ISSN-p:2664-5734
ISSN-o: 2709-5878

LIAQUAT MEDICAL RESEARCH JOURNAL

Official Journal of Diagnostic & Research Laboratory, Liaquat University of Medical & Health Sciences, Jamshoro Pakistan

Y Category

VOLUME 6 ISSUE 2
1 April 2024 - 30 June 2024

Copyright

About the Journal

Liaquat Medical Research Journal is the print, online, double blind, peer-reviewed, quarterly released journal devoted to publishing innovative biomedical research and scholastic / academic content from all fields of medical sciences, concentrating on innovative clinical, diagnostic and perspective preventive research.

Aims & Scope

The Journal aims to publish research in all fields of clinical, diagnostic, experimental & preventive areas related to medical sciences to disseminate scholastic work among clinicians and scientists around the globe.

Editorial Office
Liaquat Medical Research Journal,
Diagnostic & Research Lab,
Liaquat University Hospital, Hyderabad,
Sindh, Pakistan.
lmrj@lumhs.edu.pk

Disclaimer

All views expressed in the journal are those of the authors and do not necessarily reflect the policies or preferences of LMRJ or LUMHS, Jamshoro, Pakistan.

Patron in Chief

Editor in Chief

Managing Editor

Manuscript Editor

Table of Contents

Editorial

CANCER SURVIVORSHIP IN LOW –MIDDLE INCOME COUNTRIES- DOES QUALITY OF LIFE REALLY MATTER?

Binafsha Manzoor Syed
Medical Research Center, Liaquat University of Medical and Health Sciences, Jamshoro, Pakistan
Correspondence:
Binafsha Manzoor Syed, Medical Research Centre, Liaquat University of Medical & Health Sciences, Jamshoro, Pakistan
Email: binafsha.syed@lumhs.edu.pk

DOI: 10.38106/LMRJ.2024.6.2-01
Received: 10.06.2024
Accepted: 21.06.2024
Published: 30.06.2024

ABSTRACT
Cancer survivorship has improved in the recent years due to screening facilities, modernized treatment options and advanced cancer care in specialized centers globally. However, in low-middle-income countries cancer survivorship is not yet improved to that stature. There are multifaceted issues including delay in diagnosis, financial burden and in certain situations in appropriate treatment creates long term effects not only on patients but also on their families. Multidisciplinary approach is a limitation in the LMIC and the mental health aspects are least studies in cancer survivors. Therefore, a revised more focused and evidence based management plan along with long term quality of life issues needs to be focused in patients from LMIC.

Key Words: Cancer survivorship, low-middle-income countries, quality of life of cancer patients

INTRODUCTION

Cancer survivorship marks a significant milestone in the life of cancer patients, reflecting advancements in early detection, treatment modalities, and supportive care. However, the experience of cancer survivorship varies greatly across different socioeconomic contexts, particularly in low- and middle-income countries (LMICs). In these regions, the challenges faced by cancer survivors often extend beyond medical care to encompass social, economic, and psychological dimensions, profoundly impacting their quality of life. In the cancer care system, the focus is always on survival rates, treatment efficacy, and disease outcomes. While these metrics are undoubtedly critical in assessing the success of cancer interventions, the quality of life (QoL) experienced by cancer survivors deserves equal attention, particularly in LMICs where healthcare resources are often limited and disparities in access to care are prevalent.

Survivors in LMICs encounter a landscape where access to timely diagnosis and appropriate treatment remains a critical issue. Limited healthcare infrastructure, shortage of oncology specialists, and financial constraints often delay diagnosis and hinder optimal treatment delivery. As a result, many survivors in these settings face advanced stages of cancer at diagnosis, presenting more complex treatment challenges and poorer prognoses. The concept of QoL for cancer survivors encompasses a spectrum of physical, psychological, social, and functional dimensions that are profoundly influenced by their cancer experience and subsequent treatment journey. Furthermore, the journey through cancer treatment can exact a heavy toll on survivors in LMICs, both physically and psychologically. Long travel distances to reach treatment centers, coupled with financial burdens from out-of-pocket expenses, contribute to significant stress and strain on individuals and their families. The aftermath of

treatment may bring about persistent physical impairments, such as lymphedema, neuropathy, or organ dysfunction or even amputation, which can further compromise daily functioning and quality of life.

Low-Middle- Income countries have limited infrastructure and diagnostic facilities and some distant areas have even basic health care system resulting in delays in diagnosis as a result, survivors may experience higher rates of treatment-related side effects, physical impairments, and chronic health conditions that diminish their overall well-being and functional capacity. Moreover, the economic burden of cancer care exacerbates the challenges faced by survivors in LMICs. This economic burden badly impacts their mental health, and even affects socio-economic status of the family, putting a life-long impact on their lives. Psychosocial factors also play a pivotal role in shaping QoL outcomes for cancer survivors in LMICs, the fear of disease outcome on one side the financial burden and loses remain on other side to equally jeopardize mental health of cancer survivors. Efforts to enhance QoL for cancer survivors in LMICs necessitate a comprehensive approach that integrates medical care, supportive services, and community-based interventions. Mental health support and counseling services are often limited or nonexistent, leaving survivors grappling with anxiety, depression, and fear of cancer recurrence without adequate resources for coping. Strengthening healthcare infrastructure, expanding access to affordable cancer treatments and palliative care, and implementing survivorship care plans tailored to local contexts are imperative steps towards addressing the diverse needs of survivors and promoting long-term well-being.

As we navigate the complexities of cancer survivorship in LMICs, it is incumbent upon the global health community to prioritize QoL as a critical indicator of healthcare success. Initiatives aimed at strengthening cancer care infrastructure, increasing access to affordable diagnostics and treatments, and enhancing supportive care services are paramount. Education and awareness campaigns can help dispel myths and reduce stigma associated with cancer, promoting earlier detection and encouraging community support for survivors. Innovative approaches, such as telemedicine for follow-up care and survivorship clinics tailored to the unique needs of LMICs, hold promise in improving long-term outcomes and quality of life for survivors. Research into culturally appropriate interventions and survivorship care plans can guide the development of sustainable healthcare strategies that prioritize survivor well-being beyond initial treatment.

Multidisciplinary efforts integrating oncologists, primary care providers, psychologists, social workers, and patient advocates are crucial in fostering holistic care approaches that address the diverse needs of survivors. Moreover, advocacy for equitable access to essential medications, rehabilitation services, and palliative care ensures that no survivor is left behind in their journey towards recovery and resilience.

In conclusion, the cancer survivorship in LMICs is not a straightforward matter, but multifaceted problem, where delays in diagnosis, economic issues in getting appropriate treatment on time and then financial loses during treatment put so much burden not only on the patient but on the entire family.

Research article

THE ASSESSMENT OF *ARISTIDA ADSCENSIONIS* AND *RUMEX HYPOGAEUS* COMPARATIVE AND COMBINE ANTIOXIDANT POTENTIAL

Fahim Ullah Khan[1], Maria Niazi[1], Surayia Shahab Rani[2], Khalid Wahab[1], Zia UD Din[1], Osama Alam[3], Autif Hussain Mangi[4], Muhammad Reyan[1], Tariq Rahim[1], Zakim Ullah[1],

[1]Department of Zoology University of Science and Technology Bannu, Khyber, Pakhtunkhwa (28100), Pakistan[2]University Department of Pharmacy, University of Sargodha, Sargodha, Punjab, 40100, Pakistan

[3]Department of Biotechnology, University of Science and Technology Bannu, Khyber, Pakhtunkhwa (28100), Pakistan. [4]Institute of Biochemistry, University of Sindh Jamshoro, Sindh, Pakistan.

Correspondence:
Dr. Fahim Ullah Khan
Department of Zoology
University of Science and Technology Bannu, Khyber Pakhtunkhwa, Pakistan

Email: fahim-jani85@gmail.com

DOI: 10.38106/LMRJ.2024.6.2-02
Received: 14.05.2024
Accepted: 26.06.2024
Published: 30.06.2024

ABSTRACT

Exogenous substances and cellular metabolism both produce free radicals in cells. The produced free radicals react with cell biomolecules, including DNA. The ensuing destruction of DNA, also known as oxidative DNA damage, which is connected to aging, carcinogenesis, and mutagenesis. The *Aristida adscensionis* plays an essential role in the modulation of free radicals. We examined the antioxidant therapy of individual or combined forms of the *Aristida adscensionis* and *Rumex hypogaeus* plant extracts. We noticed that *Aristida adscensionis* showed scavenging activity at various concentrations i.e. 50, 100, 250, 500, and 1000 µg/ml was 42%, 50%, 62%, 69% and 75% respectively. The scavenging activity of *Rumex hypogaeus* at various concentrations was 43%, 52%, 58%, 66% and 75% against the standard of ascorbic acid. We noticed that the combined mixture of both plant extracts elucidated a significant antioxidant potential at different concentrations of 100 µg/ml, 500 µg/ml, and 1000 µg/ml which were 58%, 70%, 74%, 81% and 86 %. Our research study demonstrates that combinaion of both plants' extract mixtures had a more substantial antioxidant capacity than each extract individually. This property of these plants can be used for cancer treatment, however further robust data is required.

Key Words: Aristida adscensionis, Rumex hypogaeus, Antioxidant activity

INTRODUCTION

The multistage process of cancer, which includes mutational changes and uncontrolled proliferation of cells, is regarded as a leading cause of death worldwide (1, 2). Free radicals are produced in the body by a variety of endogenous and external processes (3, 4). They are typically made up of reactive oxygen species (ROS) and reactive nitrogen species (RNS). Numerous chronic diseases, including cancer, are known to be triggered by an excess of free radicals (5). Over the past few decades, the usage of herb-based medicines has been improved(6). It has been established that natural items, such as living things (plants, animals, or microorganisms), are good for both human and animal health. In underdeveloped countries, the World Health Organization (WHO) estimates that 80% of the population still relies on traditional or folk medicines, many of which are made from plants, for disease prevention or treatment (7).

Aristida adscensionis is a winter ephemeral that is found worldwide in warm temperate, tropical, and subtropical zones (8). This region naturally contains the grass *Aristida adscension*is which provides

food to cattle. This species comprises 55.37% carbohydrates, 45.37% proteins, 10% ash, 28% fiber, 8% fats, and 3.9% gross energy components that have been documented, Nitrogen 0.50 %, Phosphorus 0.18%, K 6.895%, Ca 3.8%, Mg 1.1%, Fe 2.2%, Zn 0.4%, Pb 0.2%, Cr 0.02%, Cd 0.01% and Ni 0.02%(9). *Aristida adscension* inhibits bacteria that fix nitrogen so the amount of nitrogen in the soil is reduced (10). *Aristida adscension L* is used to treat the majority of skin conditions (11).

Rumex plants (family Polygonaceae) are used in traditional medicine all over the world to treat a wide range of illnesses caused by different microorganisms (e.g., bacteria-related dermatologic conditions, dysentery and enteritis (12). There is limited data available on anti-oxidant properties individual and combine, therefore this study focused on the individual and combined antioxidant screening of *Aristida adscensionis* and *Rumex hypogaeus*.

MATERIALS AND METHODS

Materials for the Biological Assay

The various concentrations of ascorbic acids solution, 2, 2-diphenyl-1-picrylhydrazyl (DPPH) solution, the preparation of plant extractions using methanol and dilutions to various concentrations were prepared at the Laboratory of Department of Zoology, University of Science and Technology Bannu, Khyber Pakhtunkhwa, Pakistan.

Preparations of Plants Materials and Crude Extract

Aristida adscensionis and *Rumex hypogaeus* plants were collected during July 2023 at District Bannu Khyber pakhyunkhawa Pakistan. Using a pestle and mortar, fresh, shed-dried whole plants of *A. adscensions* and *R. Hypogaeus* plants were chopped into a fine powder. After the preparations of powders, they were mixed with 70% methanol until when they were completely submerged. The solutions were kept at room temperature with regular stirring for 72 hours. Whatman No. 3 filter paper was used to filter the resultant liquid. To remove the remaining liquid, the filtrate was kept at room temperature. After that, the gummy methanolic extract was lyophilized and placed inside a falcon tube. The sample that had been lyophilized was kept for later use.

Antioxidant Assay

100 µl of each of the sample solutions containing 50 µg/mL, 100 µg/mL, 250 µg/mL, 500 µg/mL and 1000/mL combined with 900 µl of DPPH. After mixing due to their sensitivity to light, all of these test tubes were incubated at 25°C for approximately 30 minutes in the dark. The absorbance of each test tube was then measured using a spectrophotometer with a wavelength of 517 nm. The ability of the samples to scavenge the DPPH free radicals was determined using the following equation;

(A1-A2/A1) ×100 = % DPPH free radicals scavenging effect A1 is the absorbance of DPPH (control) where A2 is the absorbance of plants samples (13).

RESULTS

Antioxidant activity of *Aristida adscensionis*

Initially, we examined the antioxidant activity of *Aristida adscensionis.* We observed that the free scavenging activity against DPPH at different concentrations was significant. We found that Aristida *adscensionis* 50 ug/mL, 42%, 100 ug/mL, 50%, 250 ug/mL, 62%, 500 ug/mL, 69%, 1000 ug/mL 75% at 517nm using a double beam spectrophotometer as shown in Fig 1.

Antioxidant activity of *Rumex hypogaeus*

Next, we examined the antioxidant activity of *Rumex hypogaeus.* We found that the free scavenging activity against DPPH at different concentrations was significant. We showed that *Rumex hypogaeus* 50 ug/mL 43 %, 100 ug/mL. 52%, 250 ug/mL, 58%, 500 ug/mL, 66%, 1000 ug/mL 75% as shown in Fig 2.

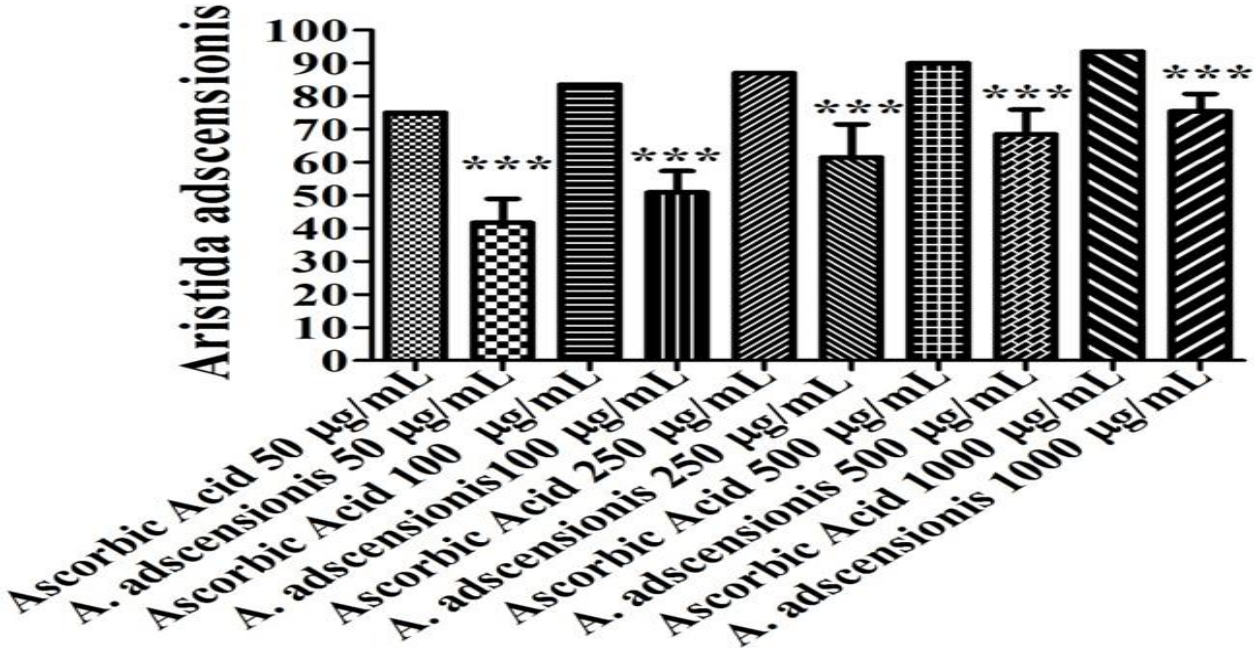


Figure 1. The antioxidant activity of *Aristidia adscensions* was performed by comparing with stander Ascorbic Acid using 50µg/mL to 1000µg/mL solutions

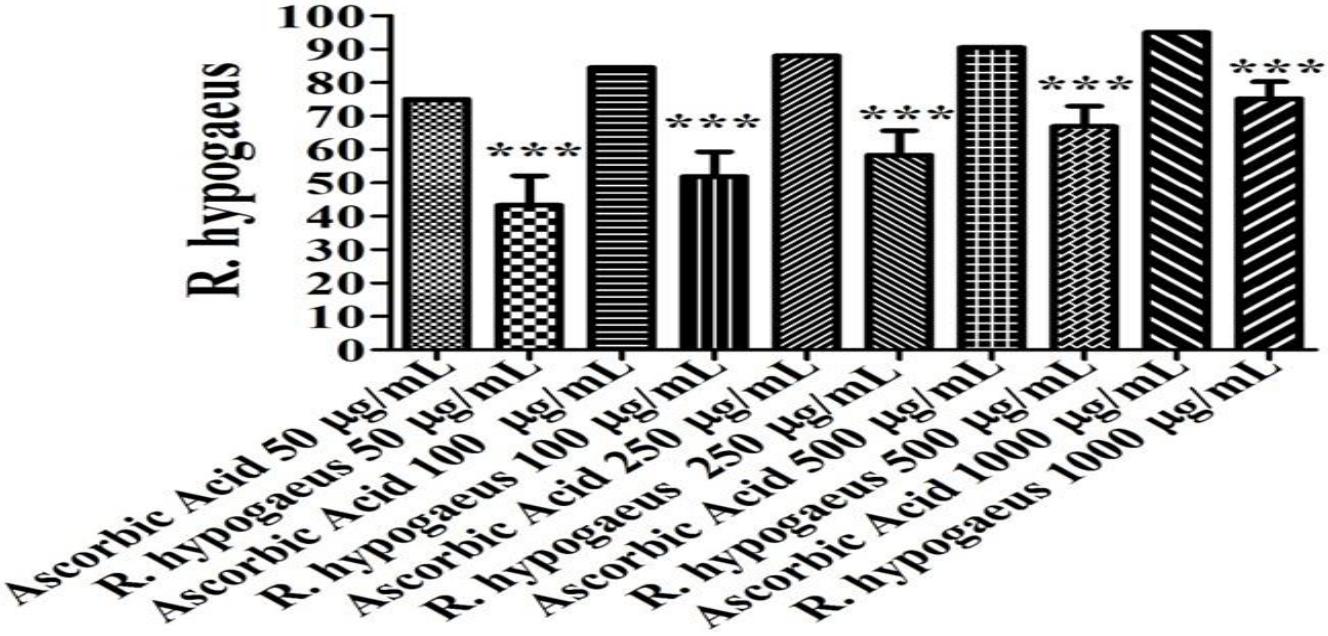


Figure 2. The antioxidant activity of *Rumex hypogaeus* was performed by comparing with stander Ascorbic Acid using 50µg/mL to 1000µg/mL solutions

Antioxidant potential of combined plant extracts *A. adscensionis* + *R. hypogaeus*

Next, we examined the antioxidant activity of both plants mixture *Aristida adscensionis* and *Rumex hypogaeus.* We found that the free scavenging activity against DPPH at different concentrations was significant. We showed that *Aristida adscensionis is* 50 ug/mL 58%, 100 ug/mL. 70%, 250 ug/mL, 74%, 500 ug/mL, 81%, 1000 ug/mL 86% as shown in Fig 3.

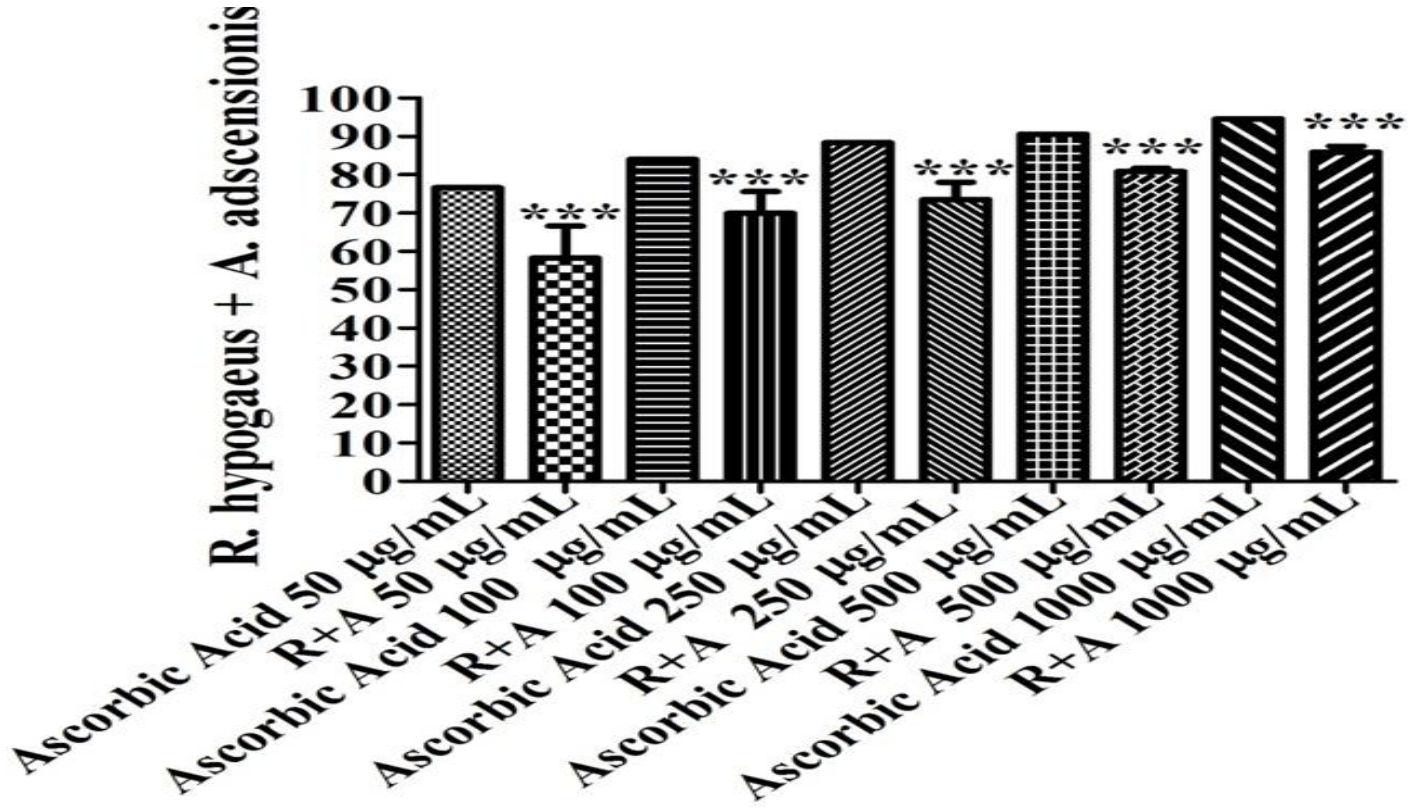


Figure 3. The combined antioxidant activity of Aristidia adscensions and Rumex hypogaeus was performed by comparing with stander Ascorbic Acid using 50µg/mL to 1000µg/mL solutions

DISCUSSION

The pathogenesis of chronic diseases including cancer, cardiovascular illnesses, diabetes, neurological disorders (Down syndrome, Parkinson's, and Alzheimer's), psychiatric disorders (depression, schizophrenia, and bipolar disorder), renal disease, lung disease (chronic pulmonary obstruction, lung cancer), and aging are all caused by oxidative stress (14, 15). The class of free radicals originating from oxygen is the most significant class produced in the biological systems. Both reactive nitrogen species (RNS) and reactive oxygen species (ROS) are free radicals which are the byproducts of regular cellular metabolism. Free radicals include hydroxyl (OH^-), superoxide (O^{-2}), nitric oxide (NO^-), nitrogen dioxide (NO^{-2}), peroxyl (ROO^-), and lipid peroxyl (LOO^-) (16). Mineral element deficiencies are the fundamental cause of many disorders; for instance, an iron shortage can result in anemia, while a zinc deficiency could accelerate the onset of lung cancer. Similarly, the hair of breast cancer patients showed decreased concentrations of Zn, Mn, Fe, Ca, Cu, and Mg (9).

Aristida adscensionis inhibits nitrogen-fixing bacteria and thus creates depleted nitrogen content in the soil. It is also used for treating skin diseases in cattle (10, 11). We examined the antioxidant therapy of the *Aristida adscensionis*. We noticed that *Aristida adscensionis* revealed a scavenging activity at various concentrations. The scavenging activity of *Aristida adsensionis* was elevated by enhancing the concentrations (50, 100, 250, 500, and 1000 µg/mL 42%, 50%,62%,69% and 75% as shown in Figure 1.

The aerial parts of Rumex species such as leaves, and roots are used as vegetables and to treat a variety of illnesses, including inflammation, constipation, mild diabetes, infections, diarrhea, oedema, and jaundice. They are also used as an antihypertensive, diuretic, and analgesic, as well as for skin, liver, gallbladder issues, an anticoagulant, anti-hypertensive, and anti-ulcer properties (17, 18). Herein we examined the *Rumex hypogaeus* scavenging activity at various concentrations. The obtained results showed significant antioxidant activity against various concentrations 50 ug/mL 43%, 100 ug/mL. 52%, 250 ug/mL, 58%, 500 ug/mL, 66%,

1000 ug/mL 75% by comparing with the standard group of ascorbic acid (75%, 85%, 88%, 91% and 95%). Furthermore, we observed the antioxidant activity of both plant mixture which displayed a significant antioxidant potential at various concentrations 50 ug/mL, 100 µg/mL, 250µg/mL, 500 µg/mL, and 1000 µg/mL which were 58%, 70 %, 74%, 81% and 86%. We found that the combination of plants produced more significant outcomes than extracts from individual plants.

CONCLUSION

The results of the study showed considerable anti-oxidant properties of the plants, further in vitro and in vivo studies are required to confirm their anti cancer properties. Further research study needs to elucidate the molecular mechanism of the individual or combined plant mixture is also recommended.

Conflict of Interest

The authors declared that no competing interests.

Ethical Consideration

There is not ethical issue involved in this study.

REFERENCES

1. Klaunig JE. Oxidative Stress and Cancer. Current pharmaceutical design. 2018;24(40):4771-8.
2. Khan FU, Owusu-Tieku NYG, Dai X, Liu K, Wu Y, Tsai H-I, et al. Wnt/β-catenin pathway-regulated fibromodulin expression is crucial for breast cancer metastasis and inhibited by aspirin. Frontiers in pharmacology. 2019;10:1308.
3. Ullah S, Khan FU, Zaman L, Abbas S, Shah MS, Rehman JU, et al. The Assessment of the Allium sativum and Tamarix aphylla Comparative and Combined Antioxidant Potential. Journal of Pharmaceutical Research International. 2022;34(45B):7-12.
4. Khan S, Khan FU, Abbas S, Shah MS, Mangi AH, Ullah S, et al. The assessment of tamarix aphylla and calotropis procera comparative and combine antioxidant potential. Liaquat Medical Research #Journal. 2023;5(2).
5. Gupta N, Verma K. Free Radicals as a Double-Edged Sword: The Cancer Preventive and Therapeutic Roles of Curcumin. 2020;25(22).
6. Yaribeygi H, Maleki M, Majeed M, Jamialahmadi T, Sahebkar A. Renoprotective Roles of Curcumin. Advances in experimental medicine and biology. 2021;1328:531-44.
7. Tran N, Pham B. Bioactive Compounds in Anti-Diabetic Plants: From Herbal Medicine to Modern Drug Discovery. 2020;9(9).
8. Fatima S, Hameed M, Ahmad F, Ashraf M, Ahmad R. Structural and functional modifications in a typical arid zone species Aristida adscensionis L. along altitudinal gradient. Flora. 2018;249:172-82.
9. Khan A, Ullah I, Khan SU, Zhang K, Muhammad Z, Wazir SM, et al. Elemental and nutritional values of wild fodder plants of poaceae in District Bannu, Pakistan. Int J Agronomy Agric Res. 2018;13:53-61.
10. Sridhara Murthy M, Ravindra R. Allelopathic effects of Aristida adscensionis. Oecologia. 1975;18:243-9.
11. Majeed M, Bhatti KH, Amjad MS, Abbasi AM, Bussmann RW, Nawaz F, et al. Ethno-veterinary uses of Poaceae in Punjab, Pakistan. PloS one. 2020;15(11):e0241705.
12. Orbán-Gyapai O, Liktor-Busa E, Kúsz N, Stefkó D, Urbán E, Hohmann J, et al. Antibacterial screening of Rumex species native to the Carpathian Basin and bioactivity-guided isolation of compounds from Rumex aquaticus. Fitoterapia. 2017;118:101-6.
13. Shah MAR, Khan H, Khan S, Muhammad N, Ullah Khan F, Shahnaz MA, et al. Cytotoxic, anti-oxidant and phytotoxic effect of Solanum surattense Burm F fruit extracts. Int J Pharmacogn Phytochem. 2013;28(2):1154-8.
14. Jomova K, Raptova R, Alomar SY, Alwasel SH, Nepovimova E, Kuca K, et al. Reactive oxygen species, toxicity, oxidative stress, and antioxidants: Chronic diseases and aging. Archives of toxicology. 2023;97(10):2499-574.

15. Sharifi-Rad M, Anil Kumar NV, Zucca P, Varoni EM, Dini L, Panzarini E, et al. Lifestyle, oxidative stress, and antioxidants: Back and forth in the pathophysiology of chronic diseases. Frontiers in physiology. 2020;11:694.
16. Caiati C, Stanca A, Lepera ME. Free Radicals and Obesity-Related Chronic Inflammation Contrasted by Antioxidants: A New Perspective in Coronary Artery Disease. Metabolites. 2023;13(6):712.
17. Vasas A, Orbán-Gyapai O, Hohmann J. The Genus Rumex: Review of traditional uses, phytochemistry and pharmacology. Journal of ethnopharmacology. 2015;175:198-228.
18. Prakash Mishra A, Sharifi-Rad M, Shariati MA, Mabkhot YN, Al-Showiman SS, Rauf A, et al. Bioactive compounds and health benefits of edible Rumex species-A review. Cellular and molecular biology (Noisy-le-Grand, France). 2018;64(8):27-34.

Research Article

QUANTITATIVE ANALYSIS OF MALIGNANT BRAIN TUMOR ON MRI IMAGES.

Imran Majeed Khan[1], Abdul Rahman[2]

[1]Radiation Oncology, Allma Iqbal Medical College/Jinnah Hosiptal Lahore, Pakistan, [2]Department of Physics FC University Lahore, Pakistan.

Correspondence:
Dr Imran Majeed Khan, Consultant Physicist,
Radiation Oncology, Allma Iqbal Medical College/Jinnah Hosiptal Lahore, **Pakistan**

Email:
bisimran@gmail.com

DOI: 10.38106/LMRJ.2024.6.2-03
Received: 13.06.2024
Accepted: 26.06.2024
Published: 30.06.2024

ABSTRACT

Longitudinal relaxation time (T1)- weighted, Transverse relaxation time (T2)- weighted and flair Magetic Resonance Imaging (MRI) sequences are used for the study of high grade malignant brain tumors and their surrounding edemas. This study aimed to examine the characteristic of MRI on malignant brain tumor and to evaluate the benefits of Flair and T2 (Transverse relaxation time) -weighted over the T1(Longitudinal relaxation time) -weighted sequence. A total of 25 patients of malignant brain tumors were selected for analysis including 16 women aged 1 to 75 (mean age, 38.31 years) and 9 men aged 1 to 75 (mean age, 19.5 years). All patients had the T1- weighted, T2- weighted and Flair MRI sequences. A Region based segmentation of MATLAB software was performed on each type of tumor and 3D volume was calculated by spheroid volume tool of MATLAB. For all the patients tumor volume was calculated in cubic millimeter and compared with other sequences.The Flair and T2- weighted images volumes were significantly larger than the T1 – weighted image volume. There was also statistical difference of volume occurred in MRI sequences. T2- weighted and Flair MRI sequences showed 100% more volume than T1- weighted in the age group between 51 to 75 years. Similarly, both T2-weighted and Flair MRI sequence showed 61% volume more than T1-weighted in the age groups betrwen 26 to 75 years. Our findings suggest that the volume produced by these techniques are distinct and not interchangeable. Flair and T2-weighted images proved efficient for the measurement of abnormal tissues and CSF fluid in the brain. On the other hand T1-weighted images efficiently locate the tumor in fat and white matter of the brain.

Key Words: Malignant brain tumours, MRI images, Radiology of brain tumours

INTRODUCTION

The most widespread use of Magnetic Resonance Imaging (MRI) is because it utilizes non-ionized electromagnetic radiations and powerful magnetic fields. MRI offers an opportunity for great improvement in the study of the pelvis, heart, lungs, stomach and soft tissues of the brain because it is completely based on the theory of nuclear magnetic resonance. It also provides a good resolution image that helps in getting a clear and distinguished view of the brain tissues (1). The brain tumor images collected by MRI segmentation are carried out using the region based active contour segmentation developed by Chan-Vese. Image segmentation is an effective method in which image pixels are separated dependent on boundaries. The pixels are grouped within the defined boundary limits (2).

Image segmentation is a technique for image processing and is normally used to locate and classify tumors. Image segmentation makes it easier to identify the portion of a tumor in the brain image. Our suggested methodology segments the images of different positions axial, coronal and sagittal sequences of T1-Weighted, T2-Weighted and Fluid attenuated Inversion recovery (Flair) of MRI brain tumor images. In T1-weighted images fat, fluid and tissues all appeared to be dark in color while in case of T2-weighted images tissues and

fluid appeared to be bright and only fat to appear as dark color. Flair images appeared to be bright in abnormalities (tumors) but dark in fluid (3).

Standard treatment of high grade malignant brain tumor requires safe resection accompanied by radiations and chemotherapy. Such type of analysis of malignant brain tumor images enables us to evaluate more precisely tumor detection, normal tissue sparing to be enhanced and early assessment of disease (4). Generally T1, T2 and Flair are used to define high grade malignant brain tumors and surrounding edema. The obtained limited data of brain tumor patients was aimed to evaluate the difference of volumes in brain tumor images (5).

MATERIALS AND METHODS

Patient Population

The study includes 25 patients who underwent the segmentation of malignant brain tumors, with the following conditions: Anaplastic astrocytoma (n=5), Gliofibroma (n=2), Lymphoma CNS primary (n=1), Malignant Melanoma Metastases to brain (n=1), Breast Cancer metastases to the brain (n=1), Chondrosarcoma Metastases to the brain (n=1), Gliosarcoma (n=1), Anaplastic Ganglioglioma (n=1), Cerebral Malignant Neoplasm (n=3), Medulloepithelioma (n=1), Atypical Teratoid Rhabdoid Tumor (n=1), Anaplastic Ependymoma (n=1), Glioblastoma Multiforme (n=3), Oligodendroglioma Malignant(n=1) , Lung Cancer to brain metastases- Adeno carcinoma (n=1), Malignant Central Neurocytoma (n=1).

Imaging Technique

The complete data set was classified into two main categories normal and abnormal tissues by an expert consultant radiologist. MRI image dataset was obtained using a PHILIPS MRI 1.5 Tesla scanner. Obtained data set consisted of malignant brain tumors of various sizes, shapes and orientations and it contained three MRI imaging sequences T1- weighted, T2-weighted and Flair images. Images were viewed under different positions axial, coronal and sagittal (6).

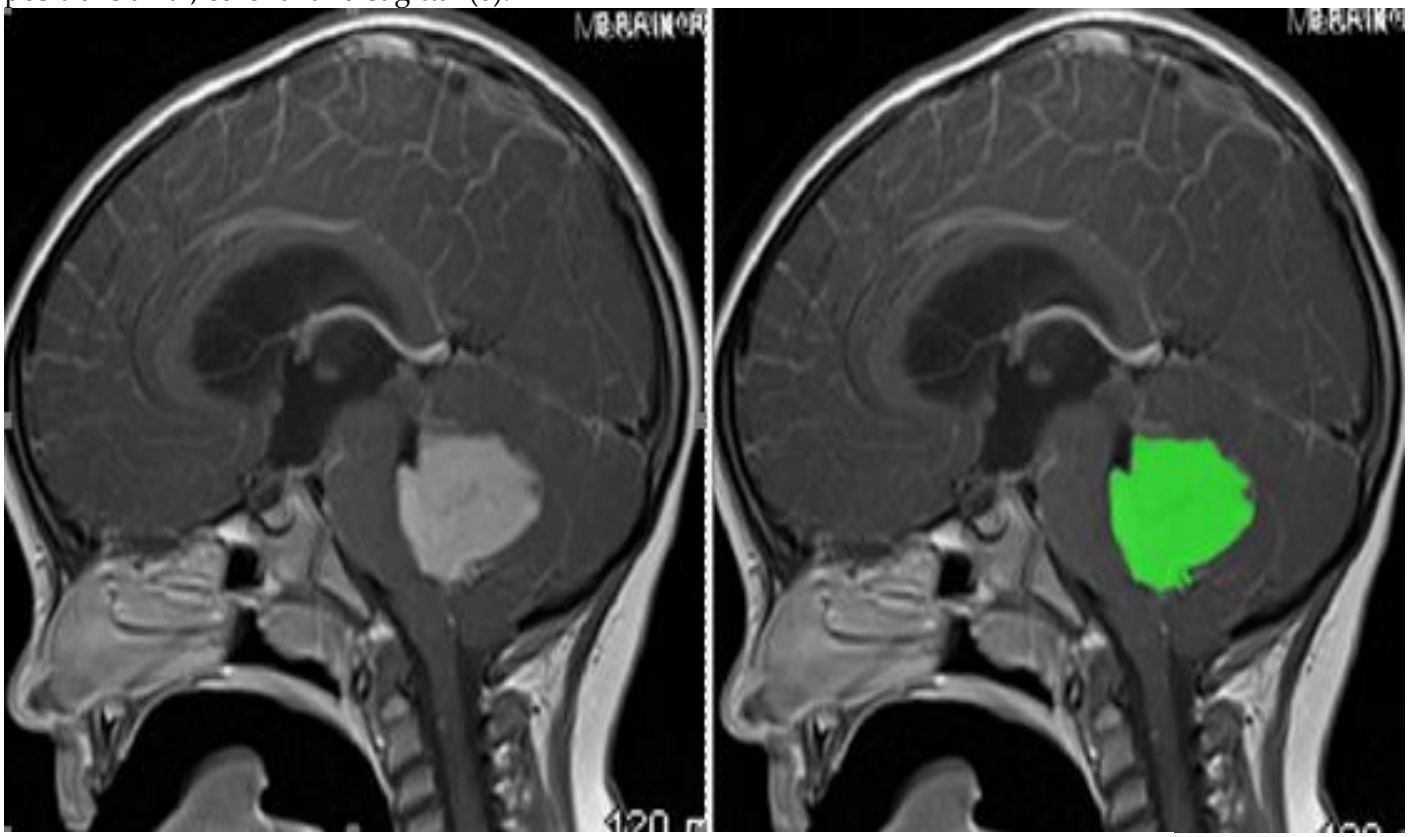


Figure 1. Image of malignant brain tumor before and after segmentation of sagittal axis.
In the above figure malignant brain tumor is expressed in sagittal axis. Similarly, segmentation was done in the brain tumor slice axial and coronal axis.

Data analysis

T1-weighted, T2-weighted and Flair images were segmented by the region based active contour segmentation of MATLAB software. Segmentation algorithm has shown that it operates on a broad range of images (7). Even though all images in this method had taken less than a minute to segment, but for some images it works very slow. Sometimes segmentation could take several seconds to perform segmentation and completely depends upon the width, size and orientation of image. This method has an interesting development in image processing and visualization as it is modernized technique. Such approaches would definitely play an important role in future studies on image processing (8).

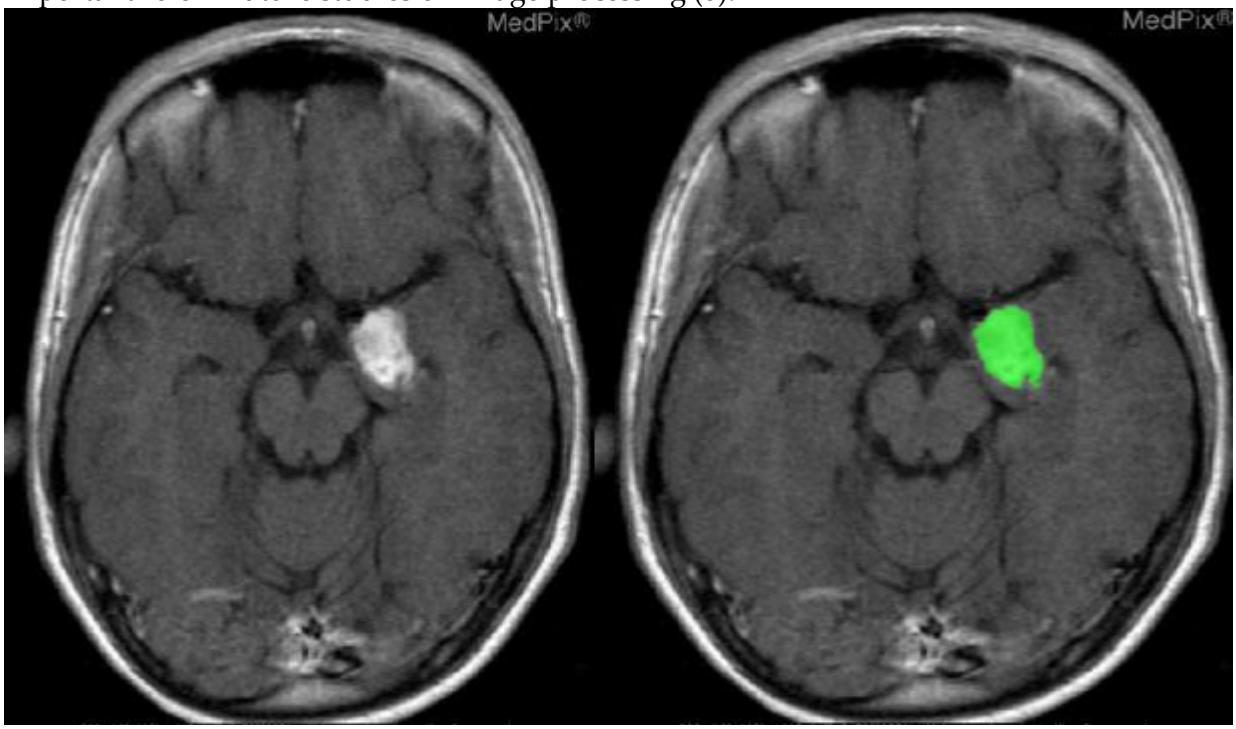


Figure 2 . Image of malignant brain tumor before and after segmentation of axial axis.

Spheroid Volume calculation

Spheroid sizer is a tool of MATLAB software which automatically and accurately measured the major and minor axis length of 3D tumor image. It computed the volume for each 3D spheroid image and provides the output in the form of a spreadsheet. The volume of spheroid image ($V = 0.5 * Length * Width^2$) was calculated on the basis of minor and major axis length (commonly referred as width and length) (9). The key benefit of this software is its accurate image analysis, which is optimized for a large number of images. This software was used for high throughput 3D image analysis and it significantly reduced the manpower and speeds up the process of research (10).

RESULTS

The malignant brain tumor patients were 16 women aged 1 to 75 years (mean age 38.31 years) and 9 men aged 1 to 75 years (mean 19.5 years). Overall age of the analyzed patients ranged from 1 to 75 years (mean age 38.1years). The age of patients considered at the time of treatment. The study of 25 patients with high grade malignant brain tumor was reviewed before treatment and the majority (n=20) of patients have WHO grade IV brain tumor. The remaining 5 patients had anaplastic astrocytoma. The highest volume percentage difference was seen in the age between 51 to 75 years which was 117 %. The second highest volume difference was observed in age of 26 to 50 years which was 61%. The lowest volume difference was seen in the age group of 1 to 25 which was only 13%. T2 weighted showed significantly more value of volume than T1 weighted in all age groups.

Table 1.1 Comparison of T2-weighted axial and T1 weighted axial 3D Spheroid Volume

Age : 1 to 25 years		
No of Obs	**T1 weighted axial Volume**	**T2 weighted axial Volume**
	mm^3	mm^3
1	40658	58111
2	131599	247308.2
3	1407294	1507017
4	1501305	1792470
5	1766250	1958272
6	2571136	2890284
Mean Value	1236374	1408910

Age : 26 to 50 years		
No of Obs	**T1 weighted axial Volume**	**T2 weighted axial Volume**
	mm^3	mm^3
1	11098	171397
2	679877.4	3331088
3	1538375	3886424
4	2664290	7218033
5	4852131	8987430
6	6735553	7465175
Mean Value	2746887	5176591

Age : 51 to 75 years		
No of Obs	**T1 weighted axial Volume**	**T2 weighted axial Volume**
	mm^3	mm^3
1	68007.26	729986.1
2	147197	1031979
3	322539	500591
4	847669	2577948
5	1731159	6977228
Mean value	623314	2363546

T2 weighted axial volume shows **13** percent more value than the T1 weighted axial volume	T2 weighted axial volume shows **61** percent more value than the T1 weighted axial volume	T2 weighted axial volume shows **117** percent more value than T1 weighted axial volume

The highest volume percentage difference came in the age of 51 to 75 years was 132%. The second highest volume difference came in age of 26 to 50 years was 80%. The lowest volume difference came in age of 1 to 25 that is only 15%**.** Flair showed significantly more value of volume than T1 weighted in all age groups. Comparison of T1 and T2 weighted volume is presented in figures 3-8.

DISCUSSION

Quantitative analysis has been achieved by comparing the 3D volumes of T1-weighted axial and T2- weighted axial images, similarly 3D volumes of Flair axial and T1-weighted axial images are compared and for that purpose graphs and tables are drawn. A very careful examination of T2-weighted images seems to provide more accurate information about many anatomical and pathological lying aspects that was not apparent on T1-weighted images (11). T2-weighted images eventually revealed the intracellular mass which indicates the presence of malignant brain tumor that was not shown in the T1-weighted images.

Table 1.2 Comparison of Flair axial and T1 weighted axial 3D Spheroid Volume

Age : 1 to 25 years		
No of Obs	**T1 weighted axial Volume**	**Flair axial Volume**
	mm^3	mm^3
1	14101	40515
2	40658	163105
3	283407	292567
4	379352	523333
5	871491	1000941
6	1407294	1617924
7	1501305	1931491
8	2571136	2683161
Mean Value	883593	1031630

Flair axial volume shows **15** percent more value than the T1 weighted axial volume.

Age : 26 to 50 years		
No of Obs	**T1 weighted axial Volume**	**Flair axial Volume**
	mm^3	mm^3
1	11098	299992
2	679877.4	3899809
3	1492131	3482644
4	1558352	3977977
5	1748646	3818613
6	6735553	13319409
Mean Value	2037609	4799740

Flair axial volume shows **80** percent more value than the T1 weighted axial volume.

Age : 51 to 75 years		
No of Obs	**T1 weighted axial Volume**	**Flair axial Volume**
	mm^3	mm^3
1	68007.26	936200.8
2	147197	1044870
3	322539	688985
4	1731159	8335090
Mean Value	567225	2751286

Flair axial volume shows **132** percent more value than the T1 weighted axial volume.

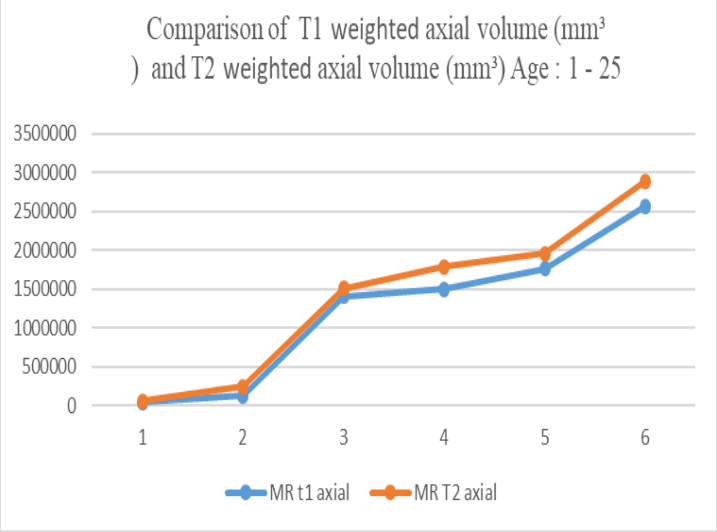


Figure 3 : Comparison of T1-weighted and T2-weighted Volume in age (1 - 25)

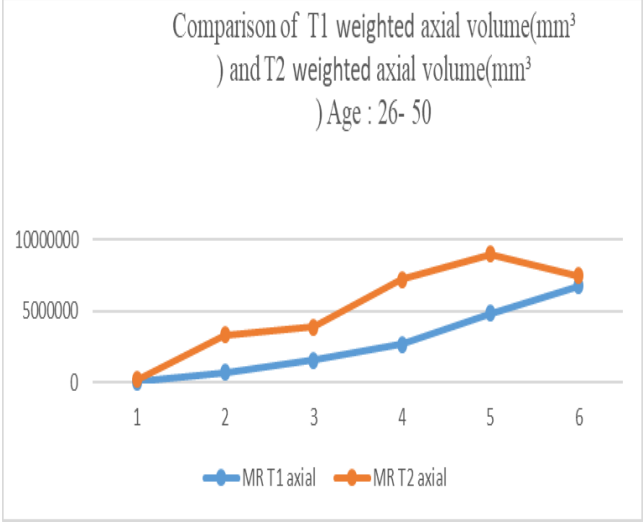


Figure 4 : Comparison of T1-weighted and T2-weighted Volume in age (26 - 50)

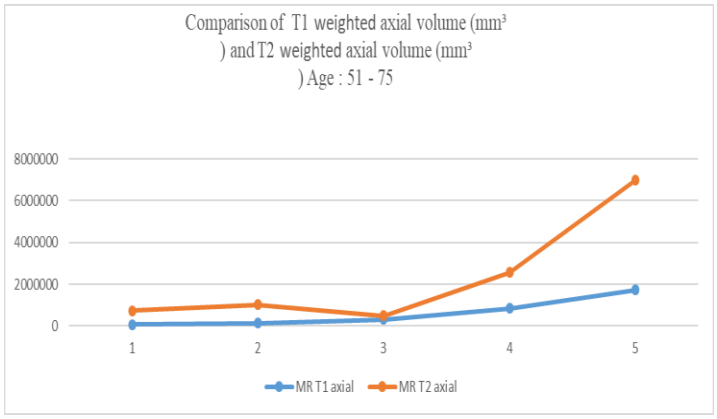


Figure 5 : Comparison of T1-weighted and T2-weighted Volume in age (51 - 75)

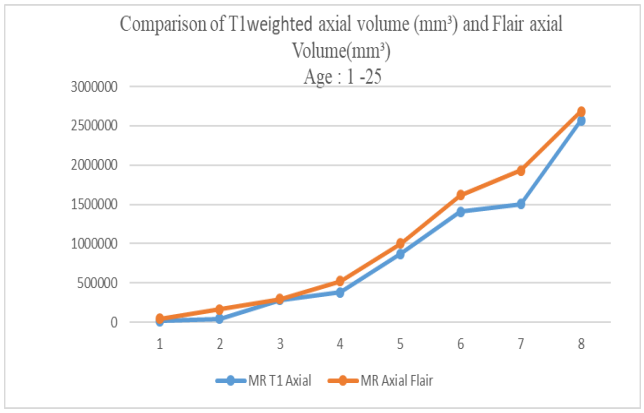


Figure 6 : Comparison of T1-weighted and Flair Volume in age (1 - 25)

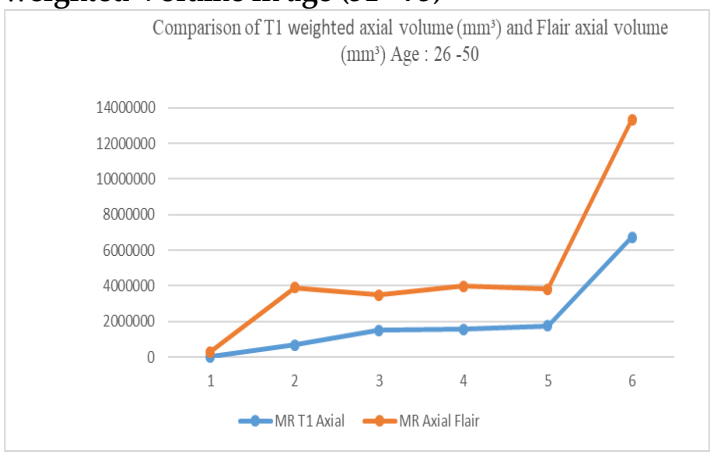


Figure 7 : Comparison of T1-weighted and Flair Volume in age (26 - 50)

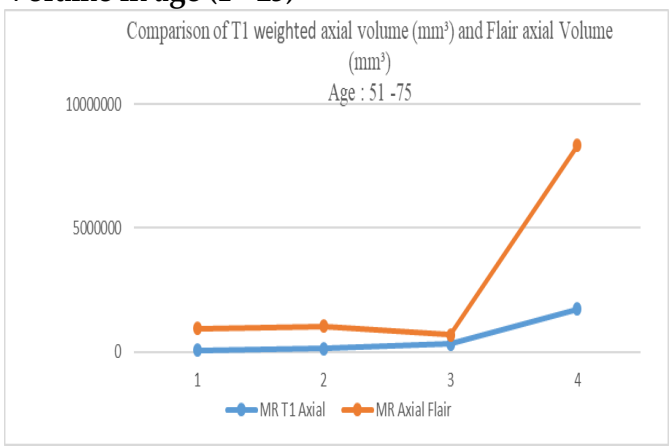


Figure 8 : Comparison of T1-weighted and Flair Volume in age (51 - 75)

Three graphs have sketched of T2 - weighted axial and T1-weighted axial in three different age sectors. The first age sector was (1 – 25 years) in figure 3, second (26 -50 years) in figure 4 and the last (51 -75 years) is represented in figure 5. because T2 weighted takes long repetition time (i.e. 4000 m/sec) and echo time (19 m/sec) to produce the image and it showed better and brighter results in case of soft tissues, fluid, CSF and in inflammation (11-12). On the other side T1 weighted takes short repetition time (500 msec) and echo time (14 m/sec) to produce image. T1 weighted only showed better result in brain structure and white matter. Number of patients are represented on the horizontal axis and T1 weighted axial and T2-weighted axial volume is represented on vertical axis in all three figures 1, 2 and 3. All the volumes were calculated in cubic millimeter. Observed that T2-weighted images were superior to T1-weighted images because T2 weighted takes long repetition time and echo time to produce the image and it showed better and bright results in case of soft tissues and fluid. On the other side T1 weighted takes short repetition time and echo time to produce image and only showed better result in brain anatomical structure. Our findings suggested that volume produced by these techniques are unique and cannot be interchanged.

Flair imaging is recognized as the sensitive technique for the identification of chronic, acute and subacute malignant brain tumor. Very few parts of the Flair images are dependent on the T1 relaxation time. Flair showed the much better and enhanced images than T1-weighted. Three graphs have sketched of Flair axial and T1-weighted axial in three different age groups. The first age group was 1 to 25 years of age, second was 26 to 50 years and third group was 51 to 75 years. Because Flair takes very long repetition time (9000 m/sec) and echo time (114 m/sec) to produce the image and it showed far better and bright results specially in case of abnormalities like malignant brain tumor tissues, soft tissues, and cortex. On the other hand T1 weighted

takes very short repetition time (500 m/sec) and echo time (14 m/sec) to produce image [14-15]. T1 weighted only showed better result in brain structure and white matter. Results show that the volumes produced by these techniques are unique and cannot be interchanged, these findings are consistent with existing literature(16).

Number of patients are represented on the horizontal axis and T1 weighted axial and Flair axial volume is represented on vertical axis in all three figures 6, 7 and 8. It was observed that Flair images were superior to T1-weighted images. Discovered that Flair images have shown the bright results in cerebrospinal fluid malignant brain tumor patients and more clear than T1-weighted images where cerebrospinal fluid remain the hyper intense (17). Since Flair images were collected after the T1-weighted images, a factor may have been the effect of long delayed enhancement. In all three figures 6, 7 and 8, long TR (Repetition time) and TE (echo time) of Flair images than T1-weighted TR (Repetition time) and TE (echo time) is also responsible for the better results of Flair. Such facts suggested that contrast enhanced flair images may facilitate the diagnosis of high grade malignant brain tumor (18). The study provided a clear evidence. However a small sample size is the limitation of this study.

CONCLUSION

T1-weighted, T2-weighted and flair MRI sequences are used to define high grade malignant brain tumor and their surrounding edemas. Our findings suggest that the volume produced by these techniques are distinct and not interchangeable. Flair and T2-weighted images proved efficient for the measurement of abnormal tissues and CSF fluid in the brain. On the other hand T1-weighted images very efficient if tumor is located in fat and white matter of brain. Further large scale study are required for confirm findings of this study.

Conflict of Interest

The authors declared that no competing interests.

Ethical Consideration

The Study was approved by Institutional Research Ethics committee, no ethical issue involved.

REFERENCES

1. Vishnuvarthanan, G., M. Pallikonda Rajasekaran, N. Anitha Vishnuvarthanan, T. Arun Prasath, and M. Kannan. "Tumor detection in T1, T2, FLAIR and MPR brain images using a combination of optimization and fuzzy clustering improved by seed-based region growing algorithm." *International Journal of Imaging Systems and Technology* 27, no. 1 (2017): 33-45.
2. Vishnuvarthanan, G., M. Pallikonda Rajasekaran, P. Subbaraj, and Anitha Vishnuvarthanan. "An unsupervised learning method with a clustering approach for tumor identification and tissue segmentation in magnetic resonance brain images." *Applied Soft Computing* 38 (2016): 190-212.
3. Anbeek, Petronella, Koen L. Vincken, Glenda S. Van Bochove, Matthias JP Van Osch, and Jeroen van der Grond. "Probabilistic segmentation of brain tissue in MR imaging." *Neuroimage* 27, no. 4 (2005): 795-804.
4. Halperin, Edward C., Gunilla Bentel, E. Ralph Heinz, and Peter C. Burger. "Radiation therapy treatment planning in supratentorial glioblastoma multiforme: an analysis based on post mortem topographic anatomy with CT correlations." *International Journal of Radiation Oncology* Biology* Physics* 17, no. 6 (1989): 1347-1350.
5. Garden, Adam S., Moshe H. Maor, WK Alfred Yung, Janet M. Bruner, Shiao Y. Woo, Richard P. Moser, and Ya-Yen Lee. "Outcome and patterns of failure following limited-volume irradiation for malignant astrocytomas." *Radiotherapy and Oncology* 20, no. 2 (1991): 99-110.
6. Hasan, Ali, Farid Meziane, Rob Aspin, and Hamid Jalab. "Segmentation of brain tumors in MRI images using three-dimensional active contour without edge." *Symmetry* 8, no. 11 (2016): 132.
7. Inglot, Justyna. "Advanced image processing with MATLAB." (2012).
8. Getreuer, Pascal. "Chan-vese segmentation." *Image Processing On Line* 2 (2012): 214-224.

9. Ayers, Gregory D., Eliot T. McKinley, Ping Zhao, Jordan M. Fritz, Rebecca E. Metry, Brenton C. Deal, Katrina M. Adlerz, Robert J. Coffey, and H. Charles Manning. "Volume of preclinical xenograft tumors is more accurately assessed by ultrasound imaging than manual caliper measurements." *Journal of Ultrasound in Medicine* 29, no. 6 (2010): 891-901.
10. Chen, Wenjin, Chung Wong, Evan Vosburgh, Arnold J. Levine, David J. Foran, and Eugenia Y. Xu. "High-throughput image analysis of tumor spheroids: a user-friendly software application to measure the size of spheroids automatically and accurately." *JoVE (Journal of Visualized Experiments)* 89 (2014): e51639.
11. Fellner, Franz A., Claudia Fellner, Franz T. Aichner, and Günther Mölzer. "Importance of T2*-weighted gradient-echo MRI for diagnosis of cortical vein thrombosis." *European journal of radiology* 56, no. 2 (2005): 235-239.
12. Kim, Jae Hyoung. "T1-, T2-weighted, and FLAIR Imaging: Clinical Application." *J Korean Soc Magn Reson Med* 13, no. 1 (2009): 9.
13. Adolphi, Natalie, Chandra Gerrard, Gary Hatch, Norbert Takacs, and Kurt Nolte. "Determining the temperature-dependence of tissue relaxation times (T1 and T2) for prospective optimization of post-mortem magnetic resonance (PMMR) image contrast." *Journal of Forensic Radiology and Imaging* 1, no. 2 (2013): 80.
14. Sener, R. N. "Atypical X-linked adrenoleukodystrophy: new MRI observations with FLAIR, magnetization transfer contrast, diffusion MRI, and proton spectroscopy." *Magnetic resonance imaging* 20, no. 2 (2002): 215-219.
15. Muccio, Carmine Franco, Annachiara Tarantino, Gennaro Esposito, and Alfonso Cerase. "Differential diagnosis by unenhanced FLAIR T2-weighted magnetic resonance images between solitary high grade gliomas and cerebral metastases appearing as contrast-enhancing cortico-subcortical lesions." *Journal of neuro-oncology* 103, no. 3 (2011): 713-717.
16. Bladowska, Joanna, Anna Biel, Anna Zimny, Katarzyna Lubkowska, Grażyna Bednarek-Tupikowska, Tomasz Sozański, Urszula Zaleska-Dorobisz, and Marek Sąsiadek. "Are T2-weighted images more useful than T1-weighted contrast-enhanced images in assessment of postoperative sella and parasellar region?." *Medical science monitor: international medical journal of experimental and clinical research* 17, no. 10 (2011): MT83.
17. Stall, Bronwyn, Leor Zach, Holly Ning, John Ondos, Barbara Arora, Uma Shankavaram, Robert W. Miller, Deborah Citrin, and Kevin Camphausen. "Comparison of T2 and FLAIR imaging for target delineation in high grade gliomas." *Radiation Oncology* 5, no. 1 (2010): 5.
18. Tsuchiya, Kazuhiro, Shichiro Katase, Ayako Yoshino, and Junichi Hachiya. "FLAIR MR imaging for diagnosing intracranial meningeal carcinomatosis." *American Journal of Roentgenology* 176, no. 6 (2001): 1585-1588

Research Article

EMERGENCY OBSTETRICAL HYSTERECTOMY AMONG POST-PARTUM HEMORRHAGE WOMEN –PATTERN OF OCCURRENCE IN TERTIARY CARE HOSPITAL

Majida Ali[1], Mawish Memon[2], Beenish Ghafar[1], Mahak Memon[3], Shazia Shaikh[1], Fozia Chandio[4]

[1]Department of gynecology and obstetrics (unit I) Shaheed Mohtarma Benazir Bhutto Medical University (SMBB) Larkana, Pakistan, [2]Department of Biochemistry, Pir Syed Abdul Qadir Shah Jeelani Institute of Medical Sciences, Gambat, Pakistan, [3]Department Biochemistry, People's University of Medical and Health Sciences for Women (PUMHSw), Shaheed, Benazirabad, Pakistan, [4]Department of Gynea and Obstetrics Shaikh Zaid Women Hospital Larkana, Pakistan

Correspondence:
Dr Majida Ali
Department of gynecology and obstetrics, Shaheed Mohtarma Benazir Bhutto Medical University (SMBB) Larkana, Pakistan

Email:mashorimajidaali@gmail.com

DOI: 10.38106/LMRJ.2024.6.2-04
Received: 09.06.2024
Accepted: 26.06.2024
Published:30.06.2024

ABSTRACT

Postpartum hemorrhage (PPH), is an excessive bleeding after giving birth, it is a major cause of maternal mortality and morbidity around the world. In the current era of obstetrics, emergency obstetric hysterectomy (EOH) is still a crucial treatment that can save lives. This study was designed to determine causes, frequency, complications of emergency cesarean /obstetrical hysterectomy in Postpartum hemorrhage (PPH) in tertiary care hospital. All the patients gave birth during 4 years (i.e. 1January 2020- 31 December 2023) were included in this study. The obstetrical patients admitted were 13532, out of which 154 underwent emergency hysterectomy. Their biodata, sign and symptoms, diagnosis, fluid/blood transfusion, morbidity, operative intervention, maternal mortality, and follow up were taken on a proforma. The data thus taken was compiled and analyzed. The incidence of EOH was 11.4/1000 obstetrical cases, mostly (85.5%) were referral from elsewhere, while 20 (13.79%) were registered as booked who took proper antenatal care. Multipara (94%) was predominantly reported with post-partum hemorrhage (n=79, 51.29%). The maternal mortality was 15.59% (n= 19). Regular and scheduled antenatal care, early diagnosis, early referral, timely decision, blood transfusion with arrangement of surgery by an experienced obstetrician are crucial to justify EOH.

KEY WARDS: Emergency obstetrical hysterectomy (EOH), PPH, Cesarean section, Postpartum hemorrhage.

INTRODUCTION

Postpartum hemorrhage (PPH), is an excessive bleeding after giving birth, it is a major cause of maternal mortality and morbidity all around the world. Worldwide, 27% of maternal fatalities are caused by postpartum hemorrhage, which is defined as blood loss of at least 500 ml following delivery (1). Common reason of maternal morbidity and mortality, worldwide, where > 125000 women die of PPH annually, it is major cause of maternal death in United Kingdom. The incidence of PPH is 1.6% in Pakistan (2). More recent clinical investigations have shown that the incidence of PPH ≥500 mL is 33.7% in the UK and 22% in Australia (3). Postpartum hemorrhage is caused by the failure of the uterus to contract appropriately after birth. There are two types of postpartum hemorrhage, primary postpartum hemorrhage (PPPH) and secondary postpartum hemorrhage (4). Primary PPH is excessive vaginal loss of blood about 500 ml or 1000ml, or more during labor within 1 day. Secondary PPH is an excessive vaginal loss of blood after 1 day till 6 weeks after labor, it is usually caused by retained placenta, infection or placental polyp. It is also defined as blood loss leading to at least 10% loss of hematocrit after delivery (5). There are various risk factors associated with PPH

such as ante partum hemorrhage, commonly associated factors include placental abruption, placenta previa and vasa previa. Over distended uterus due to multiple pregnancies, polyhydramnios, macrosomia are also associated with PPH. Hypertensive disorders in pregnancy such as PIH, Pre-eclampsia, eclampsia are related factors in addition to prolonged labor, infection and obesity (6). Other causes of PPH include atonic uterus (i.e. most common cause seen in nearly 70% of PPH cases), genital tract lacerations, retained tissues of placenta, uterine inversion, uterine rupture, disseminated intravascular coagulation (4) are prominent alterations that can lead to PPH (7).

There are various strategies for management of atonic uterus mediated PPH. It is managed through the call for help, inform Operation Theater, inform anesthetist, quick assessment of vitals, blood pressure, active management of third stage by injection oxytocin 10 IU I/M, 2 wide bore I/V line, fluid assessment, crystalloids (R/L) 1500 ml, send blood sample for investigation, blood arrangement, catheterize the bladder (empty bladder to allow uterus to contract and monitor I/O charting, Immediate Bimanual uterine pressure, start uterotonic, Oxytocin 20 IU in 500 ml N/S I/V infusion (no I/V bolus which may cause hypotension and cardiac arrest), Methergin 0.2mg I/V OR I/M (contraindicated in cardiac patients, preeclampsia, peripheral vascular disease). Causing vasoconstriction and sever uterine contraction, misoprostol 800 ug per rectum P/R (PGE1), carboprost (PGF2 Alpha) 0.25mg IM every 15 min for maximum of 8 doses. Also check if placenta is completely delivered or not, and check for genital tract lacerations, balloon tamponed 500 ml of saline in uterus ideally in OT if uterus still remains relax then surgical option should be considered (8,9). It is also treated as surgical method, as uterine compression, B-lynch, hayman, cho sutures, cervico-isthmo statures, bilateral uterine artery embolization, Internal iliac artery embolization (branch of anterior division of ii a, Bilateral ovarian artery embolization. Hysterectomy must be considered as the last option (10).

The overall aim of our study was to determine causes, frequency, complications of emergency Cesarean /obstetrical hysterectomy in postpartum hemorrhage along with maternal and perinatal mortality and morbidity in a tertiary care set up.

MATERIALS AND METHODS

This was an observational prospective study conducted from 1st Jan 2020 to 31 Dec 2023, at the Department of Gynecology and Obstetrics, Sheikh Zayad women Hospital Larkana, Pakistan. The proforma filled the patients biodata i-e age, mode of admission, parity, status of registration during antenatal period, present complaints, detailed previous obstetrical history, gynecological history, pervious cesarean sections, antenatal risk factors, mode of delivery, assisted vaginal delivery use of drugs like induction/ augmentation of labor (prostaglandin, misoprostol, oxytocin), estimated of blood loss (preoperative, intraoperative, postoperative) need of blood transfusion, maternal complication and mortality were noticed. All EOH were preferred after 28 weeks of pregnancy, prophylactic antibiotics, high-risk consents, and proper counseling. Data was analysed by using Statistical Package for Social Sciences (SPSS version 22). Data was calculated in frequencies and percentage.

RESULTS

A total of 13532 obstetrical cases were admitted during this research duration. Out of which 154 required EOH account with a frequency of 11.4/1000 subjects. Only 20 (13.79%) were booked. Referral subjects were from private setup and basic health units**,** accounted for 80 (55.17%) subjects, while other referred from Baluchistan and interior Sindh were 34 (23.44%), parity ranging 1-15, only 6 (3.89%) cases were Para 1-2, the remaining 148 (96.10%) being multipara.

The commonest cause of EOH was uterine rupture found in 21 (13.63%) patients. The causes of placental origin were noticed in 20 (32%) causes PPH 79 (51.29%) as shown in Table I. The blood/ FFP/Platelet transfusion were recorded to all the patients ranging from 4-10 units, FFP fresh frozen plasma 4-8, and

platelet transfusion 4-8 units. Subtotal abdominal hysterectomies were done in 132 (84.71%), and total hysterectomies patient 22 (14.28%). The wound infection was seen in 19 (15.07%) patients and DIC occurred in 15 (11.90%) cases each after EOH . The rupture of urinary bladder was seen in 13 (10.31%) patients and bread ligament hematoma in 14 (11.11%) patients. Maternal mortality was 19 (15.90%) cases, while the rest 135 (87.66%) were discharged within 5 to 26 days. The number of intrauterine deaths 38 (24.67%), and the rest were alive births. Summary of the results is presented in Figure 1 and Table 1.

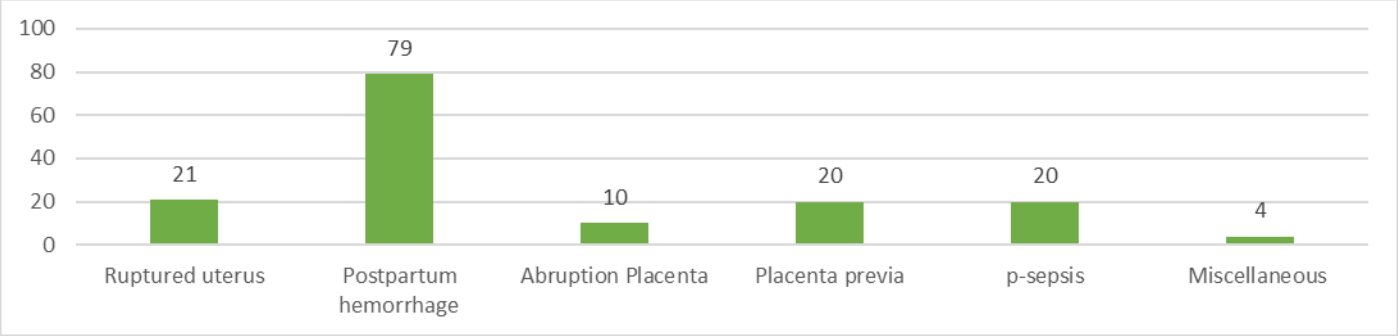


Figure. 1: Causes of postpartum hemorrhage

Table 1: Morbidity and mortality in women presenting with postpartum hemorrhage

Complication	No. of patients	%
Febrile morbidity	13	10.31
Disseminated Intravascular Coagulation	15	11.90
Wound infection	19	15.07
Urinary tract infection	12	9.52
Broad ligament hematoma	14	11.11
Urinary bladder rupture	13	10.31
Repeat laparotomy	15	11.90
Thromboembolism	06	4.76
Mortality	19	15.90
Anuria	06	4.76
Other remain normal no complication	26	20.63

DISCUSSION

The frequency of emergency obstetric hysterectomy varies significantly between nations and even within institutions. Postpartum hemorrhage, is an excessive vaginal bleeding after giving birth, it is a major cause of maternal mortality and morbidity globally. Postpartum hemorrhage is caused by the failure of the uterus to contract appropriately after birth (11), the results of our study are also consistent with the available literature. An essential part of treating potentially fatal obstetric problems is the EOH. The 11.4/1000 was frequency of EOH in the study, which is also consistent with previously reported studies (12). New surgical techniques,

multidisciplinary approach, and utero tonic agents have declined the occurrence of EOH, though it still counts a lifesaving method in obstetric units. This is true and obviously that our unit linked to private and basic health units' hospitals where most of cases are dealt by traditional birth attendant (TBAs), and lady health visitors and delayed referral result in a complicated condition of the pregnant women (13,14).

More than 80,000 maternal fatalities occurred globally in 2015, and the present criteria is insufficient for identifying this significant cause of death in a timely manner (15). PPH is one of the prominent causes of maternal mortality and morbidity in developed and under developed countries. The recommendations for PPH care emphasize the need of early evaluation of coagulation abnormalities and PPH severity (16). Timely and intensive care is essential for the well-being of mothers. Impaired hemostasis is indicative of the severity of the bleeding and can happen with severe PPH. After visual assessment, blood loss during PPH is consistently understated by around 50%–75%, with the amount of underestimating rising with blood loss volume (17).

Acute obstetric coagulopathy can be a consequence of severe PPH and the mechanisms of this particular coagulopathy are not fully understood. They result from complex interactions between dilution, leakage into the bleeding flow, local consumption, and increased fibrinolysis (18). In some acute obstetric complications, such as abruptio placenta or amniotic fluid embolism, coagulopathy occurs at a very early stage and becomes the main cause of major PPH. The massive release from placenta, amniotic membranes, and amniotic fluid of both tissue factor, leading to important activation of coagulation, and pro-fibrinolytic molecules such as urokinase plasminogen activator may contribute to fibrinolysis and fibrinogenolysis (19, 20).

A postpartum hemorrhage was a comments reason of EOH accordingly for 79 (51.29%) subjects, other authors however noticed rupture of uterus as the commonest indication of EOH. In our study rupture uterus 21 (13.63%), and APH antepartum hemorrhage placenta caused (placenta previa, Abruption placenta) were almost double (12.98% and 6.49%) respectively.

Among placental origin causes were antepartum hemorrhage including placenta previa and abruption seen in 10 (16%) cases each. Most of these cases were due to placenta accrete followed pervious cesarean operation section and hypertensive disorder in pregnancy. In rare cases placenta accrete has increased as an emergency indication for hysterectomy (65%) (6).

The broad ligament hematoma was responsible for 14 (11.11%), and uterine infection (p sepsis) were 19 (15.07%) in cases of EOH, anuria and thromboembolism were same (n=6, 4.67%). The uterine infection and sepsis are rare or low ratio in developed countries due to proper sterilization, and following all tools of infection prevention, and effective management of infection with good antibiotic cover (21). In this study, 19 (15.90%) patients expired, disseminated intravascular coagulopathy was seen 15 (11.90%) patients due to placental cause which accrete, and infection. Other subjects also have recorded similar mortality rate 23.78%. The current research demonstrated that ruptured uterus, the primary rationale for peri-partum hysterectomy, has a greater impact on neonatal death than the actual procedure.

CONCLUSION

Due to problems associated to pregnancy and delivery, almost 800 women worldwide pass away every day, or one every two minutes (22). Postpartum hemorrhage is critical and it continues to be a clinically significant source of maternal morbidity and mortality around the globe. Reducing the necessity for an obstetric hysterectomy can be achieved by early intervention, active labor management, and the identification of high-risk variables. They must act quickly and clearly, employing surgical skill to minimize complications. Our findings with emergency Cesarean/obstetrical hysterectomy recommend the proper diagnosis, an experienced obstetrician should perform timely EOH, volume replacement by blood, fresh frozen plasma, and Platelet transfusion, blood bank should be within the premises of obstetrical emergency unit, Timely decision of EOH after PPH management, good program awareness with workshops. Timely identification and diagnosis can be useful in management along with reducing the rate of maternal morbidity and mortality

Conflict of interest:

Authors declare no conflict of interest

Ethical Consideration

The study was approved by local research ethics committee, informed consent was taken from all the participants and their identity was anonymized.

REFERENCES

1. Williams EV, Goranitis I, Oppong R, Perry SJ, Devall A, Martin JT, Mammoliti KM, Beeson L, Sindhu KN, Galadanci H, Alwy Al-beity F. Early detection and treatment of postpartum haemorrhage: a cost-effectiveness analysis of the E-MOTIVE trial. medRxiv. 2024:2024-01. https://doi.org/10.1056/NEJMoa2303966
2. Aoyama K, Pinto R, Ray JG, Hill AD, Scales DC, Lapinsky SE, Hladunewich MA, Seaward GR, Fowler RA. Association of maternal age with severe maternal morbidity and mortality in Canada. JAMA network open. 2019 Aug 2;2(8):e199875-https://doi.org/10.1001/jamanetworkopen.2019.9875.
3. Oliveira MI, da Costa VS, Mer S, Osório J, Martins AP. Thrombocytopenia in pregnancy, a challenge in the intensive care unit (ICU). Revista Española de Anestesiología y Reanimación (English Edition). 2019 Aug 1;66(7):385-9. https://doi.org/10.1016/j.redare.2019.06.002
4. Mazhar SB, Batool M, Batool A. Post partum hemorrhage and its predisposing factors In WHO Multi-Country Survey on Maternal and Newborn Health, Pakistan. Journal of The Society of Obstetricians and Gynaecologists of Pakistan. 2018 Sep 6;8(2):104-9. https://www.jsogp.net/index.php/jsogp/article/view/152
5. Bell SF, Watkins A, John M, Macgillivray E, Kitchen TL, James D, Scarr C, Bailey CM, Kelly KP, James K, Stevens JL. Incidence of postpartum haemorrhage defined by quantitative blood loss measurement: a national cohort. BMC pregnancy and childbirth. 2020 Dec;20:1-9. https://doi.org/10.1186/s12884-020-02971-3
6. Downes KL, Grantz KL, Shenassa ED. Maternal, labor, delivery, and perinatal outcomes associated with placental abruption: a systematic review. American journal of perinatology. 2017 Aug;34(10):0935-57. https://doi.org/10.1055%2Fs-0037-1599149
7. Ogu RN, Adinma JI. Aetiology and Management of Obstetric Haemorrhage. Contemporary Obstetrics and Gynecology for Developing Countries. 2021:235-47. https://doi.org/10.1007/978-3-030-75385-6_20
8. Shakur H, Roberts I, Fawole B, Chaudhri R, El-Sheikh M, Akintan A, Qureshi Z, Kidanto H, Vwalika B, Abdulkadir A, Etuk S. Effect of early tranexamic acid administration on mortality, hysterectomy, and other morbidities in women with post-partum haemorrhage (WOMAN): an international, randomised, double-blind, placebo-controlled trial. The Lancet. 2017 May 27;389(10084):2105-16. http://dx.doi.org/10.1016/S0140-6736(17)30638-4
9. Adelaja LM, Taiwo OO. Maternal and fetal outcome of obstetric emergencies in a tertiary health institution in South-Western Nigeria. ISRN Obstetrics and Gynecology. 2011;2011.chttps://doi.org/10.5402%2F2011%2F160932
10. Han L, Zhang B, Xu H, Yin H, Pang Y, Zhang X, Zhai Q, Liu X, Wang Y, Zhang C, Xu Y. A new step-wise surgical technique of knapsack-like uterine compression sutures for intractable postpartum hemorrhage in cesarean section. BMC Pregnancy and Childbirth. 2024 Jan 2;24(1):9. https://doi.org/10.1186/s12884-023-06208-x
11. Felis S. Postpartum Hemorrhage. American Journal of Medical and Clinical Research & Reviews. 2023 Nov 25;2(11):1-28. https://doi.org/10.58372/2835-6276.1121

12. Lee SY, Gan YJ, Goh JP, Ho YH, Lim MY. Laryngeal gout mimicking chondrosarcoma with concurrent longus colli tendinitis. BMJ Case Reports CP. 2019 Oct 1;12(10):e231070. https://doi.org/10.1136%2Fbcr-2019-231070
13. Aoyama K, Pinto R, Ray JG, Hill AD, Scales DC, Lapinsky SE, Hladunewich MA, Seaward GR, Fowler RA. Association of maternal age with severe maternal morbidity and mortality in Canada. JAMA network open. 2019 Aug 2;2(8):e199875. https://doi.org/10.1001/jamanetworkopen.2019.9875
14. Escobar MF, Nassar AH, Theron G, Barnea ER, Nicholson W, Ramasauskaite D, Lloyd I, Chandraharan E, Miller S, Burke T, Ossanan G. FIGO recommendations on the management of postpartum hemorrhage 2022. International Journal of Gynecology & Obstetrics. 2022 Mar;157:3-50. https://doi.org/10.1002/ijgo.14116
15. Borovac-Pinheiro A, Pacagnella RC, Cecatti JG, Miller S, El Ayadi AM, Souza JP, Durocher J, Blumenthal PD, Winikoff B. Postpartum hemorrhage: new insights for definition and diagnosis. American journal of obstetrics and gynecology. 2018 Aug 1;219(2):162-8. https://doi.org/10.1016/j.ajog.2018.04.013
16. Okunade KS, Adejimi AA, Olumodeji AM, Olowe A, Oyedeji OA, Ademuyiwa IY, Adelabu H, Toks-Omage E, Okoro AC, Davies N, Adenekan MA. Prenatal anaemia and risk of postpartum haemorrhage: a cohort analysis of data from the Predict-PPH study. BMC Public Health. 2024 Apr 12;24(1):1028. https://doi.org/10.1186/s12889-024-18446-5
17. Rigouzzo A, Froissant PA, Louvet N. Changing hemostatic management in post-partum hemorrhage. American Journal of Hematology. 2024 Apr;99:S13 https://doi.org/10.1002/ajh.27264
18. Vega-Pérez A, Villarrubia LH, Godio C, Gutiérrez-González A, Feo-Lucas L, Ferriz M, Martínez-Puente N, Alcaín J, Mora A, Sabio G, López-Bravo M. Resident macrophage-dependent immune cell scaffolds drive anti-bacterial defense in the peritoneal cavity. Immunity. 2021 Nov 9;54(11):2578-94. https://doi.org/10.1016/j.immuni.2021.10.007
19. Shakur, H., Roberts, I., Fawole, B., Chaudhri, R., El-Sheikh, M., Akintan, A., Qureshi, Z., Kidanto, H., Vwalika, B., Abdulkadir, A. and Etuk, S., 2017. Effect of early tranexamic acid administration on mortality, hysterectomy, and other morbidities in women with post-partum haemorrhage (WOMAN): an international, randomised, double-blind, placebo-controlled trial. The Lancet, 389(10084), pp.2105-2116. http://dx.doi.org/10.1016/S0140-6736(17)30638-4
20. Gulbiniene V, Dumalakiene I, Balciuniene G, Pilypiene I, Narkeviciute I, Novickij V, Vysniauskis G, Ramasauskaite D. Soluble urokinase plasminogen activator receptor in vaginally collected amniotic fluid predicting fetal inflammatory response syndrome: a prospective cohort study. BMC Pregnancy and Childbirth. 2024 Jan 10;24(1):54. https://doi.org/10.1186/s12884-023-06221-0
21. Ekanem E, Ngene NC, Moodley J, Konje J. Prevention of surgical site infection and sepsis in pregnant obese women. Best Practice & Research Clinical Obstetrics & Gynaecology. 2023 Aug 19:102406. https://doi.org/10.1016/j.bpobgyn.2023.102406
22. Gelebo KG, Mulugeta H, Mossie A, Geremu K, Darma B. Tranexamic acid for the prevention and treatment of postpartum hemorrhage in resource-limited settings: a literature review. Annals of Medicine and Surgery. 2024 Jan 1;86(1):353-60. https://doi.org/10.1097/MS9.0000000000001560

Research Article

FREQUENCY OF AUTISM IN NUCLEAR AND JOINT FAMILY SYSTEM

Hamza Fayyaz[1], Azam Khan[2], Hina Samee ullah[3], Farah Khursheed[4], Saba Aziz[5], Mamona Riaz[3]

[1]Department of speech therapy, University of Lahore, Pakistan, [2]Department of speech and language pathology, Rashid Latif Khan University Lahore, Pakistan, [3]Department of speech and language Pathology, Riphah International University, Lahore Campus, Pakistan, [4]Department of speech and language pathology, Rising Sun Instituate of Special Education, Lahore, Pakistan, [5]Department of speech and language pathology, Superior University, Lahore, Pakistan

Correspondence:
Hina Samee ullah
Department of Speech and Language Pathology, Riphah International University, Lahore Campus, Pakistan

Email:
hina.omer@riphah.edu.pk

DOI:
10.38106/LMRJ.2024.6.2-05
Received: 03.05.2024
Accepted: 26.06.2024
Published:30.06.2024

ABSTRACT

Autism, also known as autism spectrum disorder (ASD), is a neurodevelopmental disorder that affects social interaction, communication, and behavior. Autism is a lifelong developmental condition that affects individual's communication and interaction with others, as well as their understanding of the world. There is limited literature available from Pakistan, therefore this study was designed to find the frequency of autism in nuclear and joint family systems. This was a Cross-sectional observational study conducted in various healthcare settings, including the University of Lahore Teaching Hospital, Mayo Hospital, Orion Center, and Sehat Medical Complex, Pakistan from February 2023 to July 2023. Purposive sampling was the method of sampling used in this investigation (n=133). Parents or caregivers who have a minimum of one ASD-diagnosed child were included in this study. Parents or caregivers who do not have a child diagnosed with autism spectrum disorder (ASD) were excluded from this study. The investigation into the frequency of autism within joint and nuclear families' reveals that a majority of families with autistic children lean towards nuclear family structures. While joint families exist, they are less prevalent. The study also underlines that parental engagement is high across both family types, with over 90% actively participating in caregiving and decision-making.

Keywords: Autism spectrum disorder, Nuclear family, Joint family

INTRODUCTION

Autism, also known as autism spectrum disorder (ASD), is a neurodevelopmental disorder that affects social interaction, communication, and behavior. It is characterized by a wide range of symptoms and varying degrees of impairment, which is why it is referred to as a spectrum disorder. Individuals with autism often have challenges in understanding and engaging in social interaction (1). They may struggle with nonverbal communication cues like gestures, facial expressions, and body language. They may have difficulty forming and maintaining relationships and may prefer to be alone. People with autism may also have difficulties with verbal and nonverbal communication. They may have delayed or limited speech and struggle with understanding and using language effectively. Some individuals with autism may not speak at all and may rely on alternative communication methods. Another characteristic of autism is the presence of repetitive behaviors or restricted interests (2). This can manifest as repetitive movements (e.g., hand flapping, rocking), insistence on sameness or routines, intense focus on specific topics or objects, and a need for predictability. Many individuals with autism have heightened sensitivities to sensory input. They may be overly sensitive or under reactive to sensory stimuli such as sounds, lights, textures, tastes, or smells (3). This can lead to sensory overload or avoidance of certain

sensory experiences. Autism is a spectrum disorder, and individuals with autism can have a wide range of intellectual abilities. Some individuals may have average or above-average intelligence, while others may have intellectual disabilities (4). It is different from other disorders such as Attention Deficit Hyperactivity Disorder (ADHD), while there can be overlapping symptoms, such as difficulties with attention and impulse control, ADHD primarily involves challenges with attention regulation and hyperactivity (5). Intellectual disability refers to significant limitations in intellectual functioning and adaptive behaviors. Autism, on the other hand, is primarily characterized by difficulties in social communication and interaction, and the presence of restrictive and repetitive behaviors. However, it is possible for individuals with autism to have co-occurring intellectual disabilities (6).

Language Disorders as Autism can co-occur with specific language impairments or language disorders. However, individuals with specific language disorders typically have difficulties with language acquisition and usage, whereas individuals with autism have broader challenges in social interaction, communication, and repetitive behaviors. A study about Family types and cognitive deficits in autism was conducted in 2014 in India which explains that Autism is a lifelong developmental condition that affects how individuals communicate and interact with others, as well as their understanding of the world. It is a complex disability that typically emerges in early childhood and hinders a person's ability to engage socially, communicate effectively, and display repetitive or restricted behaviors. Autism is believed to originate before birth, making it a congenital birth defect. It is often referred to as an impaired disorder due to its impact on social skills, language and communication abilities, and repetitive behaviors. The condition is more prevalent in males, with a sex ratio of approximately 3.5 to 1, similar to other developmental disabilities. The estimated prevalence of autism is around 1 case per 1000 population. Some studies have pointed out specific risk factors associated with autism, such as premature birth or low birth weight, which may elevate the risk, particularly among girls born under these conditions (7).

A study was conducted about Quality of life in families of children with autism spectrum disorder in India, despite the importance of understanding autism and its contributing factors, one area that has received little attention is the relationship between family types and the development of autism. To address this gap, a recent study was conducted with the aim of evaluating various cognitive deficits in autistic children and exploring the influence of family structure, comparing joint families and nuclear families. The study involved 60 autistic children between the ages of 3 and 5, coming from diverse socioeconomic backgrounds. The participants were randomly selected and diagnosed using the Autism Checklist (AC) and Childhood Autism Rating Scale (CARS). Their cognitive abilities were assessed using Hema Pandey's Cognitive Development Test for Pre- schoolers (PCDTP), which includes six sub-tests covering Concept Formation, Information, Comprehension, Visual Perception, Memory, and Object Vocabulary. The results revealed that family type had a notable impact on cognitive deficits in autistic children. Specifically, in terms of Concept Formation, children from nuclear families exhibited significantly more deficits compared to those from joint families. In summary, the study's findings strongly support the notion that family structure plays a significant role in the cognitive functioning of autistic children. Children from joint families generally exhibited higher cognitive scores compared to those from nuclear families(8).

A study conducted in 2019 about Autism spectrum disorder and sibling relationships explains that currently, there is a limited amount of research in the field of speech-language pathology concerning the involvement of siblings in the treatment of children with Autism Spectrum Disorder (ASD). Family Systems Theory (FST) offers valuable insights into the interconnections and dynamics of the family unit, making it a relevant and beneficial framework for future research and practice regarding sibling involvement in interventions. The core principles of FST are explored, followed by an overview of existing research on sibling relationships in ASD and the roles of typically developing siblings and those with ASD in intervention programs. The adoption of an FST framework has significant implications, and several considerations need to be taken into account at the child with ASD, sibling(s), and family levels. These considerations include factors such as developmental level, communication abilities, and individual strengths and challenges, which are crucial in promoting positive sibling involvement

and overall family functioning. Developing family-centered intervention programs that include siblings for individuals with ASD is an area that requires further investigation. By utilizing the FST framework, researchers and clinicians can work towards creating innovative interventions tailored to each family's unique characteristics, aiming to optimize outcomes for each individual, enhance sibling relationships, and improve family dynamics (9).

A study was conducted about child and family factors associated with the use of services for preschoolers with autism spectrum disorder. This study looked at the factors that may influence how much and what kind of common private and in-school services—such as speech-language therapy (SLT), occupational therapy (OT), and applied behavior analysis (ABA)— children with autism spectrum disorders (ASD) receive. 137 families with preschool-aged ASD children from four states—Colorado, Florida, Minnesota, and North Carolina—were participants. The findings of the study showed that the kind and quantity of services used were influenced by child and family variables. Hispanic students received less SLT and OT in the classroom than White students. Greater cognitively impaired children received more SLT, while those with more severe autistic symptoms received more OT. Higher socioeconomic status parents were more likely to sign up their kids for OT and ABA (10).

A study conducted in 2012 regarding the Parent and family impact of autism spectrum disorders, a review and proposed model for intervention evaluation explained that for parents and families, raising a kid with an ASD can be a challenging experience. When compared to parents of typically developing children and parents of children with other developmental disorders, parents of children with ASD experience more mental and physical health issues. These difficulties include decreased parenting efficacy, increased parenting stress, and an increase in mental and physical health issues. High rates of divorce and lower overall family well-being underline the hardship that having a kid with an ASD may have on families, in addition to severe time and financial constraints. These adverse parent and family effects on the diagnosed child have a reciprocal unfavorable influence on them and may even lessen the beneficial effects of intervention (11). Although parent and family characteristics may have an impact on both the short- and long-term impacts of therapy, most ASD interventions are only evaluated in terms of child outcomes. It cannot be anticipated that even large gains in the diagnosed child will lessen the existing parent and family pain, especially given that the intervention's time and cost may cause even more disruption in the family. In order to properly reflect the transactional character of these relationships and incorporate these aspects, a new model of intervention assessment is presented(12). There is a rise in the children being diagnosed with ASD in Pakistan, but the data is still scarce therefore this study was conducted to explore frequency of children diagnosed with ASD in nuclear and joint family systems in Pakistan.

MATERIALS AND METHODS

This was an observational cross-sectional study conducted in various healthcare settings, including the University of Lahore Teaching Hospital, Mayo Hospital, Orion Center, and Sehat Medical Complex Pakistan, for six months from February 2023- July 2023. The sample size calculated for this study was n=133 where the prevalence (p) of autism was taken as 3.2%. The level of confidence (z) was taken as 1.96 and the value of precision (D) was taken as 0.0025. Purposive sampling was the method of sampling used in this investigation. Parents or caregivers who have a minimum of one ASD-diagnosed child were included in this study. The questionnaire was used in this study, aimed to gather demographic information and specific details related to potential risk factors. The questionnaire consisted of two sections: one focusing on the respondent's demographics, and the other focusing on information about the ASD child. The questions cover a range of topics such as family background, parental age, prenatal factors, birth-related complications, medical history, and environmental factors. By collecting this information, the questionnaire aimed to provide insights into the potential risk factors associated with ASD development and their impact on the affected child and their family. The questionnaire was used to collect data from the participants. Researcher provided detailed information regarding the study to the participants and also obtained their informed consent. The participants were informed about the objective of the study and its aspects and told about their right to withdraw any time. The

questionnaire was designed to gather relevant information from patients, such as demographic data, medical history, symptoms, and diagnosis. The questionnaire was pre-tested before use to ensure that it is easy to understand and collect reliable data. The questionnaire had to be finished by the participants, and it took them about 10-15 minutes. The data was analyzed using the statistical software, Statistical Package for Social Sciences (SPSS version 2021). The results of the data are represented in the tables, charts, and graphs. Data was analyzed for their main values.

RESULTS

A total of 133 participants were included in this study, majority of participants had 3-5 children with autism (52%), 32% had 1-2, while 16% had more than 6 children in their family. The age of children ranged between 4-6 years in majority of cases (44%) ,35% were less than 3 years, and 21% had more than 7 years. Sibling data showed that 51% had 4-5 siblings, 33% had 1-3, 16% had more than 6 siblings. A total of 70% had nuclear family set up, 17% were living in joint family , 13% was single-parent family. Out of these 59% have extended family living with them. Among caregivers 43% had Bachelor's level education, 26% had Matric/Intermediate, 5% had Master's. 93% actively care for autistic child, 7% less involved. Out of these participants 59% were employed while 41% unemployed. A summary of the data is presented in Figures 1- 9.

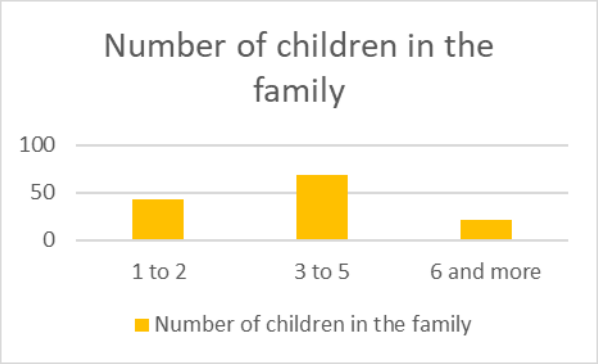


Figure 1. How many children do you have in your family, including the autistic child?

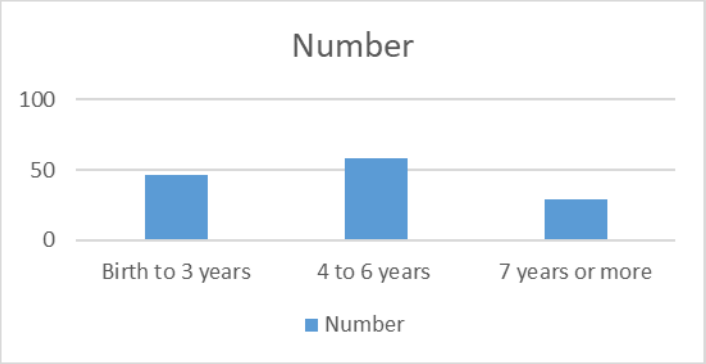


Figure 2. What is the age of your autistic child?

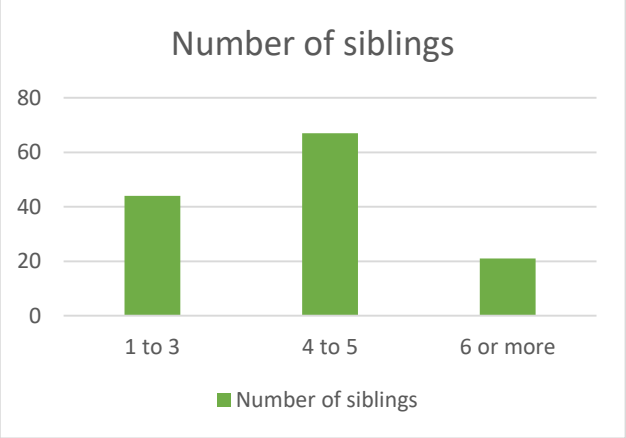


Figure 3. How many siblings does your autistic child have?

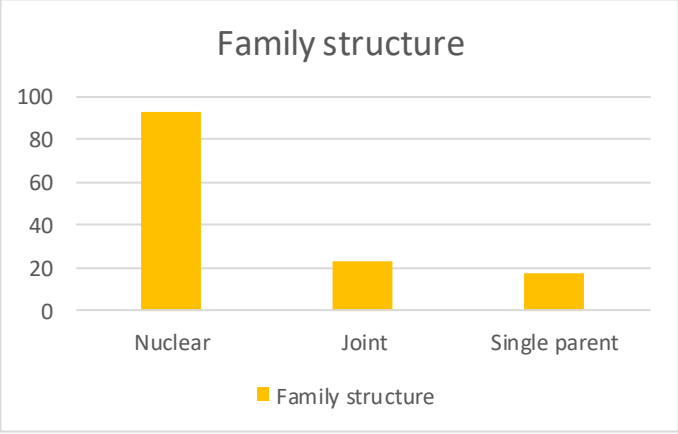


Figure 4. How would you describe your family structure (nuclear, joint, single-parent, blended, etc.)?

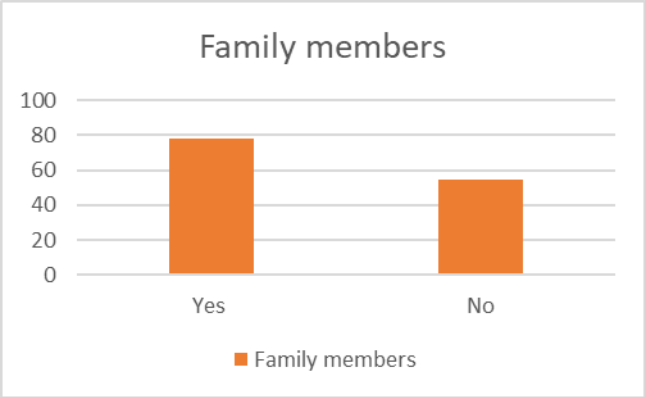


Figure 5. Are there any other family members living with you, such as grandparents or extended family?

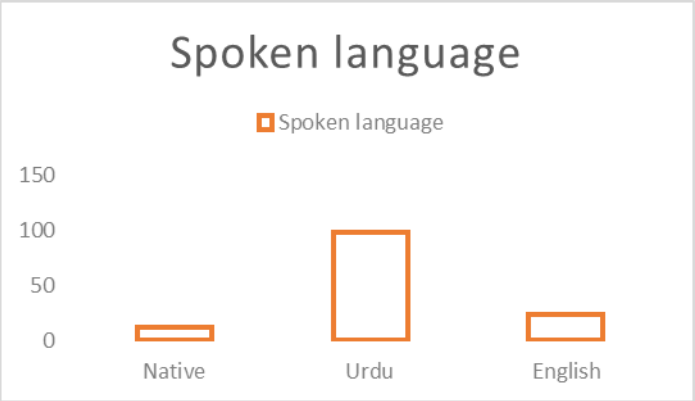


Figure 6. What is the primary language spoken at home?

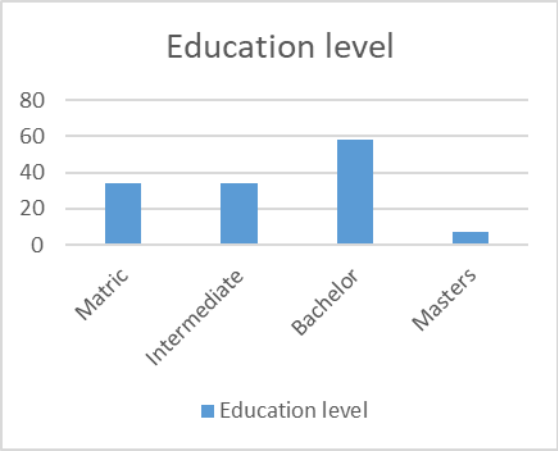


Figure 7. What is the highest level of education attained by the primary caregiver (parent or guardian)?

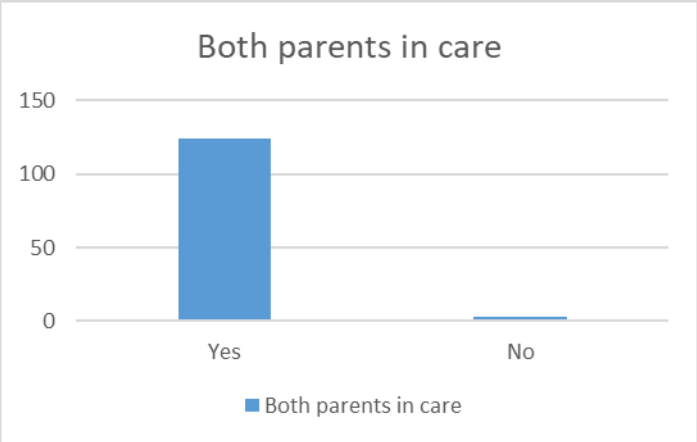


Figure 8. Are both parents actively involved in caregiving and decision-making for the autistic child?

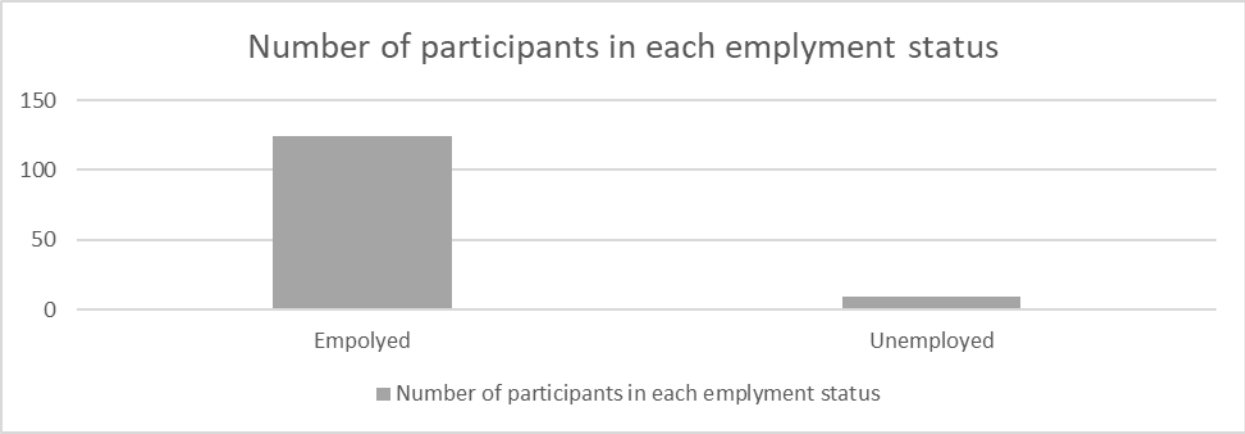


Figure 9. What is the employment status of the primary caregiver(s)?

DISCUSSION

In the present study, it is noteworthy that a substantial majority of families, comprising approximately 70% of the total sample, exhibit a nuclear family structure as their predominant familial arrangement. This observation is in stark contrast to the findings of a previous study, the distribution of family structures between joint and nuclear family setups was evenly balanced, with each accounting for a 50% share of the sampled families. However, the

landscape of family structures in our current study also reveals that a significant number of families continue to follow a joint family setup. This shift in the family structure landscape between the two studies underscores the evolving nature of family dynamics and their role in contemporary society, thereby highlighting the need for further examination and analysis in order to better understand the underlying factors contributing to this notable transformation(8) The analysis of the primary caregivers' employment status reveals a well-distributed and balanced distribution, with 59% of them currently engaged in gainful employment, while the remaining 41%were unemployed at the time of data collection. This distribution bears resemblance to the findings of a previous study, where the employed segment constituted 55% of the total primary caregiver population, highlighting a consistent pattern in the employment dynamics of this demographic. A stable and robust local economy, along with consistent employment opportunities, could result in a similar distribution of employed(13)

The educational attainment of primary caregivers in the current study exhibits a notable degree of variability, with a substantial portion of them having achieved a Bachelor's degree, constituting approximately 43% of the participant. This observation underscores the diverse educational backgrounds of the primary caregivers involved in this study.

This pattern of high educational attainment among caregivers echoes findings from a previous study, it was noted that 53% of fathers had graduated from a higher educational institution, while 39% of mothers had similarly accomplished this educational milestone. The consistency in the prevalence of graduation levels among parents in both studies highlights the significance of education within the family context, with a substantial proportion of caregivers in both cases (8). The study's focus on family structure and autism prevalence might overlook other significant factors that contribute to the dynamics of raising an autistic child. The study's relatively small sample size might not adequately represent the diversity and complexity of family structures and their relation to autism prevalence

CONCLUSION

The investigation into the frequency of autism within joint and nuclear families reveals that a majority of families with autistic children lean towards nuclear family structures. While joint families exist, they are less prevalent. The study also underlines that parental engagement is high across both family types, with over 90% actively participating in care giving and decision-making.

Conflict of interest:

Authors declare no conflict of interest

Ethical Consideration

The study was approved by local research ethics committee, informed consent was taken from all the participants and their identity was anonymized.

REFERENCES

1. Hodges H, Fealko C, Soares N. Autism spectrum disorder: definition, epidemiology, causes, and clinical evaluation. Translational pediatrics. 2020;9(Suppl 1):S55.
2. Taghizadeh N, Davidson A, Williams K, Story D. Autism spectrum disorder (ASD) and its perioperative management. Pediatric Anesthesia. 2015;25(11):1076-84.
3. Patra KP, De Jesus O. Echolalia. 2020.
4. Kapp SK, Steward R, Crane L, Elliott D, Elphick C, Pellicano E, et al. 'People should be allowed to do what they like': Autistic adults' views and experiences of stimming. Autism. 2019;23(7):1782-92.
5. Hinshaw SP. Attention deficit hyperactivity disorder (ADHD): controversy, developmental mechanisms, and multiple levels of analysis. Annual review of clinical psychology. 2018;14:291-316.
6. Schmidt NB, Vereenooghe LJBr, therapy. Targeting hostile attributions in inclusive schools through online cognitive bias modification: A randomised experiment. 2021;146:103949.

7. Norbury CF, Gooch D, Wray C, Baird G, Charman T, Simonoff E, et al. The impact of nonverbal ability on prevalence and clinical presentation of language disorder: Evidence from a population study. Journal of child psychology and psychiatry. 2016;57(11):1247-57.
8. Perumal V, Veeraraghavan V, Lekhra OP. Quality of life in families of children with autism spectrum disorder in India. Journal of Pharmacy Research. 2014;8(6):791-7.
9. Wright BM, Benigno JP. Autism spectrum disorder and sibling relationships: Exploring implications for intervention using a family systems framework. American Journal of Speech-Language Pathology. 2019;28(2):759-67.
10. Rice MLJPotASIG. Clinical lessons from studies of children with specific language impairment. 2020;5(1):12-29.
11. Merla S, Kumar SNJIJIP. A study on the levels of depression, stress and anxiety of parents having children with intellectual disability. 2021;9:1000-5.
12. Waheed A, Khan MJ, Khurshid MJPAFMJ. Effect of behavioral problems of children with autism on their mother's quality of life. 2020;70(6):1666-70.

Research Article

KNOWLEDGE, MYTHS AND ACCEPTABILITY OF COVID-19 VACCINATION AMONG EXPECTANT WOMEN ATTENDING OUT PATIENT DEPARTMENT OF THE PRIVATE AND PUBLIC SECTOR HOSPITALS

Zahida Parveen Brohi[1], Uzma Parveen[1], Aneela sadaf[2], Roohi Nigar[1], Ifat Baloch[1]

[1]Department of obstetrics and Gynaecology Bilawal Medical College for boys Jamshoro, Pakistan, [2]Department of Obstetrics and Gynaecology, Services Hospital Karachi, Pakistan

Correspondence:
Zahida Parveen Brohi, Associate Professor Department of obstetrics and Gynaecology Bilawal Medical College for boys, Jamshoro, Pakistan
Email:zahidaparveen66@yahoo.com

DOI: 10.38106/LMRJ.2024.6.2-06
Received: 25.05.2024
Accepted: 26.06.2024
Published: 30.06.2024

ABSTRACT

This cross-sectional study was conducted to explore pregnant women's knowledge, attitudes, and acceptance of the COVID-19 vaccination. A total of 237 pregnant women were included from January 2021 till December 2021. After enrolment in the hospitals and before antenatal checkup all patients sent for COVID-19 vaccinations, those who had reservations regarding vaccination in pregnancy and willing to participate and share their knowledge were included. Data was collected using a pre-designed structured proforma. There were 84 pregnant women (35.4%) from rural residences, 67.1% with middle socioeconomic status, 84.8% were literate, 83.5% with 1 -3 antenatal visits, 46.8% with 21 – 26 weeks of gestational age, the mean gestational age of samples was 21.7 weeks. The source of information regarding hazards of COVID vaccine during pregnancy, there were 35 (44.3%) reported family, 24 (30.4%) reported friends, 15 (19%) reported healthcare providers and 5 (6.3%) reported media as the main source of information regarding hazards of COVID vaccine in pregnancy. Most of the expectant ladies who has misconceptions and were worried about birth defects and long-term effects on babies, the safety and prevention of COVID infection by the vaccine had information from the family.

Keywords: Pregnant women, COVID-19 vaccination, acceptability, counseling

INTRODUCTION

Recent Corona virus causing coronavirus disease 2019 (COVID-19) pandemic has made all the nations around the globe to experience terrible health and social consequences (1). It was essential to create herd immunity in the fight against this pandemic by immunizing as many people as possible worldwide at the earliest. This will stop new variants from forming and spreading that could compromise the immunity that immunizations provide (2). Since COVID-19 vaccines have been developed and certified for use in emergencies, public trust is crucial to the success of global vaccination (3). According to American College of Obstetricians and Gynecologists (ACOG) recommendations, the vaccine should be administered to pregnant and nursing mothers based on their risk. mRNA-based immunizations are believed to have lower risk to the fetus because the mRNA is anticipated to break down in circulation (4).

The pregnant women are highly susceptible to severe COVID-19 illness. A study found that pregnant women had a 1.5 times higher risk of dying from COVID-19 and were three times more likely than non-pregnant women to need hospitalization or intubation (5). According to the authors of a recent study on the disease's impact during pregnancy Maternal mortality was 22 times greater in pregnant women with a COVID-19 diagnosis than in those without pregnancy. When giving birth, females infected with COVID-19 had a significantly increased risk of being

admitted to the intensive care unit (ICU) and of delivery before the full 37 weeks gestational age. Pregnant women in Pakistan who are not vaccinated are believed to face numerous challenges due to COVID-19(7). When local data was obtained and presented at a webinar titled "Pregnancy in Covid-19 and relevance of vaccine," organized by a public medical university in association with the American Society of Microbiology, it was discovered that COVID-19 had an 8% death rate for pregnant women (8). These adverse pregnancy outcomes emphasize how important immunization is for pregnant mothers. Promising results have been observed in recent trials assessing the effectiveness of the COVID-19 vaccination among pregnant women. Women who received at least one dose of the COVID-19 vaccination during their pregnancies showed comparable rates of all unfavorable pregnancy outcomes when compared to those who did not, according to Blakeway et al. They concluded that there is no relationship between vaccines and perinatal outcomes (9). There is limited data available on the understanding of pregnant women about COVID vaccination in Pakistan, therefore this study was explore if pregnant women visiting public and private hospitals accept the COVID-19 immunization.

MATERIALS AND METHODS

This cross sectional study was conducted at Hajiani Hospital, Hyderabad, Pakistan and Bilawal Medical College teaching (CDF) Hospital Hyderabad, Pakistan for 1year from January 2021 to December 2021.

During the study time period, a total of 237 pregnant women were enrolled in the study. After enrolment in the hospitals and before antenatal checkup all participants were sent for COVID vaccinations according to the hospital protocol. Those who had reservations regarding COVID vaccination in pregnancy and willing to participate and share their knowledge were included. It was done using a pre-designed structured proforma. Each participant got a physical examination and provided a clinical history. From each pregnant woman was asked regarding their concerns about COVID-19 vaccine such worried about birth defects and long-standing effects on babies, their concerns about safety of immunization in pregnancy. It was also asked whether in their opinion the vaccine does not prevent COVID-19 infections, or the vaccine is harmful to pregnant women. Participants were also requested to provide the source of information regarding the hazards of COVID vaccine during pregnancy.

Data were analysed using IBM-SPSS version 23.0. Number with percentages were reported on location, socioeconomic status, literacy, number of antenatal visits and gestational age (in weeks) of study sample. Pearson Chi-Square test was used to test the relationship of perceptions of respondents on hazards of COVID vaccine during pregnancy with the source of information. P-values less than 0.05 was considered statistically significant

RESULTS

A total of 237 women were included in this study with mean gestational age of samples was 21.7 (SD=±5.4) weeks, out of which 35.4% were from rural areas, 67.1% belonged to middle socioeconomic status, 84.8% were literate, 83.5% with 1 -3 number of antenatal visits, 46.8% with 21 – 26 weeks of gestational age. Eighty-four women showed expressed their concerns related to COVID vaccine.

Source of information regarding hazards of COVID vaccine during pregnancy family and relatives in 35 (44.3%), 24 (30.4%) reported friends, 15 (19%) reported healthcare providers and 5 (6.3%) reported media as the main source of information regarding hazards of COVID vaccine during pregnancy (Figure 1).

Table 2 reports the perceptions on hazards of COVID vaccine during pregnancy with the source of information, results showed samples who were worried about birth defects and long-term effects in babies 13.5% had information from a healthcare provider, 47.3% had information from family, 32.4% had information from friends and 6.8% had information from media. For samples who thought the vaccine was unsafe in pregnancy 3.2% had information from a healthcare provider, 56.5% had information from family, 38.7% had information from friends and 1.6% had information from media, samples who thought that the vaccine does not prevent the COVID infection 1.7% had information from a healthcare provider, 58.3% had information from family, 38.3% had information from friends and 1.7% had information from media, samples who thought the vaccine was harmful to pregnant mother 1.8% had information from a healthcare provider, 54.5% had information from family, 41.8% had information from friends and 1.8% had information from media, whereas samples who had some other concerns 5.3% had information from a healthcare provider, 42.1% had information from family, 52.6% had information from friends and none had

information from media. Pearson Chi-Square test provide a significant relationship of Perceptions on the hazard of COVID vaccine during pregnancy with the source of information of the respondent ($p<0.05$). A summary is presented in Figure 2.

Table 1: Demographic characteristics of the study population (n=237)

Characteristics		**n**	**%**
Residence	Urban	66	27.8
	Rural	84	35.4
	Semi Urban	87	36.7
Socioeconomic status	Low	36	15.2
	Middle	159	67.1
	Upper	42	17.7
	Unemployed	0	0.0
Literacy	Literate	213	84.8
	Illiterate	24	15.2
Number of antenatal visits	0 visits	15	6.3
	1 - 3 visits	198	83.5
	4 - 6 visits	24	10.1
Gestational age (weeks)	<20 weeks	75	31.6
	21 - 26 weeks	111	46.8
	>26 weeks	51	21.5
	Mean ±SD	*21.7*	*±5.4*

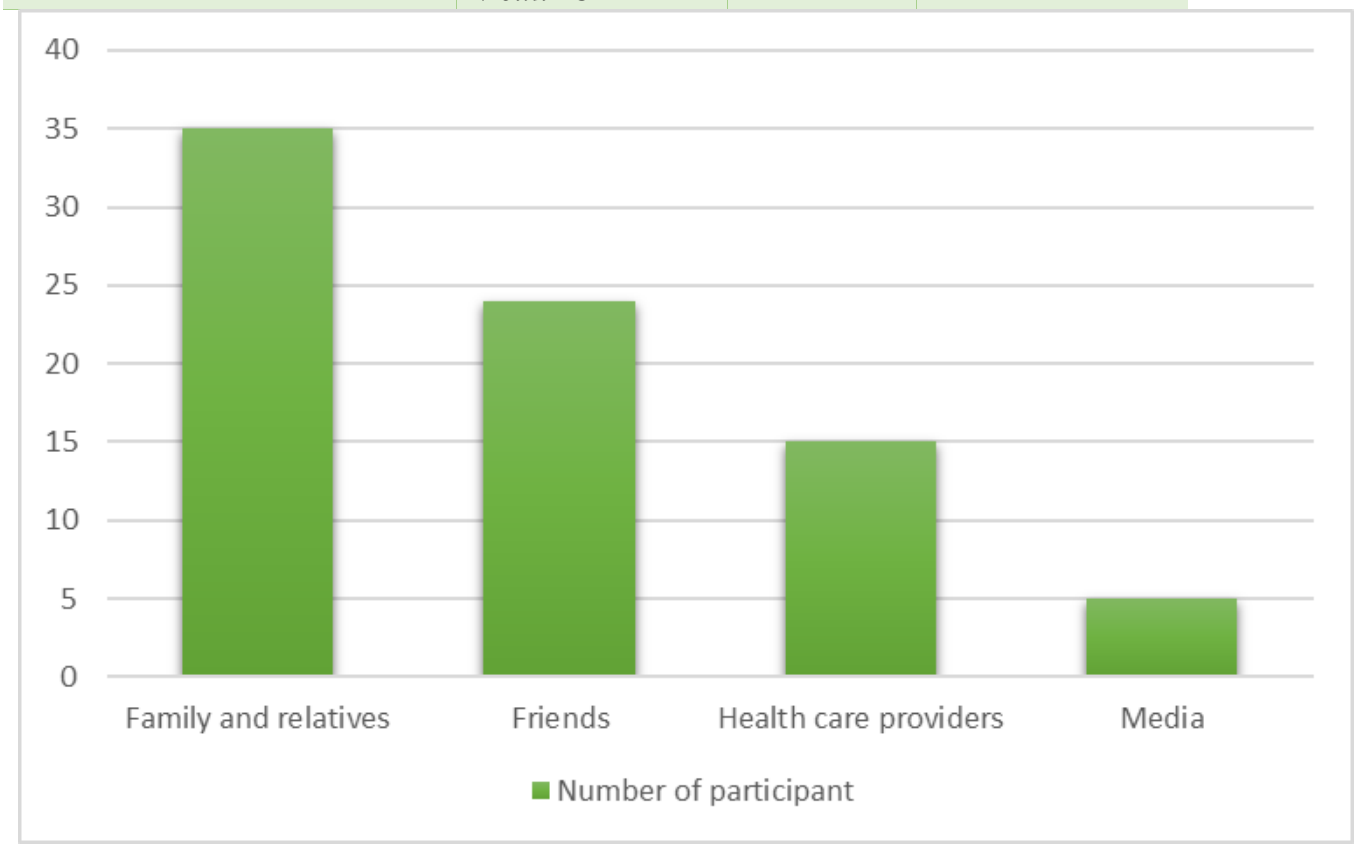


Figure 1. Source of information to the participants of the study regarding COVID vaccination

Table 2: Association of Hazard of COVID Vaccine Perceptions during Pregnancy with Source of Information of Respondents

Variables		what is your source of information regarding hazards of COVID vaccine during pregnancy								p-value
		Health Care Provider (n=45)		Family (n=105)		Friend (n=72)		Media (n=15)		
		n	%	n	%	n	%	n	%	
Worried about birth defects and long term effects in baby	Yes	30	13.5	105	47.3	72	32.4	15	6.8	<0.01*
	No	15	100.0	-	-	-	-	-	-	
vaccine is unsafe in pregnancy	Yes	6	3.2	105	56.5	72	38.7	3	1.6	<0.01*
	No	39	76.5	-	-	-	-	12	23.5	
vaccine does not prevent the Covid infection	Yes	3	1.7	105	58.3	69	38.3	3	1.7	<0.01*
	No	42	73.7	-	-	3	5.3	12	21.1	
vaccine is harmful for pregnant mother	Yes	3	1.8	90	54.5	69	41.8	3	1.8	<0.01*
	No	42	58.3	15	20.8	3	4.1	12	16.6	
other concern	Yes	3	5.3	24	42.1	30	52.6	-	-	0.04*
	No	42	23.3	81	45.0	42	23.3	15	8.3	
*p<0.05 was considered statistically significant using Pearson Chi-Square test										

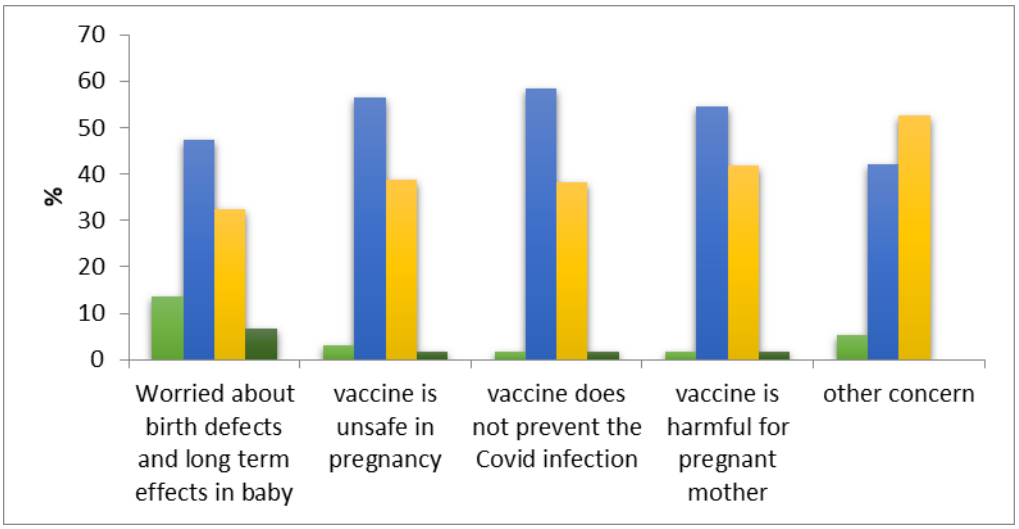


Figure 2. Source of information about vaccines related concerns of participants of the study

DISCUSSION

In our study there were eighty-four pregnant women showed their concerns related to the COVID vaccine. According to a local study about seventy-six percent of the study participants (n = 286) were between the ages

of 25 and 34 and had a history of successful pregnancies. Despite the fact that their family members (93.9%, n = 372) had already gotten at least one dose of the COVID-19 vaccine, more than half of the study participants (56.0%, n = 227) had not had the immunization at the time the data were collected. The primary motivators for vaccine reluctance were vaccine effectiveness, protection for the fetus, and risk of COVID-19-associated hospitalization among individuals who got COVID-19 vaccination (7). According to another local study Television accounted for 117 (36.8%) of the material on COVID-19, and healthcare practitioners made for 105 (33%). The participants said they could be persuaded to get vaccinated if there were 118 (37.1%) more published studies on vaccine efficacy and safety, 90 (28.3%) or higher government officials received the same vaccination and 39 (12.3%) they saw no adverse reactions in vaccine recipients (9-10).

In the current study the source of information regarding hazards of COVID vaccine during pregnancy, there were 105 (44.3%) reported family, 72 (30.4%) reported friends, 45 (19%) reported healthcare providers and 15 (6.3%) reported media as the main source of information regarding hazards of COVID vaccine during pregnancy. According to the results of an international study, the strongest factor coexisting with acceptance of the COVID-19 vaccination in pregnancy were, belief in the importance of vaccinations, acceptance of other vaccinations such as those for influenza, clear communication about the safety of COVID-19 vaccines for pregnant women, and mass vaccination in one's own country (11). According to Battarbee AN et al's findings, 72% of expectant mothers were anxious about getting COVID-19, with 92% of them fearing for the health of their unborn child and 80% fearing for their own safety in the event that they become ill. Just 41% of respondents stated they would get vaccinated. Concerns about vaccine safety during pregnancy were most frequently voiced by women who were not likely to obtain vaccines (82%) (12).

According to another study Risk to the fetus or newborn was the main worry among the women who chose not to get vaccinated, followed by vaccine adverse effects (17.7%) (13). In an international survey, the respondents who were not pregnant had the highest likelihood of accepting vaccination (457 respondents, 76.2%; p-value 0.001), while those who were breastfeeding had the lowest likelihood (i.e. 55.2%). The lowest rate of vaccine acceptability was found among pregnant respondents (44.3%; p-value 0.001) (14). In developing nations, medical resources, diagnosis, and treatment must be improved. Pakistan has few resources for medical education and research, including low patient awareness, little access to medical and health resources, and less training and information on diseases (15–23). The study included only a small sample size of the women who were seeking their antenatal care in government sector and economical private sector hospital. Thus limited resources of information are a major confounding factor and considered as a limitation of the study.

CONCLUSION

Most of the women who were worried about birth defects and long-term effects on babies, safety of vaccine during pregnancy. Therefore, the counseling of the whole family should be done regarding the benefits and safety of COVID-19 vaccine during pregnancy.

Conflict of interest:

Authors declare no conflict of interest

Ethical Consideration

The study was approved by local research ethics committee, informed consent was taken from all the participants and their identity was anonymized.

REFERENCES

1. Lai CC, Shih TP, Ko WC, Tang HJ, Hsueh PR. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and coronavirus disease-2019 (COVID-19): The epidemic and the challenges. International journal of antimicrobial agents. 2020 Mar 1; 55(3):105924.
2. Hossain MJ. Is Bangladesh moving toward herd immunity? Current COVID-19 perspective. Bangladesh Journal of Infectious Diseases. 2020 Nov 8:S63-6.

3. Fisk RJ. Barriers to vaccination for coronavirus disease 2019 (COVID-19) control: experience from the United States. Global Health Journal. 2021 Mar 1; 5(1):51-5.
4. Di Mascio D, Buca D, Berghella V, Khalil A, Rizzo G, Odibo A, Saccone G, Galindo A, Liberati M, D'Antonio F. Counseling in maternal–fetal medicine: SARS-CoV-2 infection in pregnancy. Ultrasound in Obstetrics & Gynecology. 2021 May; 57(5):687-97.
5. Hanna N, Hanna M, Sharma S. Is pregnancy an immunological contributor to severe or controlled COVID-19 disease?. American Journal of Reproductive Immunology. 2020 Nov; 84(5):e13317.
6. Chinn J, Sedighim S, Kirby KA, Hohmann S, Hameed AB, Jolley J, Nguyen NT. Characteristics and outcomes of women with COVID-19 giving birth at US academic centers during the COVID-19 pandemic. JAMA Network Open. 2021 Aug 2; 4(8):e2120456-.
7. Mustafa ZU, Bashir S, Shahid A, Raees I, Salman M, Merchant HA, Aldeyab MA, Kow CS, Hasan SS. COVID-19 Vaccine Hesitancy among Pregnant Women Attending Antenatal Clinics in Pakistan: A Multicentric, Prospective, Survey-Based Study. Viruses. 2022 Oct 25; 14(11):2344.
8. Villar J, Ariff S, Gunier RB, Thiruvengadam R, Rauch S, Kholin A, Roggero P, Prefumo F, Do Vale MS, Cardona-Perez JA, Maiz N. Maternal and neonatal morbidity and mortality among pregnant women with and without COVID-19 infection: the INTERCOVID multinational cohort study. JAMA pediatrics. 2021 Aug 1; 175(8):817-26.
9. Blakeway H, Prasad S, Kalafat E, Heath PT, Ladhani SN, Le Doare K, Magee LA, O'brien P, Rezvani A, von Dadelszen P, Khalil A. COVID-19 vaccination during pregnancy: coverage and safety. American journal of obstetrics and gynecology. 2022 Feb 1; 226(2):236-e1.
10. Rizwan W, Rana MN, Bukhari MH, Mushtaq A, Sadiq M. Reasons of vaccine hesitancy among Pakistanis with available COVID-19 vaccine: the next challenge in the fight against COVID-19. Natural Science. 2021 Jun 3; 13(6):211-7.
11. GoncuAyhan S, Oluklu D, Atalay A, MenekseBeser D, Tanacan A, MoralogluTekin O, Sahin D. COVID-19 vaccine acceptance in pregnant women. International Journal of Gynecology & Obstetrics. 2021 Aug; 154(2):291-6.
12. Battarbee AN, Stockwell MS, Varner M, Newes-Adeyi G, Daugherty M, Gyamfi-Bannerman C, Tita AT, Vorwaller K, Vargas C, Subramaniam A, Reichle L. Attitudes toward COVID-19 illness and COVID-19 vaccination among pregnant women: a cross-sectional multicenter study during August–December 2020. American journal of perinatology. 2022 Jan; 39(01):075-83.
13. Levy AT, Singh S, Riley LE, Prabhu M. Acceptance of COVID-19 vaccination in pregnancy: A survey study. American journal of obstetrics & gynecology MFM. 2021 Sep 1; 3(5).
14. Sutton D, D'Alton M, Zhang Y, Kahe K, Cepin A, Goffman D, Staniczenko A, Yates H, Burgansky A, Coletta J, Williams Z. COVID-19 vaccine acceptance among pregnant, breastfeeding, and nonpregnant reproductive-aged women. American journal of obstetrics & gynecology MFM. 2021 Sep 1; 3(5):100403.
15. Jabeen M, Shahjahan M, Farid G. Information Dissemination during COVID-19 Pandemic among Postgraduate Allied Health Sciences Students in Pakistan. Pakistan Journal of Medical & Health Sciences. 2022;16(11):366-.
16. Shahjahan M, Jabeen M, Farid G. Information Providing in COVID-19 by Health Professionals in Pakistan. Pakistan Journal of Medical & Health Sciences. 2022 Dec 12;16(10):641-.
17. Farid G, Zaheer S, Khalid A, Arshad A, Kamran M. Evaluating Medical College Lib Guides: A Usability Case Study. Pakistan Journal of Medical & Health Sciences. 2022 Aug 26;16(07):461-
18. Farid G, NiaziAk, Muneeb M, Iftikhar S. Attitude towards Utilization of e-Resources of Medical Images among Health Care Professionals. Pakistan Journal of Medical and Health Science. 2021 Sep 15 (9);261-263

19. Farid G, Iqbal S, Iftikhar S. Accessibility, Usage, and Behavioral Intention of Print Books and eBooks by Medical Students. Library Philosophy and Practice. 2021:1-25.
20. Farid G, Abiodullah M, Ramzan M. A comparative study of information seeking behaviors of medical faculty working in government and private run medical colleges. International Journal of Information Management Science. 2013;2(1):17-24.
21. Farid G, Soroya SM. Perception and Behavioral Intention of Print and Electronic Books among Medical Students; A Comparative Study. Pakistan Library & Information Science Journal. 2018;49(1):52-60.
22. Baladi ZH, Farid G, Gulzar A, Hussain M, Iftikhar S, Naz M. Examining Authorship Dynamics, Publication Patterns, and Affiliations in the Pakistan Journal of Medical and Health Sciences (PJMHS) from 2009-2019. Pakistan Journal of Medical & Health Sciences. 2023 Jun 24;17(05):277-.
23. Shahbaz T, Farid G, Asghar RS, Rashid A. hepatitis b and c: knowledge, attitude and behavior of health care workers at rlmc and affiliated hospitals (amth & hlh). The Professional Medical Journal. 2015 Nov 10;22(11):1383-9.

Review Article

The Ethics of AI in Medical Research: A Call for Open and Honest Discussion

Dr. Shazma Tahseen[1], Muhammad Ali Memon[2], Shah Muhammad Kamran[3], Kamran Taj Pathan[4]
Dr. A.H.S. Bukhari postgraduate Centre of Information and Communication Technology, and Department of Information Technology, University of Sindh, Jamshoro, Pakistan, Mehran University Institute of Science, Technology & Development (MUISTD), Jamshoro, Pakistan, Department of Software Engineering, University of Sindh, Jamshoro, Pakistan

Correspondence:
Dr. Shazma Tahseen, Dr. A.H.S. Bukhari postgraduate Centre of Information and Communication Technology, University of Sindh, Jamshoro, Pakistan

Email:
shazmatahseen@hotmail.com
DOI:
10.38106/LMRJ.2024.6.2-07
Received:26.02.2024
Accepted: 20.06.2024
Published:30.06.2024

ABSTRACT

Artificial intelligence (AI) in healthcare is gaining rapid popularity in terms of its application and research. A significant reason for its success is due to the advances it has made and the ease of use it incorporates. Because of its implications, issues, and benefits in terms of ease, AI has been debated and researched extensively. This study examined the ethical dilemmas associated with artificial intelligence in medical research. The research uses a qualitative research method based on content analysis. Authentic Internet resources were used to collect secondary data. Once AI is fully integrated into healthcare, several ethical dilemmas will likely arise, including patient privacy, data security, algorithmically biased results, transparency, and human error. Minimizing ethical dilemmas with continuous monitoring is possible, but they cannot be eliminated. It is possible with the advancement of technology and AI enables it to imitate the cognitive processes of humans, which may enhance its reliability but can also lead to negative consequences. As a result, the new technological developments must be applied ethically. An open and honest discussion is essential for the awareness and understanding of AI ethics, honoring patient rights, and

Keywords: AI Ethics,Ethics in Medical Research, Algorithm Bias, Privacy and Security

INTRODUCTION

Emerging technologies, like artificial intelligence (AI) and machine learning, are bringing positive changes and advancements in many fields of life including medical and public health (1). AI is a system that imitates human-like learning, reasoning, and decision-making to achieve defined objectives, independent of computer programming (2). AI is an umbrella concept, that covers, natural language processing, robotics, and machine learning, these supportive techniques are augmenting different areas including, health and medical research, education, and other related fields (3). AI has the potential to significantly enhance the efficiency of any given healthcare system, by improving precision, timely and accurate diagnostics, quality service, and affordable cost (4–6). Machine learning algorithms can identify unexplored patterns in large and heterogeneous data, helping innovation and advancement in diagnostic, better treatments, and optimal allocation of resources in the healthcare and welfare sectors. Globally healthcare sector faces a scarcity of resources (7), it can be optimized through AI applications for administrative redesign and clinical decision-making (4,8).

Different entities, including technology firms, pharmaceutical enterprises, medical research organizations, healthcare service providers, and public health agencies, are actively amassing, utilizing, and progressively disseminating individual-level health data. This information encompasses factors such as age, self-assessed health status, disease category, and income details, spanning an extensive array of data from sources like smartphone apps, wearable devices, medical records, and social and demographic information (9,10). These datasets frequently undergo amalgamation, aggregation, and interconnection to enhance the effectiveness of products and services within our society. However, sharing and reusing personal data can pose risks and challenges related to privacy, fair and open data use, and data security (11–15). Traditional safeguards and oversight practices struggle to address the changing notions of consent and anonymization in data-intensive contexts (16,17). Also, algorithmic bias and human-induced errors in system development are challenges to medical ethics (18– 20).

Creating strategies and establishing consistent protocols for managing individual data is of paramount importance to strike a balance between harnessing the advantages of data-driven technologies and safeguarding the rights of data subjects and communities (21). Achieving this equilibrium involves considering the viewpoints of both data subjects and data collectors/legal entities, which can sometimes diverge interests (21). An expanding body of scholarly work centers on investigating the inclinations and perspectives of the general public, research participants, and patients concerning data sharing. Elements such as the level of identifiability, transparency in data-sharing practices, and obtaining informed consent all play pivotal roles in addressing the concerns related to privacy (22–24).

Health data governance deliberations need to be scrupulously addressed in a way that reconciles security hesitations with societal expectations, comforting privacy, security, equity, and openness. The approach will make it possible to optimally use health data in the building of favorable initiatives. As the key stakeholders in the analysis of private health data at the personal level, the researchers need to take the ethical angle of research, understand the legal requirements and then translate them into practice (25). It is crucial to take into account the various viewpoints of the stakeholders regarding the use of AI in medical research because doing so will help identify any flaws and potential gaps that moral and legal considerations should fill. Differences between the policies and practices arise as a result of such discrepancies, and so governance preconditions can be obtained. AI implementation has brought up as many moral dilemmas in healthcare as technological development. Despite the research undertaken to overcome at least some of these ethical issues, there is still a necessity for a more comprehensive study.

This study aims to sort the ethical dilemmas of patient privacy and data security that come with AI application in medical research, as well as algorithmic bias, transparency, and human error. Understanding the ethical issues associated with the AI usage will help to develop a new technical solutions and legal regulations that will provide more safety to the application of AI in medicine. Results of the study will help the AI and healthcare professionals to address such issues while applying AI in medicine to ensure ethical considerations. Through identifying and resolution of ethical issues and challenges, patient's right of privacy and ethically advancement of the artificial intelligence can be ensured.

RESEARCH METHODOLOGY

Qualitative research methodology was employed, and content analysis was done through systematic review methods. A deductive approach was adopted to highlight and evaluate the ethical issues of AI application in health and medical research. To get a more nuanced understanding of the issue, a different approach from the traditional review was used (26–28). Traditional review methods use established analytical frameworks, that miss the contextual information from the data, whereas alternative methods look for more related contextual information from the data (29).

The research was carefully planned and rigorously implemented, below is a brief and comprehensive explanation of steps.

Systematic execution of the research was ensured for rigorous review of available literature about the issues related to AI applications in healthcare. Execution includes the criteria setting for inclusion and exclusion, selection of

relevant databases, and qualitative synthesis of studies to extract useful information. Results were thematically organized, for easy analysis and interpretation summarization of the finding with supporting evidence and finally systematic presentation. Results of the study brought useful insight for medical and AI research.

The research was planned and executed as follows:

- A systematic approach.
- A qualitative synthesis of the data.
- A thematic organization of the studies.
- A comprehensive presentation of the results.

This study confirms the transparency and replicability of systematic reviews approach, in order to ensure the use of existing evidence in future research. Systematic reviews provide the following benefits (Table 1):

Table 1: Benefits of Systematic Review

Accuracy	**In systematic reviews, studies are identified and appraised systematically and transparently, which makes them more accurate.**
Reliability	**systematic reviews use a consistent process, other researchers can reproduce them.**
Credibility	**A rigorous process is used to identify and appraise studies, which makes them more credible.**
Breadth	**systematic review provides a broader overview than a traditional literature review.**
Depth	**A systematic review measures the quality of the studies, which provides a deeper understanding of the literature.**

Stepwise detail of the review process is as follows;

Methodological Procedures for Search, Inclusion and Exclusion

The research employed distinct criteria and techniques to delineate and examine the realm of AI ethics and ethical concerns linked to AI in medical research. Only peer-reviewed articles that met empirical, conceptual, or review criteria were considered. Exclusion criteria were applied to AI application and ethical issues studies, published in edited books or conference proceedings, and non-electronically accessible articles. The search involved a thorough examination of relevant academic journals using specific keywords. Two senior investigators manually reviewed all papers, ensuring alignment with search parameters; the initial search brought 195 articles. Additionally, a second search was performed to address potentially missed studies. The final sample for analysis comprised 40 articles after applying inclusion and exclusion criteria.

Conducting Review

At the beginning of the study, a search protocol was established defining exclusion and inclusion criteria for the literature search. Based on the guidelines described in the protocol, keywords from the latest research were derived to ensure the inclusion of all relevant AI-Ethics-Medical research. Books, reports, and conference papers were excluded from the search pool because of their obscure review process and limited access. Journal articles were especially searched for; they are regarded as reliable and authentic because of the rigorous peer review procedure.

Literature was searched from April 2020 to March 2023. Definitive work during this period serves the guiding principles of including articles, further refined by keyword search by academic search engines like Google Scholar and ScienceDirect. After thorough screening in the first phase of the search, 109 articles were shortlisted.

However, in the second phase of scrutiny more articles were excluded because of their scope of work, only the 50 most recent and influential research articles with validated knowledge were compiled for the analysis (Table 2).

Table 2: Qualitative Database Development

Methodological Procedures	Description
Inclusion and Exclusion Criteria	**Inclusion: Peer-reviewed articles meeting empirical, conceptual, or review criteria.** **Exclusion: Studies published in edited books or conference proceedings, and non-electronically accessible articles.**
Search Process	**- specific keywords search for in-depth examination of relevant academic journals.** **- All papers reviewed by two senior investigators manually.** **- Search resulted 195 articles initially** **- A second search performed to address potentially missed studies** **- 40 articles finalized for analysis**
Conducting Review	**A comprehensive inclusion and exclusion criteria were established, to analyze only reliable research of peer reviewed journal articles.**
Time Span	**April 2020 to March 2023**
Analysis	**The final 35 articles were reviewed to thoroughly understand the AI-Ethic-Medical issue.**

RESULTS AND DISCUSSION

A. Data Protection and Privacy

Protection from cyber and other threats and the privacy of medical datasets is critical to AI- medical research. Medical datasets contain sensitive personal information, including medical, insurance, and genetic data. It is, therefore, crucial to ensure the confidentiality of personal information. Institutions applying AI techniques must adhere to strict security standards to protect data. That can be achieved through rigorous encryption frameworks in sorting and transmission of data, it will prevent unauthorized access and decryption of the data.

Moreover, strict control over data access through authorization can ensure limited rights to view, process, or modify data. A more sophisticated "need-to-know" protection layer considerably avoids data breaches or unauthorized use. Data anonymization can also add an extra layer of privacy protection; it assigns a unique ID to the identifiable information and refrains from linkage to the individual-specific data. Anonymization minimizes the possible risk of re-identification.

Additionally, routine assessments and security audits to examine the vulnerabilities in the system are critical to rectify possible loopholes. Implementation and compliance with data protection standards, e.g. GDPR and HIPPA, can help the development of feasible data protection frameworks. These standards cover the basic requirements of consent, storage, and breach issues.

Data protection and privacy are extremely important when applying AI for medical research. Robust encryption protocol, limited and authorized access to data, anonymization, and security audits can help achieve privacy and protection (30–36).

B. Algorithmic Bias

Though AI algorithms are becoming more intelligent, it is crucial to acknowledge that they can be biased, potentially leading to unfair or discriminatory decisions. The bias can stem from the data used to train the algorithm or from inherent flaws in the algorithm's design. If the data used to train the algorithm is biased, it can perpetuate and amplify the biases present in society. For instance, an algorithm is trained on historical data about disease incidences in a particular location. In future diagnostic decisions, it may increase the chances of new cases in the exact location.

Furthermore, the design of the algorithm can also cause bias. It may happen when the algorithm relies on closely correlated features with protected attributes, e.g. ethnicity or gender identification, leading to unfair results. Adoption of a proactive approach is critical to address this bias. This approach includes carefully compiled data for training, that is representative, diverse, and free from biases. Assessment of the algorithm's design for potential biases is also crucial to mitigate the issue.

Algorithmic biases can be mitigated by critical design audit, transparency, and accountability of design and deployment through documentation of the decision-making process. The involvement of diverse stakeholders in the scrutiny and evaluation process is essential to avoid bias. Iterative monitoring and evaluation are also essential to desist algorithmic biases' reoccurrence and maintenance of fairness (37,38,39–47).

C. Transparency and Accountability

Though AI algorithms can significantly increase and improve decision-making efficiency, complexity and opaqueness are growing concerns. Challenges to understanding the workings of algorithms because of the complexity make it further difficult to take corrective measures.

Transparency of the AI process is essential, clear, and understandable inner working of the algorithm for experts and novices alike. Public availability of algorithms' source code and scrutiny and assessment of logic function can help identify possible biases or flaws for improved transparency. Documentation of the algorithms, explaining data sources, functionality, and decision-making process enhances transparency. Comprehensive and understandable documentation allows users to conclude the algorithms.

To hold the AI system accountable for the decision, a clear job description and a line of responsibility imply responsibility for development, deployment, and performance. Assessment and monitoring by experts from associated fields can help establish the accountability framework for the system.

Third-party audits, with diverse expertise in medical research ethics and AI-machine learning, as well as the feedback from the users and affected individuals, can improve the system's performance and transparency and build trust by highlighting potential biases in decision-making.

Third-party audits, with diverse expertise in medical research ethics and AI-machine learning, as well as the feedback from the users and affected individuals, can improve the system's performance and transparency and build trust by highlighting potential biases in decision-making (48–57).

D. The Role of Humans in AI-powered Medical Decision-Making

Artificial intelligence is remarkably augmenting medical and health research, and the development of sophisticated models allows precise and critical decisions to be made by analyzing complex data. However, artificial intelligence still lacks the judgment potential of human decision-making related to treatment. While AI provides immense help and insight to healthcare professionals, humans are still responsible for final decisions regarding the interpretation and execution of AI-generated information, considering preference, context, and norms. This approach keeps the human element intact to address inherent issues of medical data and foster the healthcare system. Based on the patterns and correlations in the datasets, trained AI systems are prone to biases and errors. There is a chance of omission error and a lack of patient-specific information, yet it shows high accuracy because of the task-specific design. However, clinicians and related professionals use intuition, empathy, and contextual knowledge to address these issues in decision-making with ethical consideration. Furthermore, human-to-human interaction gives patients a sense of understanding, comfort, and compassion, which leads to hope and better recovery.

While AI algorithms have become increasingly sophisticated and are used to make more complex decisions, they should not replace human judgment in healthcare. AI integration into medical practice should complement and support healthcare professionals' expertise and medical researchers' findings. As a decision support system, AI algorithms can help healthcare providers increase the accuracy of their clinical decisions while maintaining patient-centered care (58, 59, 60–68).

Table 3. Transparency and Privacy in Artificial intelligence

Issues	Description
Data Protection and Privacy	**⚜Data security and privacy is vital, especially, while training the machine with large datasets.** **-Substantial encryption, controlled and authorized access, and anonymization techniques are essential.** **-Compliance with relevant privacy and protection standards are mandatory.**
Algorithmic Bias	**-AI algorithms can produce biased and discriminatory decisions.** **-Bias may be a result of skewed or biased data or biased design of algorithm.** **-Biased can be mitigated through algorithm audit, transparency, and monitoring and evaluation of the system.**
Transparency and Accountability	**-Making source code publicly available to achieve transparency.** **⚜Providing comprehensive documentation.** **⚜Establishing clear lines of responsibility and mechanisms for auditing and independent evaluation leads towards accountability.**
The Role of Humans	**⚜Healthcare professionals are responsible for interpreting and applying AI. AI should complement and support human expertise, not replace it.**

CONCLUSION

The application of artificial intelligence in medical and health research raised many critical concerns, especially the privacy and security of data with sensitive and personal information. Protection of patients' private information including medical, financial records, and genetic data is vital and needs to be secured. Confronting algorithmic bias may avert the discriminatory decisions caused by the biased design of algorithms or biased training. Vigilance and corrective measures are crucial to address the bias. Inherited complexity and opacity of artificial intelligence algorithms, make it challenging to be liable, therefore, transparency in design is essential. By ensuring transparency, algorithmic decisions can be comprehended and trusted. Lastly, while AI algorithms are utilized to assist in the complex decision-making process in medicine, it is vital to retain human involvement to prevent substituting human judgment with AI algorithms. Despite advances in artificial intelligence, humans must remain a critical component of diagnosis, treatment, and decision-making.

REFERENCES

1. Costa FF. Big data in biomedicine. Drug Discov Today. 2014 Apr;19(4):433–40.

2. Du-Harpur X, Watt FM, Luscombe NM, Lynch MD. What is AI? Applications of artificial intelligence to dermatology. Br J Dermatol. 2020 Sep;183(3):423–30.

3. Ramesh AN, Kambhampati C, Monson JRT, Drew PJ. Artificial intelligence in medicine. Ann R Coll Surg Engl. 2004 Sep;86(5):334–8.

4. AlAhmad YM, Mahmoud Haggeer D, Alsayed AY, Haik MY, AbuAfifeh LM, Hussain Aljaber M, et al. The effect of telemedicine on patients' compliance in family medicine follow-ups in Qatar. Avicenna. 2022 Feb;2022(1).

5. Barman M, Hussain T, Abuswiril H, Noor Illahi M, Sharif M, Talat Saman H, et al. Embracing healthcare delivery challenges during a pandemic. review from a nodal designated COVID-19 center in qatar. Avicenna. 2021 Sep;2021(2).

6. Sidhom O. Physical and mental health aspects in COVID-19: Two sides of a coin. Avicenna [Internet]. 2021 Sep;2021(2). Available from: https://www.qscience.com/content/journals/10.5339/avi.2021.6

7. OECD. Trustworthy AI in Health. Riyadh, Saudi Arabia; 2020. (Background Paper for the G20 AI Dialogue, Digital Economy Task Force).

8. Dilsizian SE, Siegel EL. Artificial Intelligence in Medicine and Cardiac Imaging: Harnessing Big Data and Advanced Computing to Provide Personalized Medical Diagnosis and Treatment. Curr Cardiol Rep. 2014 Jan;16(1):441.

9. Badawi O, Brennan T, Celi LA, Feng M, Ghassemi M, Ippolito A, et al. Making Big Data Useful for Health Care: A Summary of the Inaugural MIT Critical Data Conference. JMIR Med Informatics. 2014 Aug;2(2):e22–e22.

10. Gadde SS, Reddy VD, Kalli. Descriptive Analysis of Machine Learning and Its Application in Healthcare. Int J Comput Sci Trends Technol. 2008;8(2):189–96.

11. Verma P, Kumar S, Sharma SK. Multiple dimensions of e-healthcare ethics and its relationship to the ethical concerns of the consumer. Int J Ethics Syst. 2021 Jan;37(1):70–89.

12. Saheb T, Saheb T, Carpenter DO. Mapping research strands of ethics of artificial intelligence in healthcare: A bibliometric and content analysis. Comput Biol Med. 2021 Aug;135:104660.

13. Geneviève LD, Martani A, Wangmo T, Paolotti D, Koppeschaar C, Kjelsø C, et al. Participatory Disease Surveillance Systems: Ethical Framework. J Med Internet Res. 2019 May;21(5):e12273–e12273.

14. Petersen C, Subbian V. Special Section on Ethics in Health Informatics. Yearb Med Inform. 2020 Aug;29(01):77–80.

15. Price WN, Cohen IG. Privacy in the age of medical big data. Nat Med. 2019 Jan;25(1):37–43.

16. Mostert M, Bredenoord AL, Biesaart MCIH, van Delden JJM. Big Data in medical research and EU data protection law: challenges to the consent or anonymise approach. Eur J Hum Genet. 2016 Jul;24(7):956–60.

17. Mascalzoni D, Bentzen HB, Budin-Ljøsne I, Bygrave LA, Bell J, Dove ES, et al. Are Requirements to Deposit Data in Research Repositories Compatible With the European Union's General Data Protection Regulation? Ann Intern Med. 2019 Mar;170(5):332.

18. Chen IY, Pierson E, Rose S, Joshi S, Ferryman K, Ghassemi M. Ethical Machine Learning in Healthcare. Annu Rev Biomed Data Sci. 2021 Jul;4(1):123–44.

19. Choudhury A, Asan O. Impact of accountability, training, and human factors on the use of artificial intelligence in healthcare: Exploring the perceptions of healthcare practitioners in the US. Hum Factors Healthc. 2022 Dec;2:100021.

20. Sujan M, Pool R, Salmon P. Eight human factors and ergonomics principles for healthcare artificial intelligence. BMJ Heal Care Inf. 2022 Feb;29(1):e100516–e100516.

21. de Hert P, Sajfert J. Regulating Big Data in and out of the Data Protection Policy Field: Eur Data Prot Law Rev. 2019;5(3):338–51.

22. Shabani M, Bezuidenhout L, Borry P. Attitudes of research participants and the general public towards

genomic data sharing: a systematic literature review. Expert Rev Mol Diagn. 2014 Nov;14(8):1053–65.

23. Aitken M, de St. Jorre J, Pagliari C, Jepson R, Cunningham-Burley S. Public responses to the sharing and linkage of health data for research purposes: a systematic review and thematic synthesis of qualitative studies. BMC Med Ethics. 2016 Dec;17(1):73.

24. Clayton EW, Halverson CM, Sathe NA, Malin BA. A systematic literature review of individuals' perspectives on privacy and genetic information in the United States. Wang W, editor. PLoS One. 2018 Oct;13(10):e0204417–e0204417.

25. Viberg Johansson J, Bentzen HB, Mascalzoni D. What ethical approaches are used by scientists when sharing health data? An interview study. BMC Med Ethics. 2022 Dec;23(1):41.

26. Sandelowski M, Barroso J. Creating Metasummaries of Qualitative Findings. Nurs Res. 2003 Jul;52(4):226–33.

27. Walsh D, Downe S. Meta-synthesis method for qualitative research: a literature review. J Adv Nurs. 2005 Apr;50(2):204–11.

28. Weed M. A Potential Method for the Interpretive Synthesis of Qualitative Research: Issues in the Development of 'Meta-Interpretation.' Int J Soc Res Methodol. 2008 Feb;11(1):13–28.

29. Macpherson A, Holt R. Knowledge, learning and small firm growth: A systematic review of the evidence. Res Policy. 2007 Mar;36(2):172–92.

30. Car J, Sheikh A, Wicks P, Williams MS. Beyond the hype of big data and artificial intelligence: building foundations for knowledge and wisdom. BMC Med. 2019 Dec;17(1):143.

31. Ng WY, Zhang S, Wang Z, Ong CJT, Gunasekeran D V, Lim GYS, et al. Updates in deep learning research in ophthalmology. Clin Sci. 2021 Oct;135(20):2357–76.

32. Zaman U, Imran, Mehmood F, Iqbal N, Kim J, Ibrahim M. Towards Secure and Intelligent Internet of Health Things: A Survey of Enabling Technologies and Applications. Electronics. 2022 Jun;11(12):1893.

33. Rafik H, Maizate A, Ettaoufik A. Data Security Mechanisms, Approaches, and Challenges for e-Health Smart Systems. Int J Online Biomed Eng. 2023 Feb;19(02):42–66.

34. Ali O, Abdelbaki W, Shrestha A, Elbasi E, Alryalat MAA, Dwivedi YK. A systematic literature review of artificial intelligence in the healthcare sector: Benefits, challenges, methodologies, and functionalities. J Innov Knowl. 2023 Jan;8(1):100333.

35. Khawar Hussain H, Tariq A, Yousaf Gill A. Role of AI in Cardiovascular Health Care; a Brief Overview. J World Sci. 2023 Apr;2(4):794–802.

36. Alshehri M. Blockchain-assisted cyber security in medical things using artificial intelligence. Electron Res Arch. 2023;31(2):708–28.

37. Aggarwal R, Sounderajah V, Martin G, Ting DSW, Karthikesalingam A, King D, et al. Diagnostic accuracy of deep learning in medical imaging: a systematic review and meta-analysis. npj Digit Med. 2021 Apr;4(1):65. z

38. Zhou Q, Chen Z, Cao Y, Peng S. Clinical impact and quality of randomized controlled trials involving interventions evaluating artificial intelligence prediction tools: a systematic review. npj Digit Med. 2021 Oct;4(1):154.

39. Xu Z, Wang X, Zeng S, Ren X, Yan Y, Gong Z. Applying artificial intelligence for cancer immunotherapy. Acta Pharm Sin B. 2021 Nov;11(11):3393–405.

40. van de Sande D, van Genderen ME, Huiskens J, Gommers D, van Bommel J. Moving from bytes to bedside: a systematic review on the use of artificial intelligence in the intensive care unit. Intensive Care Med. 2021 Jul;47(7):750–60.

41. Kleppe A, Skrede O-J, De Raedt S, Liestøl K, Kerr DJ, Danielsen HE. Designing deep learning studies in cancer diagnostics. Nat Rev Cancer. 2021 Mar;21(3):199–211. 42. Vagliano I, Chesnaye NC, Leopold JH, Jager KJ, Abu-Hanna A, Schut MC. Machine learning models for predicting acute kidney injury: a systematic review and

critical appraisal. Clin Kidney J. 2022 Nov;15(12):2266–80.

43. Weaver CGW, Basmadjian RB, Williamson T, McBrien K, Sajobi T, Boyne D, et al. Reporting of Model Performance and Statistical Methods in Studies That Use Machine Learning to Develop Clinical Prediction Models: Protocol for a Systematic Review. JMIR Res Protoc. 2022 Mar;11(3):e30956–e30956.

44. Dhiman P, Ma J, Andaur Navarro CL, Speich B, Bullock G, Damen JAA, et al. Methodological conduct of prognostic prediction models developed using machine learning in oncology: a systematic review. BMC Med Res Methodol. 2022 Apr;22(1):101.

45. Xie Q, Wang X, Pei J, Wu Y, Guo Q, Su Y, et al. Machine Learning–Based Prediction Models for Delirium: A Systematic Review and Meta-Analysis. J Am Med Dir Assoc. 2022 Oct;23(10):1655-1668.e6.

46. Bullock GS, Hughes T, Arundale AH, Ward P, Collins GS, Kluzek S. Black Box Prediction Methods in Sports Medicine Deserve a Red Card for Reckless Practice: A Change of Tactics is Needed to Advance Athlete Care. Sport Med. 2022 Aug;52(8):1729–35.

47. Kaiser I, Mathes S, Pfahlberg AB, Uter W, Berking C, Heppt M V, et al. Using the Prediction Model Risk of Bias Assessment Tool (PROBAST) to Evaluate Melanoma Prediction Studies. Cancers (Basel). 2022 Jun;14(12):3033.

48. Trocin C, Mikalef P, Papamitsiou Z, Conboy K. Responsible AI for Digital Health: a Synthesis and a Research Agenda. Inf Syst Front. 2021 Jun;

49. Nair A V, Ramanathan S, Sathiadoss P, Jajodia A, Blair Macdonald D. Barriers to artificial intelligence implementation in radiology practice: What the radiologist needs to know. Radiol (English Ed. 2022 Jul;64(4):324–32.

50. Qayyum A, Qadir J, Bilal M, Al-Fuqaha A. Secure and Robust Machine Learning for Healthcare: A Survey. IEEE Rev Biomed Eng. 2021;14:156–80.

51. Recht MP, Dewey M, Dreyer K, Langlotz C, Niessen W, Prainsack B, et al. Integrating artificial intelligence into the clinical practice of radiology: challenges and recommendations. Eur Radiol. 2020 Jun;30(6):3576–84.

52. Kiener M. Artificial intelligence in medicine and the disclosure of risks. AI Soc. 2021 Sep;36(3):705–13.

53. Khan R, Srivastava AK, Gupta M, Kumari P, Kumar S. Medicolite-Machine Learning-Based Patient Care Model. Keravnou E, editor. Comput Intell Neurosci. 2022 Jan;2022:1–12.

54. Hermann E. Leveraging Artificial Intelligence in Marketing for Social Good—An Ethical Perspective. J Bus Ethics. 2022 Aug;179(1):43–61.

55. Durán JM, Jongsma KR. Who is afraid of black box algorithms? On the epistemological and ethical basis of trust in medical AI. J Med Ethics. 2021 Mar;medethics-2020-106820. 56. Lysaght T, Lim HY, Xafis V, Ngiam KY. AI-Assisted Decision-making in Healthcare. Asian Bioeth Rev. 2019 Sep;11(3):299–314.

57. Redrup Hill E, Mitchell C, Brigden T, Hall A. Ethical and legal considerations influencing human involvement in the implementation of artificial intelligence in a clinical pathway: A multi-stakeholder perspective. Front Digit Heal. 2023 Mar;5.

58. Rathore FA, Rathore MA. The Emerging Role of Artificial Intelligence in Healthcare. J Pak Med Assoc. 2023 Jun;73(7):1368–9. 59. Buabbas AJ, Miskin B, Alnaqi AA, Ayed AK, Shehab AA, Syed-Abdul S, et al. Investigating Students' Perceptions towards Artificial Intelligence in Medical Education. Healthcare. 2023 May;11(9):1298.

60. Secinaro S, Calandra D, Secinaro A, Muthurangu V, Biancone P. The role of artificial intelligence in healthcare: a structured literature review. BMC Med Inform Decis Mak. 2021 Dec;21(1):125.

61. Jussupow E, Spohrer K, Heinzl A, Gawlitza J. Augmenting Medical Diagnosis Decisions? An Investigation into Physicians' Decision-Making Process with Artificial Intelligence. Inf Syst Res. 2021 Sep;32(3):713–35.

62. Homayoun H, Rad HS, Ardakani AA. The Role of Artificial Intelligence in Urology Practice. Transitional Res Urol. 2022;4(1):1–3. 63. Pezzo M V, Beckstead JW. Algorithm Aversion Is Too Often Presented as Though It Were Non-Compensatory: A Reply to Longoni et al. (2020). Judgm Decis Mak. 2020;15(3):449–51. 64. Manickam P, Mariappan SA, Murugesan SM, Hansda S, Kaushik A, Shinde R, et al. Artificial Intelligence (AI) and Internet of Medical Things (IoMT) Assisted Biomedical Systems for Intelligent Healthcare. Biosensors. 2022 Jul;12(8):562.

65. Humairo CN, Hapsari A, Bramanti I. The Role of Artificial Intelligence in Many Dental Specialties. Gunadi, Yamada T, Pramana AAC, Ophinni Y, Gusnanto A, Kusuma WA, et al., editors. BIO Web Conf. 2021 Dec;41:3005. 66. Naqvi SG, Nasir T, Azam H, Zafar L. Artificial Intelligence in Healthcare. Pakistan J Humanit Soc Sci. 2023 Jun;11(2).

67. Talwar V, Chufal KS, Joga S. Artificial Intelligence: A New Tool in Oncologist's Armamentarium. Indian J Med Paediatr Oncol. 2021 Dec;42(06):511–7.

68. Seetharam K, Shrestha S, Sengupta PP. Cardiovascular Imaging and Intervention Through the Lens of Artificial Intelligence. Interv Cardiol Rev Res Resour. 2021 Oct;16.

69. Mahdi SS, Battineni G, Khawaja M, Allana R, Siddiqui MK, Agha D. How does artificial intelligence impact digital healthcare initiatives? A review of AI applications in dental healthcare. Int J Inf Manag Data Insights 2023 Apr;3(1):100144.

Review Article

PREVENTION OF CENTRAL VENOUS LINE ASSOCIATED BLOODSTREAM INFECTIONS- A LITERATURE REVIEW

Tariq Ali[1], Kashif Khan[2]

[1]Aga Khan University School of Nursing and Midwifery, Karachi, Pakistan, [2]Hayatabad Institute of Medical Sciences (HIMS) College of Nursing, Peshawar, Pakistan

Correspondence:
Kashif Khan
Vice Principal/Assistant Professor HIMS College of Nursing, Peshawar, Pakistan
Email: kashifadmissions97@gmail.com

DOI:10.38106/LMRJ.2024.6.2-08
Received:26.02.2024
Accepted: 20.06.2024
Published:30.06.2024

ABSTRACT

Hospital-acquired infections, particularly Central Venous Line-Associated Bloodstream Infections (CLABSIs), are a noteworthy concern in intensive care units (ICUs). CLABSIs not only extend hospital stays but also increase healthcare costs and pose serious threats to patients' well-being. This narrative literature review explores the evidence-based strategies for the prevention of CLABSIs in critical care settings. It emphasizes the importance of proper infection control measures, such as hand hygiene, maximal barrier precautions, and chlorhexidine skin preparation, to reduce the risk of infection. The choice of catheter insertion site, duration of catheter use, and nurse-patient ratios are also discussed as crucial factors in CLABSI prevention. Additionally, post-insertion care, including daily bathing with chlorhexidine, catheter patency maintenance, and dressing changes, is highlighted. The review underscores the need for healthcare workers to adhere to best practices and guidelines to minimize CLABSI rates, ultimately enhancing patient safety and reducing healthcare burdens. The findings emphasize the significance of informed practices in preventing CLABSIs and the potential for improved patient outcomes with their implementation.

Keywords: Central venous catheter, infection control, best practices, guidelines, Antimicrobial-coated catheters

INTRODUCTION

Hospital-acquired infections in intensive care units are a source of prolonged length of stay in the hospital, increased expenses on the patient, and, most importantly, the cause of morbidity and mortality (1). The infectious pathogens are sometimes resistant to multiple drugs and cannot be cured with a common or a single medication, exerting more burden on the patient and the hospitals. These infections contribute to severe health conditions in neonates (2). Similarly, infections can cause life-threatening illnesses in adult patients admitted into critical care units (1). A common source of nosocomial infection and higher incidence rates is improper dealing with a central venous line or central catheter. Infections related to central venous lines significantly contribute to hospital-acquired infections and sometimes sepsis in critical care patients (3. Central venous lines or central venous catheters are frequently used in critical patients to facilitate multiple purposes like administering medications and parenteral nutrition, infusing fluids, transfusion of blood products, performing plasmapheresis and dialysis, and measuring venous pressure. When inserted, the central lines are in place for several days and even weeks (4). Improper care and use without preventive measures of these catheters end up in infection spreading to the bloodstream and leading to sepsis, septic shock, and extra burden on the patient and healthcare system, as discussed above. Infections related to these lines are preventable by consistently incorporating evidence-based guidelines in patient care. The higher rate

of bloodstream infections associated with the central line is due to poor compliance with infection control measures.

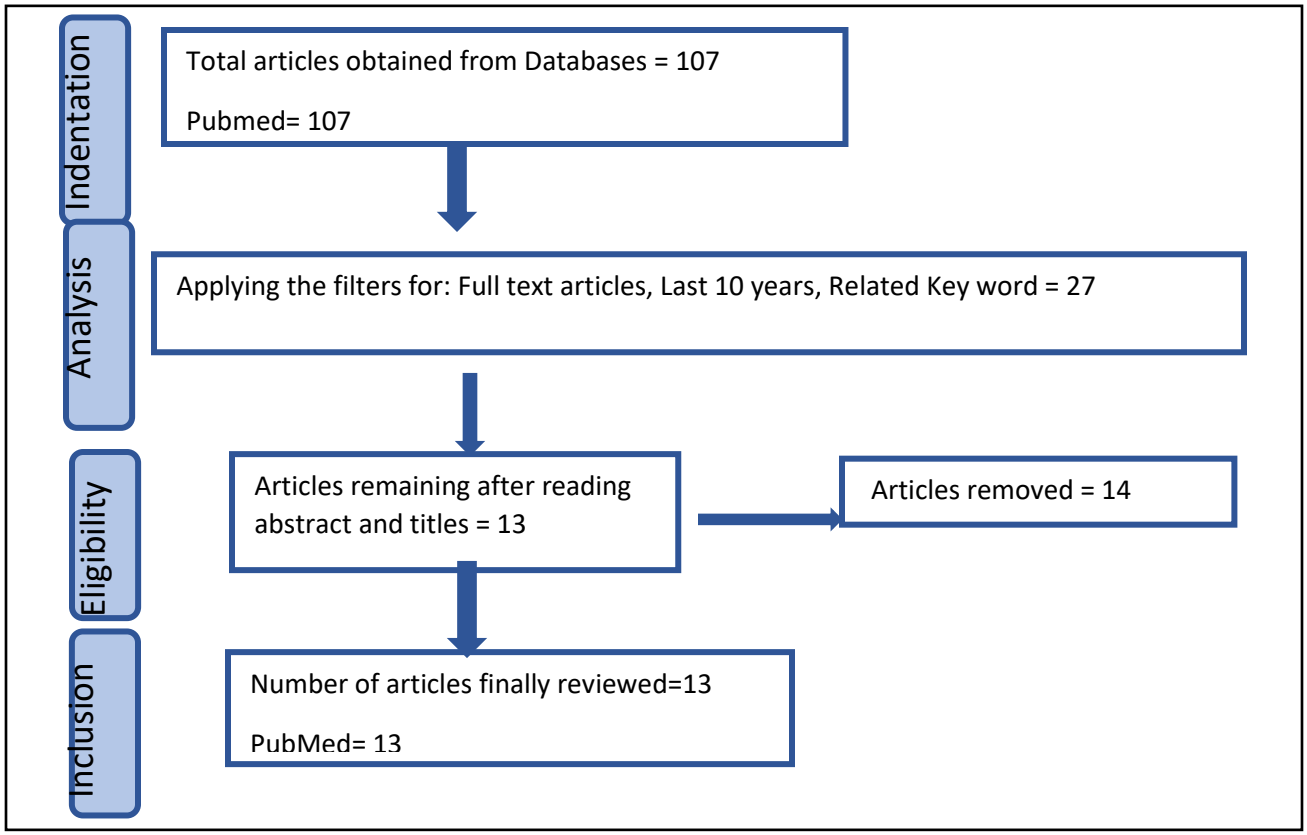
In addition, the incidence rate is reported to be higher in developing countries than in developed countries and resourceful settings. Several strategies have been revealed to control central line-related infections and make it useable for a maximum duration, including central line bundle of care, duration of the catheter, nurse-patient ratio, insertion site, and care of the catheter after insertion.

This review is taken on to recapitulate the evidence for effective prevention of bloodstream infections related to central venous lines in critical care units to address the question: is the evidence concluded to prevent central line-associated bloodstream infections effectively?

Search Strategy

PubMed data base was used for literature search purposes. The keywords included were, "central venous catheter" AND "infection control" AND " best practices" OR " guidelines" AND "Antimicrobial-coated catheters" AND "CLABSI reduction" OR "Bundle protocols" OR "CLABSI prevention" AND "Hand hygiene" OR "central line infection". The search yielded a total of 107 articles. Two filters were applied those were full text and last ten years. Only 27 articles remained after the application of filters. All 27 articles were reviewed and then 13 articles were included in the literature review. Articles published in high impact factor journals and relevant to the topic of interest were included. Literature search strategy is presented in Figure 1.

Figure 4. PRISMA Flow Chart of Literature Search Strategy



Review of the Literature

Overall improvement in the knowledge and practice regarding evidence-based practices for infection prevention related to central lines is required for healthcare workers. The study described that nurses' knowledge, attitude, and approach toward preventive measures of catheter-related infections can be

enahnced with training with evidence-based policies (5). Poor compliance with infection control practices has contributed to higher catheter-related infection rates in ICUs (4).

Updated guidelines have been provided for preventing intravascular catheter-related infections. A study carried out with a project on quality improvement principles shows that a noteworthy reduction in catheter-related infections is possible with improved quality of care in ICUs (2). Adherence to infection control techniques is recommended, especially in patients with compromised immunity levels (6). The evidence-based practices are followed universally for preventing central line-associated bloodstream infections.

Application of Preventive Measures

Hand washing

Proper hand washing is essential to performing any procedure on a patient. Hand washing should be done before and after every procedure performed on a patient. A strong association has been shown between infection related to central line procedures performed without handwashing compared to procedures performed with handwashing (5, 7, 8).

Maximal barrier precautions

These are the personal kits to be worn by the person(s) performing the central line catheterization procedure, including the mask, gown, hat, gloves, and full body drape. Any equipment missing during the process can lead to an increased risk of infection. Lee, Cho (7), showed that the infection rate was lower in patients for whom a minimum of four of the five components were used, while it was considerably high where zero to three components were used.

Chlorhexidine skin preparation

The skin is prepared for the insertion site of the central line. Most commonly, the skin preparation is done with 2% chlorhexidine, which is more effective in preventing catheter-related infection than other solutions (8).

Site for the Catheter Insertion

Three sites are commonly used as insertion sites for central venous line catheters: the internal jugular vein, subclavian vein, and femoral vein (9). The subclavian vein is considered the safest site for the catheter in terms of catheter-related infections as compared to other sites, as catheters inserted peripherally are more susceptible to clotting and dislocating compared to the central venous catheter placed in the internal jugular or subclavian veins . However, the physician sometimes finds it convenient to insert the catheter into the femoral vein, an avoidable site for preventing the infection. So, considering an appropriate site, minimizing patients risk from disease and other complications to ensure the quality care improvement is needed to be preferred over own feasibility.

Duration of the Central Line Catheter

However, the catheter duration is not associated with the infection. Chi, Guo (5), said central venous catheters should be removed and replaced only when a related disorder is considered. Burnham, Rojek (10), claimed that catheter removal in patients who caught an infection related to the catheter was effective compared to non-removal. Researchers also claim that peripherally inserted catheters must be replaced in 25 days to prevent catheter-related infections (11). The central venous catheter placed in an emergency situation must be replaced immediately (8). As the infection preventive guidelines are less likely to be applied appropriately in emergencies, the catheter must be replaced with infection prevention guidelines. In the light of the evidence provided, there is no specified time for the catheter removal. It should be removed when it is not required any further or in case of infection related to it.

Nurse Patient Ratio

A proper nurse-to-patient ratio is essential to ensure the delivery of holistic care. Aloush and Alsaraireh (12), reported that nurses working with a nurse-to-patient percentage of 1:1 are 6.3 times more likely to conform to infection prevention guidelines than a rate of 1:2 in critical care. Thus, a higher number of patients assigned to a single nurse can cause a failure for a nurse to give proper time to every patient and increase the risk of complications. Therefore, lowering the nurse-to-patient ratio can ensure compliance with preventive measures to prevent the infection.

Post Insertion Care of Catheter

Daily Bathing with Chlorhexidine

During stay in intensive care units, daily bath with chlorhexidine gluconate has been suggested as an effective intervention to control the rate of infections. Daily bathing of the patients admitted to ICUs is reported to overcome approximately 29% of bloodstream infections, 40% of central line-associated bloodstream infections, and 18% of multidrug-resistant organisms' infections (1). Reynolds, Woltz (3), also recommended an implementation program for nurses to change their behavior and improve knowledge and perception by adopting the guidelines based on chlorhexidine bathing, resulting in a significant 27.4% reduction in central line-associated bloodstream infections in the study.

Patency of Central Venous Catheters

Keeping the catheter patent is necessary for its long-term use, and for this purpose, proper flush and lock of the catheter is always essential to reduce the blood influx into the catheter. Using the catheter for a long duration may cause catheter occlusion, which further needs to be replaced, causing threats to the patient's health and the expenditure burden on the hospital and patient (13). Zhong, Wang (13), compared the use of normal saline and heparinized saline for flushing and locking the catheter and found no significant difference in both. Instead, the heparin further exposes the patient to coagulation disorder. So, it is recommended to regularly flush the catheter and lock it properly for its prolonged use.

Dressing Changes

The insertion site needs to be disinfected and applied with dressing and routinely observed for signs of infection and blood oozing. The preferable dressing for the site is transparent dressing and semipermeable rather than sterile gauze for the detection of early infection signs of infection; sterile gauze may be used if the patient is sweating, the site is oozing or bleeding actively (8). The dressing must be changed every seven days or if it becomes opaque, loosened or moist.

CONCLUSION

In conclusion, central venous line catheters are widely used in the hospital for accessing a large vein of the body for multiple purposes, like administration of medicine, parenteral nutrition, blood transfusion and performing procedures like dialysis and plasmapheresis. It must be placed with appropriate guidelines and infection prevention measures to ensure patient safety from complications and save the hospital and patient from extra burden of prolonged hospitalization.

REFERENCES

1. Frost SA, Hou YC, Lombardo L, Metcalfe L, Lynch JM, Hunt L, et al. Evidence for the effectiveness of chlorhexidine bathing and health care-associated infections among adult intensive care patients: a trial sequential meta-analysis. BMC Infect Dis. 2018;18(1):679.

2. Balla KC, Rao SP, Arul C, Shashidhar A, Prashantha YN, Nagaraj S, et al. Decreasing Central Line-associated Bloodstream Infections Through Quality Improvement Initiative. Indian Pediatr. 2018;55(9):753-6.

3. Reynolds SS, Woltz P, Keating E, Neff J, Elliott J, Hatch D, et al. Results of the CHlorhexidine Gluconate Bathing implementation intervention to improve evidence-based nursing practices for prevention of central line associated bloodstream infections Study (CHanGing BathS): a stepped wedge cluster randomized trial. Implement Sci. 2021;16(1):45.
4. Khodare A, Kale P, Pindi G, Joy L, Khillan V. Incidence, Microbiological Profile, and Impact of Preventive Measures on Central Line-associated Bloodstream Infection in Liver Care Intensive Care Unit. Indian J Crit Care Med. 2020;24(1):17-22.
5. Chi X, Guo J, Niu X, He R, Wu L, Xu H. Prevention of central line-associated bloodstream infections: a survey of ICU nurses' knowledge and practice in China. Antimicrob Resist Infect Control. 2020;9(1):186.
6. Baier C, Linke L, Eder M, Schwab F, Chaberny IF, Vonberg RP, et al. Incidence, risk factors and healthcare costs of central line-associated nosocomial bloodstream infections in hematologic and oncologic patients. PLoS One. 2020;15(1):e0227772.
7. Lee KH, Cho NH, Jeong SJ, Kim MN, Han SH, Song YG. Effect of Central Line Bundle Compliance on Central Line-Associated Bloodstream Infections. Yonsei Med J. 2018;59(3):376-82.
8. Lutwick L, Al-Maani AS, Mehtar S, Memish Z, Rosenthal VD, Dramowski A, et al. Managing and preventing vascular catheter infections: A position paper of the international society for infectious diseases. Int J Infect Dis. 2019;84:22-9.
9. Bell T, O'Grady NP. Prevention of Central Line-Associated Bloodstream Infections. Infect Dis Clin North Am. 2017;31(3):551-9.
10. Burnham JP, Rojek RP, Kollef MH. Catheter removal and outcomes of multidrug-resistant central-line-associated bloodstream infection. Medicine (Baltimore). 2018;97(42):e12782.
11. Park S, Moon S, Pai H, Kim B. Appropriate duration of peripherally inserted central catheter maintenance to prevent central line-associated bloodstream infection. PLoS One. 2020;15(6):e0234966.
12. Aloush SM, Alsaraireh FA. Nurses' compliance with central line associated blood stream infection prevention guidelines. Saudi Med J. 2018;39(3):273-9.
13. Zhong L, Wang HL, Xu B, Yuan Y, Wang X, Zhang YY, et al. Normal saline versus heparin for patency of central venous catheters in adult patients - a systematic review and meta-analysis. Crit Care. 2017;21(1):5.

Case Report

A MULTIDISCIPLINARY APPROACH TO MANAGING UNUSUAL COMPLICATIONS FOLLOWING CORROSIVE INGESTION IN A YOUNG ADULT: A CASE REPORT

Anny Ashiq Ali, Kashif Khan, Salma Ratani, Samar Fatima
Agha University Hospital, School of Nursing and Midwifrey, Pakistan

Correspondence:
Anny Ashiq Ali,
Agha Khan Hospital, School of Nursing and Midwifery
Karachi, Pakistan
Email: annyamirali@gmail.com

DOI: 10.38106/LMRJ.2024.6.2-09
Received: 19.10.2023
Accepted: 26.06.2024
Published: 30.06.2024

ABSTRACT

This case report presents the clinical management of a 24-year-old female patient who was presented to the emergency room with a history of corrosive ingestion. The patient experienced a complex clinical course involving cardiogenic shock, myocarditis, high anion -gap metabolic acidosis, esophagitis, and pulmonary complications. The issue at hand could not have been caused by only corrosive ingestion; it looked like a distinct matter involved. This case highlights the challenges in diagnosing and managing such cases and the importance of a multidisciplinary approach to optimize patient outcomes.

Key Words: **Corrosive Ingestion, Cardiogenic Shock, Suspected Organophosphorus ingestion**

INTRODUCTION

Organophosphorus ingestion poses a significant medical challenge, with a broad spectrum of immediate and long-term effects, ranging from facial and oropharyngeal burns to life-threatening esophageal and gastric necrosis, potentially leading to fatal outcomes (1). While the consequences of caustic ingestion can vary, this dangerous act is often deliberate among adults and is particularly associated with suicide attempts. Notably, individuals with psychiatric disorders or a history of alcoholism are at an elevated risk (2). Corrosive ingestion, often involving household cleaning products, poses a serious risk, especially among underprivileged teenage girls in rural areas. Improved coordination among medical specialists and regulations for product manufacturers can reduce the incidence of this life-threatening issue (3).

This case report provides a comprehensive account of a young female patient, without any known comorbidities, who ingested a corrosive substance. It underscores the gravity of such incidents and the urgent need for holistic care. This case is particularly pertinent as it sheds light on both the immediate and long-term effects of organophosphorus poisoning, emphasizing the essential role of a multidisciplinary approach in optimizing patient care and outcomes. The successful management of this patient, marked by improved clinical status, underscores the significance of early recognition, specialized care, and aggressive intervention.

The prevalence of caustic poisonings is a matter of grave concern, as indicated by data from the American Association of Poison Control, which reports over 200,000 cases annually, predominantly involving household cleaning products with acidic or alkaline properties (4). In England and Wales, more than 40,000 cases of caustic ingestion in children are reported annually. A startling trend

emerges in regions like Galsya, where over 500 toxic substances are stored in households, primarily in kitchens, often without proper consideration for safe storage practices. Consequently, caustic ingestion in children accounts for 4.8% of the annual medical service admissions among half a million children under 14. One was conducted in a tertiary care hospital in Pakistan, primarily focusing on clinical-epidemiological characteristics. It reported that the majority were females (65.5%), and corrosive ingestion was often deliberate for suicidal purposes (95.6%), with commonly used agents being bathroom cleaners and laundry bleaches (2). Moreover, a review paper also concluded that younger individuals (<30 years) showed higher suicidal behavior rates, with females representing up to 60% of attempts, though more completed suicides occurred among males. Urban areas had diverse methods, including household chemicals, benzodiazepines, kerosene oil, and rat poison (5). Among adults, this alarming statistic highlights the pressing need for increased awareness regarding safe household chemical storage practices. A recent Indian study highlighted the increasing problem of poisoning, primarily from household products. It underscores the need for heightened awareness and preventive actions, including identifying high-risk situations and toxic products, and implementing effective home poison control programs (Sharda Shah & Gupta, 2018). Moreover, the economic burden imposed by caustic ingestions is substantial, encompassing measurement, treatment, follow-up, and caregiving costs. While short-term consequences such as esophageal stricture are well-recognized, caustic agents can inflict severe long-term effects, including esophageal perforation, obstruction, and even the development of esophageal cancer (6). Notably, approximately 80% of corrosive ingestion cases involve children, with a significant proportion occurring in developing countries. Younger children, particularly those under five years old, are prone to accidental ingestions, while adolescents more frequently engage in suicidal ingestion. The extent of injury hinges on various factors, including the type of corrosive substance (alkali or acid), its pH level, the quantity ingested, and the site of contact within the body. Managing immediate ingestion incidents and their potential long-term complications present a myriad of uncertainties and challenges (7).

Case Presentation

A twenty-four-year-old female presented to the emergency department of a private tertiary care hospital with a history of corrosive ingestion on the night shift. She was initially managed in a local hospital within ten minutes with hypersalivation and throat irritation. Nasogastric-guided lavage was performed and later transferred to a private tertiary care hospital for further management.

Patient Presentation

On history, she took a white colour liquid 150ml, likely bleach. She was conscious, and no tonic-colonic seizures were observed. On arrival in the ER, her blood pressure was 119/78mmHg, and her heart rate was 118 per minute. Pupils were bilateral and equally reactive to light. Moreover, her temperature was 37 degrees Celsius, her respiratory rate was 22 per minute, and her oxygen saturation was 100%. 0.25 mg Atropine was given due to post-op poisoning. Atropine is given to poisoned patients to block muscarinic overstimulation (3).

Physical examination results

After 04 hours, the patient was transferred to the special care unit for further management under multiple teams, including the Intensive care team, Internal Medicine team, Gastroenterology, Cardiology, and toxicology teams. Initial ABGs were sent, the results were suggestive of metabolic acidosis (Table 1).

Upon arrival, the Glasgow Coma Scale scored 15 out of 15. Upon conducting a physical assessment, the skin exhibited a cool and moist sensation. The cardiac examination detected no unusual sounds, with both S1 and S2 heart sounds audible. During the respiratory evaluation, bilateral equal air entry was noted, along with the presence of basal crepitations.

In the musculoskeletal system evaluation, a +2-tendon reflex was observed, with a limited range of motion noted in both legs. The patient was responsive and followed commands. Lymph nodes were non-palpable, and the abdomen felt soft and non-tender. No significant abnormalities were detected in other systems.

Table 1. Arterial Blood Gas Reports

PH	7.40	7.30
PCO2	39	35
PO2	35	99
Bicarb	23	16
O2 sat	68%	96%

During the assessment, the patient's urine output was decreased, indicating hypotension with a systolic blood pressure of 80 mmHg and persistent frothing oral secretions. Immediate fluid resuscitation was initiated, administering 2.8 litres of fluids. Central venous access was established to monitor central venous pressure (CVP), and inotropic agents (vasopressin and norepinephrine infusion) were administered to maintain adequate perfusion.

CVP was closely monitored with a target value of approximately 12 cm H_2O. Over time, the inotropic support was gradually reduced as the patient's hemodynamic status improved. This patient presented with an atypical picture of corrosive ingestion, displaying hypovolemic and cardiogenic shock symptoms. The rapid response team was alerted, and specialists in cardiology and gastroenterology were consulted.

Subsequently, the patient developed shortness of breath and exhibited bilateral crepitations upon auscultation. A chest X-ray confirmed the presence of pulmonary edema, prompting the initiation of non-invasive ventilation support to enhance oxygenation and alleviate respiratory distress. As her pulmonary edema resolved, the NIV support was successfully discontinued.

Given the persistent hypotension and pulmonary edema, cardiology consultation was sought. Echocardiography revealed a reduced ejection fraction (EF) of 30%. The patient was diagnosed with corrosive-induced cardiomyopathy. Cardiology specialists recommended appropriate medication adjustments, including angiotensin-converting enzyme inhibitors (ACE inhibitors) and beta-blockers, to manage the cardiomyopathy and optimize cardiac function.

While going on with the case, family conflicts have been highlighted and promptly handled by the multidisciplinary approach of different consultants and Nursing professionals. During the hospital stay, the patient's condition improved significantly, and her family was counselled in detail regarding her condition and possible long-term effects; and advised for further monitoring, but family decided to leave against medical advice due to financial constraints. In the end, medication compliance, soft diet, hydrations, and teachings related to vomiting or chest pain, stopping oral diet and rushing to the emergency department were the main components of discharge teachings.

Differential Diagnosis

- Hypovolemic shock versus cardiogenic shock.
- Myocarditis 2-degree toxic ingestion.
- NAGMA (Non-anion-gap metabolic acidosis).

- Hypoxic respiratory failure 2-degree volume overload.
- Esophagitis 2-degree toxic ingestion (Showing esophageal stricture)

Laboratory and diagnostic test findings with rationale

Based on the presented symptoms, several diagnostic measures can be employed to investigate myocarditis or related risk factors. The initial assessment commonly encompasses a range of examinations, including blood tests, radiological evaluations such as chest X-rays, CT scans of the chest, abdomen, and pelvis, abdominal ultrasound, echocardiography, and electrocardiograms (EKGs). A summary of the investigations is presented in Tables 2 and 3.

Table. 2. Summary of diagnostic procedures of the patient

Diagnostic Measures	Results
Chest X-ray	Mild bilateral pleural effusion with subsegmental atelectasis Developing pulmonary edema Redemonstration of inhomogeneous airspace opacification in the left lower zone.
CT's Abdomen and Pelvis	Minimal bilateral pleural effusion with basilar atelectatic changes and mild fat stranding in the mediastinum. No abnormal dilation.
Ultrasound Abdomen	Slightly thickened and edematous gallbladder walls, likely secondary to ascites. Minimal abdominopelvic ascites. Minimal finding of pleural effusion.
Echocardiogram	Left ventricular systolic function is moderately reduced. The ejection fraction is approximately 35%. Grade III left ventricular diastolic dysfunction Mild mitral regurgitation Mild tricuspid regurgitation

Table. 2. Summary of laboratory investigations of the patient

Labs	Results	Labs	Results
HB	13.6 g/dl	Na	14 mmol/L
Hct	40.9%	K	3.7mmol/L
WBC	10.9*10E9/L	Cl	106mmol/L
Platelets	198*10E9/L	Bic	27.2mmol/L
BUN	14mg/dl	Glu.fasting	106mg/dl
S. Cr	0.5mg/dl	TSH	1.670uIU/ml
eGFR	>60 ml/min	Ca	7.9mg/dl
Urine DR	Normal	Mg	2.0mg/dl
PT	12.0sec	APTT	26.5 sec
INR	1.1 ratio	Trop I	1749ng/L

Management of corrosive ingestion and its treatment plan:

1. Initial Assessment:

Upon arrival, the patient was assessed for immediate life-threatening complications of corrosive ingestion. The initial presentation included cardiogenic shock, which was addressed promptly.

2. Nutritional Support:

The patient was placed on nothing per oral (NPO) status and received parenteral nutrition via a central line to ensure adequate nutritional support while minimizing the risk of further esophageal damage.

3. Gastroenterology Consultation:

A gastroenterology specialist was consulted to evaluate and manage the esophageal injury. They recommended a stepwise approach to re-introducing oral intake based on the patient's condition and tolerance.

4. Radiological Assessment:

A CT Chest and abdomen with contrast was performed to assess the extent of the injury. The imaging revealed airspace opacification in the left lower lobe and posterior segments of bilateral lower lobes with air bronchograms, possibly indicating secondary infection. Additionally, minimal bilateral pleural effusion, basilar atelectatic changes, and mild fat stranding in the mediastinum were noted.

5. Diet Progression:

After the initial stabilization, the patient was cautiously transitioned to a clear liquid diet, which she tolerated well. Subsequently, her diet was escalated to a soft diet, allowing for a gradual reintroduction of oral intake.

6. Family Education and Counseling:

The patient's family was extensively counselled throughout the hospital stay about her condition, potential long-term effects, and the importance of ongoing monitoring and follow-up care.

Outcome:

During her hospitalization, the patient's clinical status showed significant improvement. However, despite the positive progress, the patient and her family chose to leave against medical advice. This decision underscores the complexity of managing corrosive ingestion cases and emphasizes the critical role of patient education and effective communication in ensuring optimal outcomes.

Pharmacological Therapy

Several drugs were used to treat the patient's condition. Table 4 shows the typical medications used in the treatment plan for the patient.

Table 4. Summary of Pharmacological management of the patients

Drugs	Classification & Mechanism of Action
Ipratropium Bromide	**Classification:** Anticholinergic Bronchodilator **Mechanism of Action:** Ipratropium bromide blocks muscarinic receptors in the airways, leading to bronchodilation and reduced airway secretions.
Calcium Gluconate	**Classification:** Electrolyte Replacement **Mechanism of Action:** Calcium gluconate is used to treat conditions like hypocalcemia. It provides an immediate source of calcium ions, helping to restore normal calcium levels in the body.
Sodium Chloride infusion	**Classification:** Electrolyte Solution **Mechanism of Action:** Sodium chloride infusion provides essential

	sodium and chloride ions needed for various physiological processes in the body.
Sucralfate	**Classification:** Gastrointestinal Protectant **Mechanism of Action:** Sucralfate forms a protective barrier over ulcers and damaged mucosa in the gastrointestinal tract. This barrier shields the tissue from gastric acid and pepsin, promoting healing.
Omeprazole	**Classification:** Proton Pump Inhibitor **Mechanism of Action:** Omeprazole reduces gastric acid production by inhibiting the proton pump in the stomach's parietal cells.
Metoprolol Tartrate	**Classification:** Beta-Blocker (Beta-1 Selective) **Mechanism of Action:** Metoprolol tartrate blocks beta-1 adrenergic receptors, reducing heart rate and blood pressure.
AminoAcid8%	**Classification:** Parenteral Nutritional Supplement **Mechanism of Action:** Amino acid solutions provide essential amino acids for protein synthesis and overall nutritional support in patients who cannot take nutrients orally.
Lactated Ringer Solution	**Classification:** Intravenous Fluid (Crystalloid) **Mechanism of Action:** Lactated Ringer solution is used to restore fluid and electrolyte balance in the body. It contains sodium, potassium, calcium, and lactate, which help replace lost fluids and maintain pH.
Hydrocortisone	**Classification:** Corticosteroid (Glucocorticoid) **Mechanism of Action:** Hydrocortisone acts as an anti-inflammatory and immunosuppressive agent by reducing the production of inflammatory mediators.
Ondansetron HCL	**Classification:** Antiemetic (5-HT3 Receptor Antagonist) **Mechanism of Action:** Ondansetron blocks serotonin (5-HT3) receptors in the central nervous system and gastrointestinal tract, preventing nausea and vomiting.
Furosemide	**Classification:** Loop Diuretic **Mechanism of Action:** Furosemide inhibits the reabsorption of sodium and chloride in the ascending loop of Henle in the kidney, leading to increased urine output.
Meropenem	**Classification:** Antibiotic (Carbapenem) **Mechanism of Action:** Meropenem is a broad-spectrum antibiotic that inhibits bacterial cell wall synthesis. It is effective against many bacteria and treats severe bacterial infections.
Vasopressin	**Classification:** Hormone (Antidiuretic Hormone) **Mechanism of Action:** Vasopressin, also known as antidiuretic hormone (Adhami Moghadam et al.), acts on the kidneys to promote water reabsorption, reducing urine output.
Nor Epinephrine	**Classification:** Sympathomimetic Vasopressor **Mechanism of Action:** Norepinephrine is a potent vasoconstrictor that increases blood pressure by stimulating alpha-adrenergic receptors.
5% Dextrose	**Classification**: Carbohydrate Solution **Mechanism of Action:** A 5% dextrose solution provides a source of glucose for energy and helps maintain blood sugar levels.

DISCUSSION

Acute corrosive poisonings represent a significant societal and medical challenge, causing severe chemical damage primarily to the upper gastrointestinal tract, particularly the esophagus and stomach. These cases present complex clinical signs, challenging clinical evaluations and uncertain treatment results. Typically occurring in individuals during their most active life stages, they impose substantial economic burdens due to the necessity for expensive diagnostic and therapeutic interventions and extended hospital stays. Given the intricate clinical presentation during the acute phase, the need for thorough assessments, and the potential for significant long-term complications, a multidisciplinary approach is indispensable for providing the best possible patient care.

Furthermore, thorough patient education and communication are crucial in guiding patients and their families through the complexities of treatment and potential long-term consequences, ultimately promoting the best possible outcome for the patient's well-being.

The case presented here underscores the formidable challenges acute corrosive poisonings pose to healthcare providers and patients. This 24-year-old female patient's clinical journey after ingesting a corrosive substance highlights the intricate nature of diagnosing and managing such cases. The complex clinical presentation, involving cardiogenic shock, myocarditis, high anion gap metabolic acidosis, esophagitis, and pulmonary complications, exemplifies the diverse array of immediate and long-term effects that corrosive ingestions can trigger.

In our patient, gastric lavage was also employed as the initial treatment following the ingestion of corrosive substances. This procedure was part of the first-line management strategy. Subsequently, a plain radiograph was utilized to identify signs of esophageal or gastric perforation and provide valuable insights into the size of the mediastinum. Esophagogastroduodenoscopy, an advanced and dependable diagnostic technique, was employed to assess acute corrosive intoxications and detect lesions in the upper gastrointestinal tract (3).

Managing cases of corrosive ingestion requires a multidisciplinary approach, as seen in this patient's care. The involvement of emergency medicine, cardiology, gastroenterology, and radiology teams underscores the necessity for a coordinated effort to optimize patient outcomes. The patient's initial presentation, marked by shock symptoms and metabolic acidosis, demonstrates the need for swift and comprehensive assessment and intervention in corrosive ingestion cases. The utilization of inotropic agents and aggressive fluid resuscitation played a pivotal role in stabilizing her hemodynamic status.

Furthermore, the development of pulmonary edema and corrosive-induced cardiomyopathy showcases the diverse complications that can arise from corrosive ingestions. The role of specialized cardiac care, including echocardiography and tailored medication adjustments, was vital in addressing these cardiac manifestations.

CONCLUSION

Corrosive ingestion is a life-threatening condition that can result in complex cardiovascular and pulmonary complications. Early recognition, aggressive fluid resuscitation, inotropic support, and specialized cardiac care are essential for successful management. This case report emphasizes the importance of a coordinated approach toward corrosive ingestion-induced complications.

REFERENCES

1. Adhami Moghadam, F., Sahebalzamani, M., Mohammadi, F., Farahani, H., & Abdolreza Gharahbagh, Z. (2018). A comparative analysis of the effect of Mini-CEX and conventional

assessment methods on clinical skills in anesthesiology students of School of Paramedicine, Hamedan University of Medical Sciences.
2. Chibishev, A., Pereska, Z., Chibisheva, V., & Simonovska, N. (2012). Corrosive poisonings in adults. Mater Sociomed, 24(2), 125-130. https://doi.org/10.5455/msm.2012.24.125-130
3. Eddleston, M., & Chowdhury, F. R. (2016). Pharmacological treatment of organophosphorus insecticide poisoning: the old and the (possible) new. British journal of clinical pharmacology, 81(3), 462-470.
4. Hashmi, M. U., Ali, M., Ullah, K., Aleem, A., & Khan, I. H. (2018). Clinico-epidemiological Characteristics of Corrosive Ingestion: A Cross-sectional Study at a Tertiary Care Hospital of Multan, South-Punjab Pakistan. Cureus, 10(5), e2704. https://doi.org/10.7759/cureus.2704
5. Obonyo, H., Tarimo, E. A., Ramadhan, F., & Kapalata, S. N. w. (2019). A cross-sectional study on knowledge and implementation of the nursing process among nurses at Muhimbili National Hospital-Tanzania. Tanzania Journal of Health Research, 21(2), 1-9.
6. Safdar, M., Afzal, K. I., Smith, Z., Ali, F., Zarif, P., & Baig, Z. F. (2021). Suicide by poisoning in Pakistan: review of regional trends, toxicity and management of commonly used agents in the past three decades. BJPsych Open, 7(4), e114. https://doi.org/10.1192/bjo.2021.923
7. Sharda Shah, P., & Gupta, Y. K. (2018). Poisoning due to household products: A ten years retrospective analysis of telephone calls to the National Poisons Information Centre, All India Institute of Medical Sciences, New Delhi, India. Journal of Forensic and Legal Medicine, 58, 205-211. https://doi.org/https://doi.org/10.1016/j.jflm.2018.07.005

Editorial office:

Liaquat Medical Research Journal
Diagnostic & Research Lab,
Liaquat University Hospital, Hyderabad,
Sindh, Pakistan.

Ph #: +92 22 9210 212
Fax #: +92 22 9220 100

Email: lmrj@lumhs.edu.pk
URL:http://ojs.lumhs.edu.pk/index.php/LMRJ