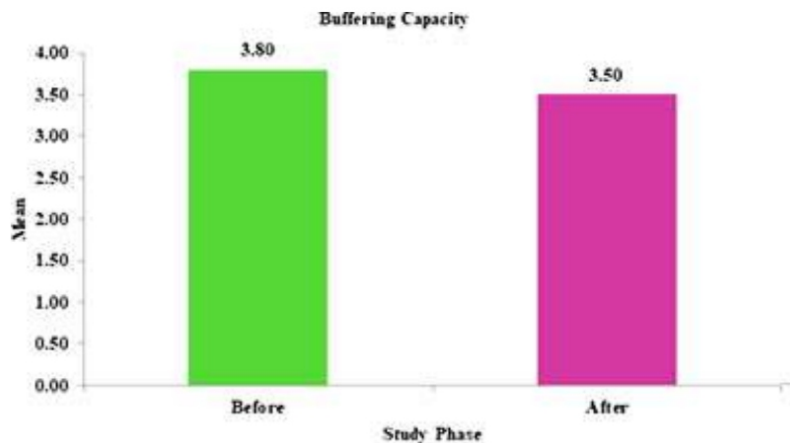


Figure 2: Pre- and post-probiotic ingestion variations in buffering capacity

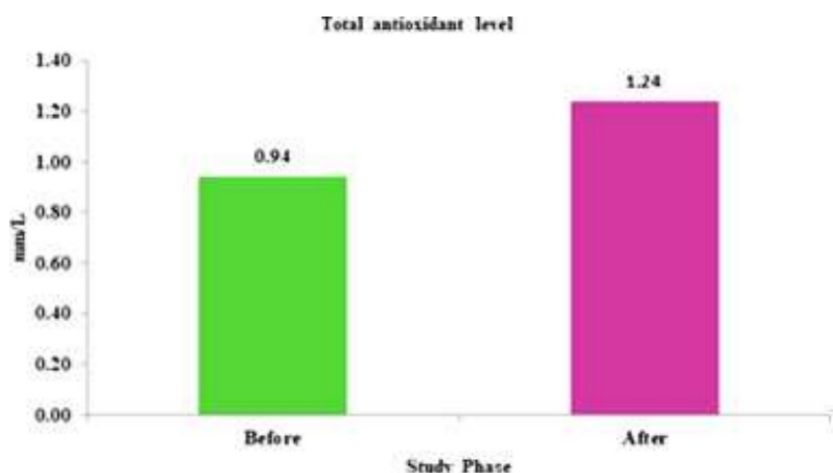


Figure 3: Probiotics' impact on the number of total antioxidants both before and after administration

DISCUSSION:

Bifidobacterium and Lactobacillus are two of the most widely utilized probiotic microorganisms. Despite the controversy surrounding its usage, recent studies have shown that lactic acid bacteria have a beneficial effect on halitosis, periodontitis, dental caries, and a variety of other oral disorders. (21) There was no observable difference in the pH of the saliva after probiotics were administered in the present study. This result is in line with other studies that found no discernible pH change after the addition of probiotic bacteria to a biofilm. The unaltered phenomenon in the present investigation may be explained in one of two ways:

- a) By using the acids produced by Lactobacillus, the other microbes in the oral cavity prevented environmental impacts.
- b) The pH was unaffected by the acids generated by lactobacillus cells since they made up a very small fraction of saliva.

A key host defense mechanism, saliva buffer controls the pH of the mouth environment. (23) Saliva's ability to act as a buffer remained unchanged after two weeks of probiotic use. In contrast to this result, a prior study found that probiotic treatment increased buffering capacity. (24) This result might be explained by

- a) The lack of any noticeable pH shift suggests that probiotic distribution did not result in any significant ionic interactions that would have impacted buffering capacity.
- b) In addition, the study was conducted for a shorter period of time than earlier studies, which typically lasted at least six months.

Last but not least, probiotic supplementation increased saliva's level of all antioxidants. This outcome is in line with a prior investigation that discovered probiotics increase plasma antioxidant levels. (25)

These considerations may help to explain this result: a) Lactobacillus, a probiotic bacterium with superoxide dismutase activity, was present in the probiotic beverage utilized in the study. b) other ways by which plasma and saliva are exchanged, resulting in the presence of biomarkers in saliva, include active and passive diffusion.

CONCLUSION:

Probiotics have been shown to maintain a healthy microbial ecology in the past. However, it also affects cells. Probiotics raise the body's number of antioxidants. These antioxidants stop the production of free radicals, halting cell harm in its tracks. Additionally, it has an impact on the metabolism of several microbial cells, particularly those in charge of oral illnesses. Saliva may also be used to detect changes in antioxidant levels after probiotics. Therefore, using saliva as a regular diagnostic technique to determine the amount of all antioxidants is possible. It may also be used to assess how probiotics affect a particular antioxidant system linked to a certain illness.

REFERENCES:

1. de Sousa Né, Y. G., Frazão, D. R., Bittencourt, L. O., Fagundes, N. C. F., Marañón-Vásquez, G., Crespo-Lopez, M. E., ... & Lima, R. R. (2022). Are Dental Caries Associated with Oxidative Stress in Saliva in Children and Adolescents? A Systematic Review. *Metabolites*, 12(9), 858.
2. De Giani, A., Sandionigi, A., Zampolli, J., Michelotti, A., Tursi, F., Labra, M., & Di Gennaro, P. (2022). Effects of Inulin-Based Prebiotics Alone or in Combination with Probiotics on Human Gut Microbiota and Markers of Immune System: A Randomized, Double-Blind, Placebo-Controlled Study in Healthy Subjects. *Microorganisms*, 10(6), 1256.
3. Skomro, P., Lietz-Kijak, D., Bogdziewicz-Wałęsa, O., & Janiszewska-Olszowska, J. (2022). Effect of an Extremely Low Frequency Electromagnetic Field on the Concentration of Salivary Immunoglobulin A. *International Journal of Environmental Research and Public Health*, 19(10), 5786.
4. Prémusz, V., Lendvai-Emmert, D., Makai, A., Amrein, K., Chauhan, S., Bódis, J., ... & Várnagy, Á. (2022). Pre-Treatment Physical Activity Could Positively Influence Pregnancy Rates in IVF despite the Induced Oxidative Stress: A Cohort Study on Salivary 8-Hydroxy-2'-deoxyguanosine. *Antioxidants*, 11(8), 1586.
5. Tian, J., Wang, X., Zhang, X., Chen, X., Dong, M., Rui, X., ... & Li, W. (2023). Artificial simulated saliva, gastric and intestinal digestion and fermentation in vitro by human gut microbiota of intrapolysaccharide from *Paecilomyces cicadae* TJJ1213. *Food Science and Human Wellness*, 12(2), 622-633.
6. Priya, K. L., Mahendra, J., Mahendra, L., Kanakamedala, A., Alsharif, K. F., Mugri, M. H., ... & Bhandi, S. (2022). Salivary Biomarkers in Periodontitis Post Scaling and Root Planing. *Journal of*

Clinical Medicine, 11(23), 7142.

7. Czech, A., Nowakowicz-Debek, B., Łukaszewicz, M., Florek, M., Ossowski, M., & Wlazło, Ł. (2022). *Effect of fermented rapeseed meal in the mixture for growing pigs on the gastrointestinal tract, antioxidant status, and immune response*. *Scientific Reports*, 12(1), 1-10.

8. Noor, H. S. M., Ariff, R. M., Chang, L. S., Chai, X. Y., Tan, H. Y., Babji, A. S., & Lim, S. J. (2022). *Enzymatic recovery of glycopeptides from different industrial grades edible bird's nest and its by-products: nutrient, probiotic and antioxidant activities, and physicochemical characteristics*. *Food Science and Human Wellness*, 11(6), 1555-1564.

9. Liu, K., & Kong, X. J. (2022). *Altered Salivary Microbiota Following Bifidobacterium animalis Subsp. Lactis BL-11 Supplementation Are Associated with Anthropometric Growth and Social Behavior Severity in Individuals with Prader-Willi Syndrome*. *Probiotics and Antimicrobial Proteins*, 1-13.

10. McDermott, C. E., Vincent, H. K., Mathews, A. E., Cautela, B. G., Sandoval, M., Tremblay, A., & Langkamp-Henken, B. (2022). *Impact of probiotic supplementation on exercise endurance among non-elite athletes: study protocol for a randomized, placebo controlled, double-blind, clinical trial*. *Trials*, 23(1), 1-12.

11. Zhang, Y., Huang, W., Li, M., Li, F., Li, L., Mortimer, M., & Guo, L. H. (2022). *Food-related engineered nanoparticles and food grade TiO₂ impact the metabolism of a human commensal bacterial strain in physiologically relevant conditions*. *Environmental Science: Nano*.

12. Tan, Y., Li, M., Kong, K., Xie, Y., Zeng, Z., Fang, Z., ... & Liu, Y. (2022). *In vitro simulated digestion of and microbial characteristics in colonic fermentation of polysaccharides from four varieties of Tibetan tea*. *Food Research International*, 112255.

13. Sandionigi, A., De Giani, A., Tursi, F., Michelotti, A., Cestone, E., Giardina, S., ... & Di Gennaro, P. (2022). *Effectiveness of Multistrain Probiotic Formulation on Common Infectious Disease Symptoms and Gut Microbiota Modulation in Flu-Vaccinated Healthy Elderly Subjects*. *BioMed research international*, 2022.

14. Zhou, J., Wang, M., Bäuerl, C., Cortés-Macías, E., Calvo-Lerma, J., Collado, M. C., & Barba, F. J. (2023). *The impact of liquid pressurized extracts of Spirulina, Chlorella and Phaedactylum tricorutum on in vitro antioxidant, antiinflammatory and bacterial growth effects and gut microbiota modulation*. *Food chemistry*, 401, 134083.

15. Guo, Y., Chen, X., Gong, P., Wang, M., Yao, W., Yang, W., & Chen, F. (2022). *Effects of simulated saliva-gastrointestinal digestion on the physicochemical properties and bioactivities of Siraitia grosvenorii polysaccharides*. *International Journal of Food Science & Technology*.

16. Zhang, Y., Diao, R., & Zhang, L. (2022). *Effects of Probiotics Supplementation on the Performance and Metabolic Health of Overtraining Athletes*. *Journal of Food and Nutrition Research*, 10(8), 560-

17. Kim, E. H. J., Wilson, A. J., Motoi, L., Mishra, S., Monro, J., Parkar, S. G., ... & Morgenstern, M. P. (2022). Chewing differences in consumers affect the digestion and colonic fermentation outcomes: *in vitro* studies. *Food & Function*, 13(18), 9355-9371.
18. Surana, K., Ahire, E. D., Pawar, R., Khairnar, R., Mahajan, S., Kshirsagar, S., ... & Keservani, R. K. (2022). Oral Health and Prebiotics. *Prebiotics and Probiotics in Disease Regulation and Management*, 291-309.
19. Rosier, B. T., Takahashi, N., Zaura, E., Krom, B. P., Martínez-Espinosa, R. M., van Breda, S. G., ... & Mira, A. (2022). The Importance of Nitrate Reduction for Oral Health. *Journal of dental research*, 00220345221080982.
20. Guo, Y., Chen, X., Gong, P., Wang, M., Yao, W., Yang, W., & Chen, F. (2022). *In vitro* digestion and fecal fermentation of *Siraitia grosvenorii* polysaccharide and its impact on human gut microbiota. *Food & Function*, 13(18), 9443-9458.
21. Chen, D., Bai, R., Yong, H., Zong, S., Jin, C., & Liu, J. (2022). Improving the digestive stability and prebiotic effect of carboxymethyl chitosan by grafting with gallic acid: *In vitro* gastrointestinal digestion and colonic fermentation evaluation. *International Journal of Biological Macromolecules*, 214, 685-696.
22. Chen, P., Sun, J., Liang, Z., Xu, H., Du, P., Li, A., ... & Li, C. (2022). The bioavailability of soy isoflavones *in vitro* and their effects on gut microbiota in the simulator of the human intestinal microbial ecosystem. *Food Research International*, 152, 110868.
23. Ale, E. C., Ibáñez, R. A., Wilbanks, D. J., Peralta, G. H., Ceylan, F. D., Binetti, A. G., ... & Lucey, J. A. (2023). Technological role and metabolic profile of two probiotic EPS-producing strains with potential application in yoghurt: Impact on rheology and release of bioactive peptides. *International Dairy Journal*, 137, 105533.
24. Perra, M., Manca, M. L., Tuberoso, C. I., Caddeo, C., Marongiu, F., Peris, J. E., ... & Manconi, M. (2022). A green and cost effective approach for the efficient conversion of grape byproducts into innovative delivery systems tailored to ensure intestinal protection and gut microbiota fortification. *Innovative Food Science & Emerging Technologies*, 80, 103103.
25. Jayasinghe, T. N., Harrass, S., Erdrich, S., King, S., & Eberhard, J. (2022). Protein Intake and Oral Health in Older Adults—A Narrative Review. *Nutrients*, 14(21), 4478

Noise Levels During Laparoscopic Procedures In Operation Theatres: An Observational Study In A Tertiary Care Hospital In Southern India

Clement Prakash¹, John Abraham^{2*}, Eslavath Rajkumar³, Anieta Merin Jacob⁴, Namrata Nathwani⁵, Shrenik G⁶, John Romate⁷

1: St.John's National Academy of Health Sciences, Bengaluru, Karnataka, India- 560034

2: St.John's National Academy of Health Sciences, Bengaluru, Karnataka, India- 560034

3: Central University of Karnataka, Kalaburagi, India- 585367

4: Sri Venkateshwara Dental College and Hospital, Bengaluru, India- 560083

5: St.John's National Academy of Health Sciences, Bengaluru, Karnataka, India- 560034

6: St.John's National Academy of Health Sciences, Bengaluru, Karnataka, India- 560034

7: Central University of Karnataka, Kalaburagi, India- 585367 Author for Correspondence:

ABSTRACT

Introduction: Noise pollution in operating theatres has deleterious effects on patient outcomes and staff performance. At the same time, the use of noisy technological equipment in operation theatres has increased in recent years. In light of this trend, it can be assumed that noise pollution in operating theatres remains challenging for patients and providers.

Objective: To measure noise levels during laparoscopic procedures in operation theatres of a tertiary care hospital in Southern India and compare them with the recommended standards. **Methods:** In this cross-sectional observational study, the noise level in the operating theatre of a tertiary care hospital in Southern India during laparoscopic procedures was evaluated using a Decibel Meter from January 2022 and June 2022. Statistical analysis was done using descriptive statistics and one-way ANOVA.

Results: Noise levels between 73.68 dB(A) and 49.30 dB(A) during laparoscopic procedures exceed national and international recommended standards. The highest noise level is observed in the extubation phase of laparoscopic surgery, followed by the surgery and induction phases.

Conclusion: Prolonged exposure to high levels of noise during laparoscopic procedures in operating theatres is a hazard to surgeons, anesthetists, personnel, and patients. Government, healthcare professionals, and other agencies should discuss guidelines for improving measures to reduce noise in operation theatres.

Keywords: Laparoscopic surgery, Noise pollution, Operating rooms, Southern India.

INTRODUCTION

The deleterious effects of noise levels on individual health and work performance have evoked considerable attention in recent years. Noise pollution is defined as undesired or unwanted sound in the

the external environment. It is an irregular or arbitrary combination of sounds.[1] Noise is often measured on the dB(A) scale, a frequency weighted tool that separates frequencies below 1 kHz.[2] Prolonged exposure to loud noise in everyday life may be a biological stressor with far-reaching physiological and psychological consequences. The adverse effects of noise pollution on humans include hearing loss, poor communication, emotional issues, and physical and psychological repercussions.[3] Likewise, excessive noise might negatively impact individual work efficiency. It can also cause an increase in intestinal activity, blood pressure, heartbeat, oxygen consumption, respiratory rate, and impaired sleep and behavior.[4]

Hospitals are one of the settings where high noise levels can significantly affect public health.[5,6] The patients and healthcare staff alike are subjected to a barrage of sounds. Notably, operation theatres are particularly susceptible to noise pollution.[7] Literature reveals a mean noise level in operating theatres of about 65–60 dB(A); however, some studies indicate noise levels above 100 dB(A).[8] Previous studies have shown that surgical instruments may expose patients and providers to high noise levels of 131 dB(A).[9-11] Moreover, noise exposure might elevate blood-based cortisol levels in operating surgeons, result in permanent hearing loss, or trigger cardiovascular disorders.[12-14] Besides, noise indirectly affects patients' health by reducing the quality of the surgeons' work.[15,16] In particular, research shows that intraoperative noise, among other factors, hinders the concentration of the operating team, eventually leading to postoperative difficulties (e.g., infections).[17-20]

Therefore, it is crucial to measure the noise levels in operating theatres and compare them to accepted standards to reduce noise pollution. Noise, however, may have varying effects on certain surgical phases. For instance, the operative phase of surgery is the most difficult for surgeons and produces the most cognitive workload.[21] Thus, evaluating the noise levels during different phases of surgery can provide a comprehensive understanding of the noise generated at each step. Further, to the best of the authors' knowledge, no studies have been done in India on noise levels in the operating rooms of hospitals, particularly during various laparoscopic procedures, a widely performed surgical technique. Therefore, this study aimed to measure the noise levels in the operating theatres during laparoscopic procedures in a tertiary care hospital in Southern India. Furthermore, obtained results were compared with recommended noise level standards.

MATERIALS AND METHODS

Study design, period, location, and approval

This cross-sectional observational study was conducted between January 2022 and June 2022 in a tertiary care hospital in Bangalore, South India. Noise levels of three laparoscopic procedures such as intraperitoneal onlay mesh (IPOM), laparoscopic cholecystectomy (LAP Chol.), and transabdominal

preperitoneal (TAPP), were monitored. No identifiable patient/provider information parameters were used in data analysis. The study did not require approval from the Institutional Ethics Committee. Informed consent was waived due to the adopted research method.

Procedure

The noise level in the operating theatre of the hospital was monitored using the ‘Mengshen Decibel Meter, Digital Sound Level Meter Handheld Audio Noise Meter Tester’ with certain specifications on frequency range (31.5 Hz-8Hz), microphone (½ inch electric condenser microphone), sound range (40dB(A)-130 Db(A)), display (LCD 4 digits, measuring range 30-130 dB(A); +/- 1.5 dB Accuracy with 0.1 dB Resolution), calibration (electrical calibration with the internal oscillator) and ASIN: B01CZFCRA8.

For evaluation and measurement, the project executor calibrated the device every time before starting to measure. This was followed by placing the device at the top of the ‘anesthesia machine’, which was set at 2 feet from the patient’s head and 3 feet from the floor. Data about the noise level measurement were gathered from the laparoscopic operation theatres when the surgical procedure was being performed, during three periods of 5 minutes (5 minutes at the start of the surgery, 5 minutes in the middle of the surgery, and 5 minutes at the end of the surgery). The middle of the surgery is the period just after the completion of the Induction Phase. The noise level was registered in dB(A) every second, and other details of such noise (conversations and music) were not noted. Noise recordings were made in one operation theatre at a time.

Statistical analysis

After transferring data to MS excel, data were analyzed using descriptive statistical tests using mean \pm standard deviation in SPSS software version 22.0. A comparison of noise levels during the three surgical procedures and phases of surgery was performed using one-way ANOVA.

RESULTS

A total of 50 laparoscopic surgeries were observed, including three phases: induction, surgery, and extubation. Data were derived from 33 LAP Chol., 6 IPOM, and 11 TAPP surgery observations. The demographics of the data are shown in Table 1.

Table 1: Demographic characteristics

Surgery	Number of Observations (N = 50)	Frequency (%)
LAP Chol.	33	66
IPOM	6	12
TAPP	11	22

Table 2: One-way ANOVA results of maximum noise levels in the induction phase during laparoscopic procedures

Surgery	N	Mean	SD	F	p-value
LAP Chol.	33	70.06	2.345	.594	.556
IPOM	6	69.37	1.642		
TAPP	11	70.56	2.243		

Table 2 indicates the one-way ANOVA results of maximum noise-level measurements in the induction phase by type of laparoscopic surgery such as LAP Chol., IPOM, and TAPP. The difference in maximum noise levels in the induction phase by laparoscopic procedures was not significant ($F = .594$, $p = .556$).

Table 3: One-way ANOVA results of maximum noise levels in the surgery phase during laparoscopic procedures

Surgery	N	Mean	SD	F	p-value
LAP Chol.	33	71.99	1.948	.259	.773
IPOM	6	71.60	1.840		
TAPP	11	72.18	1.645		

Table 3 indicates the one-way ANOVA results of maximum noise-level measurements in the surgery phase by type of laparoscopic surgery such as LAP Chol., IPOM, and TAPP. The difference in maximum noise levels in the surgery phase by laparoscopic procedures was not significant ($F = .259$, $p = .773$).

Table 4: One-way ANOVA results of maximum noise levels in the extubation phase during laparoscopic procedures

Surgery	N	Mean	SD	F	p-value
LAP Chol.	33	73.68	1.450	4.77	.13
IPOM	6	71.68	2.234		
TAPP	11	72.95	1.487		

Table 4 indicates the one-way ANOVA results of maximum noise-level measurements in the extubation phase by type of laparoscopic surgery such as LAP Chol., IPOM, and TAPP. The difference in maximum noise levels in the extubation phase by laparoscopic procedures was significant ($F = 4.77$, $p = .13$).

Table 5: One-way ANOVA results of minimum noise levels in the induction phase during laparoscopic procedures

Surgery	N	Mean	SD	F	p-value
LAP Chol.	33	49.56	1.765	.197	.822
IPOM	6	49.75	2.158		
TAPP	11	50.04	1.658		

Table 5 indicates the one-way ANOVA results of minimum noise-level measurements in the induction phase by type of laparoscopic surgery such as LAP Chol., IPOM, and TAPP. The difference in minimum noise levels in the induction phase by laparoscopic procedures was not significant ($F = .197$, $p = .822$).

Table 6: One-way ANOVA results of minimum noise levels in the surgery phase during laparoscopic procedures

Surgery	N	Mean	SD	F	p-value
LAP Chol.	33	49.30	1.531	.383	.684
IPOM	6	49.83	1.632		
TAPP	11	49.86	1.399		

Table 6 indicates the one-way ANOVA results of minimum noise-level measurements in the surgery phase by type of laparoscopic surgery such as LAP Chol., IPOM, and TAPP. The difference in maximum noise levels in the surgery phase by laparoscopic procedures was not significant ($F = .383$, $p = .684$).

Table 7: One-way ANOVA results of minimum noise levels in the extubation phase during laparoscopic procedures

Surgery	N	Mean	SD	F	p-value
LAP Chol.	33	51.13	2.413	.541	.586
IPOM	6	52.10	2.784		
TAPP	11	51.58	2.051		

Table 7 indicates the one-way ANOVA results of minimum noise-level measurements in the extubation phase by type of laparoscopic surgery such as LAP Chol., IPOM, and TAPP. The difference in

maximum noise levels in the extubation phase by laparoscopic procedures was not significant ($F = .541, p = .586$).

Table 8: One-way ANOVA results of maximum noise levels during different phases of laparoscopic surgery

Surgery	N	Mean	SD	F	p-value
Induction	50	70.09	2.238	34.10	.000
Surgery	50	71.99	1.845		
Extubation	50	73.28	1.666		

Table 8 indicates the one-way ANOVA results of maximum noise-level measurements by phase of laparoscopic surgery, such as induction, surgery, and extubation. Maximum noise levels between phases of laparoscopic surgery in the operation theatres surgery were found to be significantly different ($F = 34.10, p = .000$).

Table 9: One-way ANOVA results of minimum noise levels during different phases of laparoscopic surgery

Surgery	N	Mean	SD	F	p-value
Induction	50	49.69	1.764	15.12	.000
Surgery	50	49.49	1.507		
Extubation	50	51.35	2.359		

Table 9 indicates the one-way ANOVA results of minimum noise-level measurements by phase of laparoscopic surgery, such as induction, surgery, and extubation. Minimum noise levels between phases of laparoscopic surgery in the operation theatres surgery were found to be significantly different ($F = 15.12, p = .000$).

DISCUSSION

Long-term noise exposure in operating theatres has negative physical and psychological ramifications. The results showed a noise level between 73.68 dB(A) and 49.30 dB(A) during the three surgical procedures, which is considerably greater than the allowable levels recommended by the World Health Organization (WHO) and International Noise Council. The International Noise Council[22] and WHO[23] have suggested that noise levels in hospital surroundings should be 35-40 dB(A) during the day and 30-40 dB(A) in the evening. Working in extreme conditions while exposed to noise levels exceeding those standardized parameters established by laws or agencies such as the WHO can delay patients' recovery and impair healthcare professionals' performance.[24-26]

A study by Giv et al.[27] revealed that orthopedic procedures cause the most noise pollution, whereas

laparoscopic and cardiac surgery procedures cause the least. However, the present study results add to this existing literature and indicate that even noise levels in operating theatres during laparoscopic procedures exceed the recommended maximum noise levels in operation theatres. Corroborating these findings, Tsiou et al.[16] reported a noise pollution level index in laparoscopy surgery (internal injuries) of 61 dB(A).

Noise levels were unstable in three phases of laparoscopy surgery, with the main surgery and closing extubation phases noisier than the initial induction phase. Maximum noise level is found to be higher in the last phase of surgery extubation, followed by the surgery phase and initial induction phase. Findings reveal a significant difference in maximum noise levels across the types of laparoscopic surgeries during the extubation phase of the laparoscopic procedure. Relatedly, results indicate a significant difference in the minimum and maximum noise levels during these three phases of laparoscopy surgery. These findings are consistent with earlier studies that found increased noise levels during surgical procedures or exceptionally high noise pollution in the last phase of surgery.[16,17,28] Additionally, the main effect of noise on staff was found to be impaired concentration and communication. Previous research evaluating the effect of noise in operation theatres reported that communication was the factor most adversely affected.[15] Because miscommunication is one of the most commonly identified causes of adverse events and medical errors, noise pollution in operation theatres has to be addressed with prime importance.[7]

The strength of the study includes a comparison of noise levels during different laparoscopic surgeries at different phases with recommended noise levels by different organizations. However, it could not include that other tasks and off-task distractions that could influence noise. Also, the study did not measure the concentration/distraction of the surgical team or the surgical performance during laparoscopic surgeries. The measurements included in the present study were limited to laparoscopic procedures conducted in a tertiary care hospital in India. Further research is required to evaluate noise levels in operation theatres across various surgeries in other hospitals.

Thus, the findings suggest that daily exposure to noise by the laparoscopic surgical team should be kept as low as possible. This could be achieved by providing noise barriers, boosting the absorption of ceilings and walls, implementing practical standards, or reducing the time professionals are exposed to. Thus, a multidisciplinary approach may be required to eliminate unwanted noise in operating rooms. Future research can focus on locations where equipment was installed, time of measurement, measurement height from ground level, and measurement period to improve hospital noise assessment.

CONCLUSION

In conclusion, this study offers comprehensive knowledge of noise levels in a tertiary care hospital in South India, albeit from an operating theatre perspective. The study highlights that noise levels in

operating theatres deserve special attention from planners and policy-makers since noise can impair the performance of medical professionals and aggravate the health issues of both patients and providers. Future research can explore the physical and psychological consequences of noise levels during laparoscopic surgeries from the perspectives of patients and operating room staff.

DECLARATION

Funding: Nil

Conflict of Interest: Nil

REFERENCES

1. Barbosa ASM, Cardoso MRA. Hearing loss among workers exposed to road traffic noise in the city of São Paulo in Brazil. *Auris Nasus Larynx*. 2005 Mar;32(1):17–21.
2. Bentley S, Murphy F, Dudley H. Perceived noise in surgical wards and an intensive care area: an objective analysis. *BMJ*. 1977 Dec 10;2(6101):1503–6.
3. Bahreyni T, Pour SM, Tamjidi A, Bazri A. Sound pollutants in the industrial environments of Mashhad. *Med J Mashhad Univ Med Sci*. 1997; 40:27–32.
4. Gerhardt KJ, Abrams RM. Fetal exposures to sound and vibroacoustic stimulation. *J Perinatol*. 2000 Dec 1;20(S1):S21–30.
5. Katz JD. Noise in the Operating Room. *Survey of Anesthesiology*. 2015; 59(1):60.
6. Shapiro RA, Berland T. Noise in the operating room: Survey of Anesthesiology. 1973 Aug;17(4):374-375.
7. Hasfeldt D, Laerkner E, Birkelund R. Noise in the operating room—what do we know? A review of the literature. *Journal of PeriAnesthesia Nursing*. 2010 Dec;25(6):380–6.
8. West J, Busch-Vishniac I, King J, Levit N. Noise reduction in an operating room: A case study. *The Journal of the Acoustical Society of America*. 2008 May;123(5):3677–3677.
9. Fritsch MH, Chacko CE, Patterson EB. Operating room sound level hazards for patients and physicians. *Otology & Neurotology*. 2010 Jul;31(5):715–21.
10. Siverdeen Z, Ali A, Lakdawala AS, McKay C. Exposure to noise in orthopaedic theatres - do we need protection? *International Journal of Clinical Practice*. 2008 Nov;62(11):1720–2.
11. Peters MP, Feczko PZ, Tsang K, van Rietbergen B, Arts JJ, Emans PJ. Noise exposure in TKA surgery; oscillating tip saw systems vs oscillating blade saw systems. *The Journal of Arthroplasty*. 2016 Dec;31(12):2773–7.
12. Chen L, Brueck SE, Niemeier MT. Evaluation of potential noise exposures in hospital operating rooms. *AORN Journal*. 2012 Oct;96(4):412–8.
13. Ginsberg SH, Pantin E, Kraidin J, Solina A, Panjwani S, Yang G. Noise levels in modern operating

-
-
- rooms during surgery. *Journal of Cardiothoracic and Vascular Anesthesia*. 2013 Jun;27(3):528–30.
14. Stokholm ZA, Hansen ÅM, Grynderup MB, Bonde JP, Christensen KL, Frederiksen TW, et al. Recent and long-term occupational noise exposure and salivary cortisol level. *Psychoneuroendocrinology*. 2014 Jan;39:21–32.
15. Padmakumar AD, Cohen O, Churton A, Groves JB, Mitchell DA, Brennan PA. Effect of noise on tasks in operating theatres: a survey of the perceptions of healthcare staff. *British Journal of Oral and Maxillofacial Surgery*. 2017 Feb;55(2):164–7.
16. Tsiou C, Efthymiatos G, Katostaras T. Noise in the operating rooms of Greek hospitals. *The Journal of the Acoustical Society of America*. 2008 Feb;123(2):757–65.
17. Kurmann A, Peter M, Tschan F, Mühlemann K, Candinas D, Beldi G. Adverse effect of noise in the operating theatre on surgical-site infection. *British Journal of Surgery*. 2011 May 27;98(7):1021–5.
18. Arora S, Sevdalis N, Nestel D, Woloshynowych M, Darzi A, Kneebone R. The impact of stress on surgical performance: A systematic review of the literature. *Surgery*. 2010 Mar;147(3):318-330.e6.
19. Way JT, Long A, Weihing J, Ritchie R, Jones R, Bush M, et al. Effect of noise on auditory processing in the operating room. *Journal of the American College of Surgeons*. 2013 May;216(5):933–8.
20. Keller S, Tschan F, Semmer NK, Holzer E, Candinas D, Brink M, et al. Noise in the operating room distracts surgical team members. An observational study. *World J Surg*. 2018 Dec;42(12):3880–7.
21. Parker SH, Flin R, McKinley A, Yule S. Factors influencing surgeons' intraoperative leadership: video analysis of unanticipated events in the operating room. *World J Surg*. 2014 Jan;38(1):4–10.
22. Guidelines for intensive care unit design. Guidelines/Practice Parameters Committee of the American College of Critical Care Medicine, Society of Critical Care Medicine. *Crit Care Med*. 1995; 23:582-8.
23. World Health Organization. WHO Noise Guide Lines. [Internet] 2022 [cited 2023, Jan 22];. Available from: <http://www.ourhealdsburg.com/noise/noise.htm>.
24. Zannin PHT, Milanês ML, De Oliveira Filho MVM. Evaluation of noise in the vicinity of a hospital and a gated community. *CUS*. 2019;07(01):59–75.
25. Busch-Vishniac I. Hospital soundscapes: characterization, impacts, and interventions. *Acoust Today*. 2019;15(3):11.
26. Loupa G. Influence of noise on patient recovery. *Curr Pollution Rep*. 2020 Mar;6(1):1–7.
27. Giv MD, Sani KG, Alizadeh M, Valinejadi A, Majdabadi HA. Evaluation of noise pollution level in the operating rooms of hospitals: A study in Iran. *Interventional Medicine and Applied Science*. 2017 Jun;9(2):61–6.
28. Broom MA, Capek AL, Carachi P, Akeroyd MA, Hilditch G. Critical phase distractions in anaesthesia and the sterile cockpit concept: Critical phase distractions in anaesthesia. *Anaesthesia*. 2011 Mar;66(3):175–9.
-
-

29. Wallis R, Harris E, Lee H, Davies W, Astin F. *Environmental noise levels in hospital settings: a rapid review of measurement techniques and implementation in hospital settings*. *Noise Heal*. 2019; 21;200–216.

A Total Proximal Interphalangeal Joint Arthroplasty Of The Hand With Secondary Destruction Of The Proximal Finger Bone Resulting In Chondrosarcoma

Huang Kunpeng ,P.I.Bespalchuk

ABSTRACT

Abstract Aim The authors present the clinical case of a surgically treated patient with post-traumatic destruction of the proximal interphalangeal joint of the third finger of the left hand with chondrosarcoma of the proximal phalanx. **Methods** In the first stage of surgical treatment, the patient underwent total arthroplasty of the proximal interphalangeal joint. Three months later, a fracture of the distal portion of the implant (internal fixation) was diagnosed due to a re-injury to the hand. **Result** The result was a diagnosis of healed chondromalacia and arthroplasty was performed. **Conclusion** This surgical procedure is worth promoting

Keywords: hand, proximal phalangeal joint, arthroplasty, chondromas.

Introduction

Open severe hand injuries, especially those involving joint destruction, are a pressing issue in modern traumatology. Surgical intervention should follow the principle of maximum preservation of living tissue so that later reconstructive surgery can be performed to restore the function of the injured finger [1, 8]. In recent decades, involved in being the "diamond of orthopedic surgery" surgeons, the hand has had the opportunity to use various types of orthopedic interventions, including intra-articular fixation devices for the finger [2]. When choosing the best internal fixation solution, the degree of damage to the very unique finger extensor device must be taken into account and care must be taken to restore the integrity of the flexor tendons [7]. If these structures are not repaired, endoscopy is meaningless. Special care should be taken in the reconstruction of the most complex proximal interphalangeal joints of the fingers in the presence of post-traumatic deformities [8,9].

1 Materials and methods

A special part of orthopedic surgery is the treatment of benign tumors, such as chondromas, which are known to affect mainly the phalanges and metacarpals (4, 6). Surgical treatment is currently the method of choice for the treatment of these benign tumors. Depending on the stage of the pathological process, surgeons use different ways to remove of the tumor, followed by bone grafting with autografts and allografts and, in some cases, bone cement [3, 5]. Some authors prefer to perform only intra-lesional tumor resection without subsequent plication for specified types of bone lesions (pathological processes that do not involve the cortical layer of the bone) [3, 10]. The 37-year-old victim, D, was

admitted to the Hand Surgery Center of the Republic of Belarus on September 15, 2014, with the diagnosis of post-traumatic deformational arthritis of the proximal interphalangeal joint of the third finger of the left hand. He suffered a traumatic injury on July 8, 2014, while working at home with a woodworking machine, with an open multi-axial fracture of the base of the middle finger shown (Figure 1). In parallel, he underwent primary surgical treatment of the wound and Kirschner wire osteosynthesis at a regional hospital (Figure 2). A course of antibiotics was given and the wound healed by secondary stretching. Movement of the proximal interphalangeal joint of the third finger was severely restricted and painful.

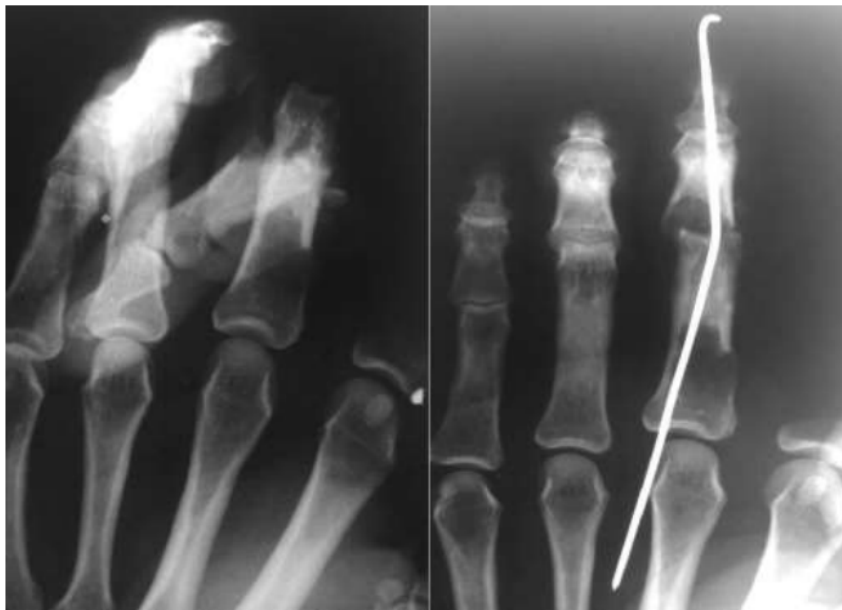


Figure 1. Radiograph of the left hand of patient D., 37 years old (after injury)

Figure 2. Radiograph of the left hand of patient D., 37 years old (after situational osteosynthesis at the CDH)



Figure 3. Radiograph of patient D., on admission to the Republican Center for Hand Surgery



Figure 4. radiograph of patient D., after placement of an endoprosthesis

Active and passive flexion and extension of the metacarpal was moderately limited, indicating preservation of the deep flexor tendon and recovery of the dorsal tendon (through tissue scarring). A closer examination of the radiographs showed that the patient had a radiological picture of a chondrosarcoma: the tumor process affected the base and middle third of the proximal phalanx and also sharply thinned the radial aspect of the phalanx (Figure 3). The patient had no clinical manifestations of the tumor prior to the injury. The patient flatly rejected the proposed arthrodesis of the proximal interphalangeal joint and insisted on trying an internal fixation. The decision was made to perform a two-stage procedure: the first stage was a total arthroplasty of the destroyed joint, and the subsequent stage was the elimination of the tumor process, which left no doubt about its benign nature.

On September 16, 2014, under anesthesia and hemostasis, the head of the main phalanx and the base of the injured middle phalanx were exposed through a dorsal approach, using a graft applied to the proximal third of the forearm. The dorsal portion of the intact deep flexor tendon was the base of the wound; the superficial flexor tendon was not present (apparently removed during the initial surgery). The head of the main phalanx is excised and a canal is created into which the opaque metal portion of the Safar prosthesis is pressed. The proximal portion of the middle finger is sawed off and a hooked prosthetic Teflon rod is inserted, which is attached to the metal bridge of the anterior portion of the prosthesis. The dorsal tendon above the prosthesis was sutured as a duplicate. After careful hemostasis and x-ray monitoring, the wound was closed. A sterile dressing and a plaster splint were applied from the palmar surface of the finger to the lower third of the forearm for fixation. An X-ray performed in the operating room showed that the proximal portion of the metal part of the prosthesis had penetrated the tumor cavity (Figure 4). The patient received postoperative antibiotic therapy. The wound healed under primary tension and the sutures were removed after 2 weeks. Plaster immobilization was discontinued after 3 weeks, followed by a short course of physical therapy.

On November 3, 2014, the patient was readmitted to the Hand Surgery Department and underwent the planned second stage of surgery: exhalation of the tumor (confirmed as chondrosarcoma) through the

dorsal channel at the base of the proximal phalanx, followed by intensive filling of the cavity with allogeneic fibrin. The wound also healed under primary tension. The patient started working 3 weeks after surgery.

On February 4, 2015, patient D noticed a deformity in his left hand during a fall and found limited movement of the prosthetic joint of the 3rd finger. Radiography (Figure 5) showed a dislocation at the base of the middle phalanx.



Figure 5. Radiograph of patient D., after re-injury (dislocation of the middle phalanx as a result of damage to the distal component of the endoprosthesis)

2 Results

He was again admitted to the Hand Surgery Center of the Republic of Belarus and was admitted to the operating room. During revision of the proximal interphalangeal joint, it was found that the Teflon rod of the internal fixator had broken at the entrance into the medial phalanx, apparently as a result of significant mechanical action. The locking hook, however, was intact. The distal prosthesis was replaced. Control radiographs showed that the tumor nodule was completely replaced by its own bone tissue (Figure 6). The patient was followed up as of 2022, and functional recovery of the 3rd finger of the left hand was possible.



Figure 6. Radiogram of patient D., after bone alloplasty of the main phalanx and revision endoprosthesis

3 Discussion

This clinical observation is unique because patient D, 37 years old, underwent total internal fixation of the proximal interphalangeal joint of the third finger of the left hand in the context of his existing and initially identified osteochondroma of the injured segment. We could not find such pathological healing in the available data.

4. Conclusion

The results obtained with the two-stage surgical intervention confirm the correct sequence of the two stages and allow us to recommend its practical application in similar situations. The patient's insistence on replacing the prosthesis in case of recurrent trauma indicates that he was satisfied with the results of both the primary total internal fixation prosthesis and the performed intervention of allograft shaping after focal intraoperative resection of the tumor process.

References

1. Azolov V. V. *The effectiveness of finger reconstruction in the aftermath of injuries of various etiologies // Vestn. traumatology and orthopedic.* - 2004. - №2. - P. 82-88.
2. Afanasiev A.V. *Two-stage method of treatment of post-traumatic deformities and contractures of fingers with the use of total bipolar endoprosthesis: Author's thesis ... Candidate of medical sciences.* - M., 2008. - P.18.
3. Bepalchuk A.P. *Simple excocclusion as a method of treating hand enchondromes // Belarusian medical journal.* - 2004. - № 3. - P. 30-31.
4. Demichev, N. P., Darwin E. O. *Clinic and treatment of hand tumors // Orthopedics, Traumatology and Prosthetics.* - 2004. - № 1. - P. 58-62.
5. *Comparative analysis of surgical treatment of hand chondromes using different types of bone grafting / S.S. Strafun, A.V. Borzykh, N.A. Borzykh et al. // Trauma.* - 2003. - № 1. - P. 47-50.
6. Aboulafia, A. J., Temple H. T., Scully S. P. *Surgical treatment of benign bone tumors // AAOS Instructional Course lectures.* - 2002. - Vol. 51. - P. 441-450.
7. *Anatomical basis for functional treatment of dorsolateral dislocation of the proximal interphalangeal joint / M. lutz, D. Fritz, R. Arora et al. // Clin. Fnat.* - 2004. - Vol. 17. - № 4. - P. 303-307.
8. Delia Santa D. *Treatment of fractures of the fingers. Whats news? // J. Hand Surg.* - 2003. - Vol. 28. - № 1. - P. 2-4.
9. *Extensor mechanism slide to the treatment of the proximal interphalangeal joint / R. A. Beekman, A. E. Abbot., N. L. Taylor et al. // Hand Surg.* - 2004. - Vol. 29. - P. 1063-1068.
10. *Simple curettage without bone grafting for enchondromata of the Hand. / T. Goto, S. Yokokura, A.*

Instructions for Authors

Essentials for Publishing in this Journal

- 1 Submitted articles should not have been previously published or be currently under consideration for publication elsewhere.
- 2 Conference papers may only be submitted if the paper has been completely re-written (taken to mean more than 50%) and the author has cleared any necessary permission with the copyright owner if it has been previously copyrighted.
- 3 All our articles are refereed through a double-blind process.
- 4 All authors must declare they have read and agreed to the content of the submitted article and must sign a declaration correspond to the originality of the article.

Submission Process

All articles for this journal must be submitted using our online submissions system. <http://enrichedpub.com/> . Please use the Submit Your Article link in the Author Service area.

Manuscript Guidelines

The instructions to authors about the article preparation for publication in the Manuscripts are submitted online, through the e-Ur (Electronic editing) system, developed by **Enriched Publications Pvt. Ltd.** The article should contain the abstract with keywords, introduction, body, conclusion, references and the summary in English language (without heading and subheading enumeration). The article length should not exceed 16 pages of A4 paper format.

Title

The title should be informative. It is in both Journal's and author's best interest to use terms suitable. For indexing and word search. If there are no such terms in the title, the author is strongly advised to add a subtitle. The title should be given in English as well. The titles precede the abstract and the summary in an appropriate language.

Letterhead Title

The letterhead title is given at a top of each page for easier identification of article copies in an Electronic form in particular. It contains the author's surname and first name initial .article title, journal title and collation (year, volume, and issue, first and last page). The journal and article titles can be given in a shortened form.

Author's Name

Full name(s) of author(s) should be used. It is advisable to give the middle initial. Names are given in their original form.

Contact Details

The postal address or the e-mail address of the author (usually of the first one if there are more Authors) is given in the footnote at the bottom of the first page.

Type of Articles

Classification of articles is a duty of the editorial staff and is of special importance. Referees and the members of the editorial staff, or section editors, can propose a category, but the editor-in-chief has the sole responsibility for their classification. Journal articles are classified as follows:

Scientific articles:

1. Original scientific paper (giving the previously unpublished results of the author's own research based on management methods).
2. Survey paper (giving an original, detailed and critical view of a research problem or an area to which the author has made a contribution visible through his self-citation);
3. Short or preliminary communication (original management paper of full format but of a smaller extent or of a preliminary character);
4. Scientific critique or forum (discussion on a particular scientific topic, based exclusively on management argumentation) and commentaries. Exceptionally, in particular areas, a scientific paper in the Journal can be in a form of a monograph or a critical edition of scientific data (historical, archival, lexicographic, bibliographic, data survey, etc.) which were unknown or hardly accessible for scientific research.

Professional articles:

1. Professional paper (contribution offering experience useful for improvement of professional practice but not necessarily based on scientific methods);
2. Informative contribution (editorial, commentary, etc.);
3. Review (of a book, software, case study, scientific event, etc.)

Language

The article should be in English. The grammar and style of the article should be of good quality. The systematized text should be without abbreviations (except standard ones). All measurements must be in SI units. The sequence of formulae is denoted in Arabic numerals in parentheses on the right-hand side.

Abstract and Summary

An abstract is a concise informative presentation of the article content for fast and accurate Evaluation of its relevance. It is both in the Editorial Office's and the author's best interest for an abstract to contain terms often used for indexing and article search. The abstract describes the purpose of the study and the methods, outlines the findings and state the conclusions. A 100- to 250- Word abstract should be placed between the title and the keywords with the body text to follow. Besides an abstract are advised to have a summary in English, at the end of the article, after the Reference list. The summary should be structured and long up to 1/10 of the article length (it is more extensive than the abstract).

Keywords

Keywords are terms or phrases showing adequately the article content for indexing and search purposes. They should be allocated heaving in mind widely accepted international sources (index, dictionary or thesaurus), such as the Web of Science keyword list for science in general. The higher their usage frequency is the better. Up to 10 keywords immediately follow the abstract and the summary, in respective languages.

Acknowledgements

The name and the number of the project or programmed within which the article was realized is given in a separate note at the bottom of the first page together with the name of the institution which financially supported the project or programmed.

Tables and Illustrations

All the captions should be in the original language as well as in English, together with the texts in illustrations if possible. Tables are typed in the same style as the text and are denoted by numerals at the top. Photographs and drawings, placed appropriately in the text, should be clear, precise and suitable for reproduction. Drawings should be created in Word or Corel.

Citation in the Text

Citation in the text must be uniform. When citing references in the text, use the reference number set in square brackets from the Reference list at the end of the article.

Footnotes

Footnotes are given at the bottom of the page with the text they refer to. They can contain less relevant details, additional explanations or used sources (e.g. scientific material, manuals). They cannot replace the cited literature.

The article should be accompanied with a cover letter with the information about the author(s): surname, middle initial, first name, and citizen personal number, rank, title, e-mail address, and affiliation address, home address including municipality, phone number in the office and at home (or a mobile phone number). The cover letter should state the type of the article and tell which illustrations are original and which are not.

Address of the Editorial Office:**Enriched Publications Pvt. Ltd.**

S-9, IInd FLOOR, MLU POCKET,
MANISH ABHINAV PLAZA-II, ABOVE FEDERAL BANK,
PLOT NO-5, SECTOR -5, DWARKA, NEW DELHI, INDIA-110075,
PHONE: - + (91)-(11)-45525005