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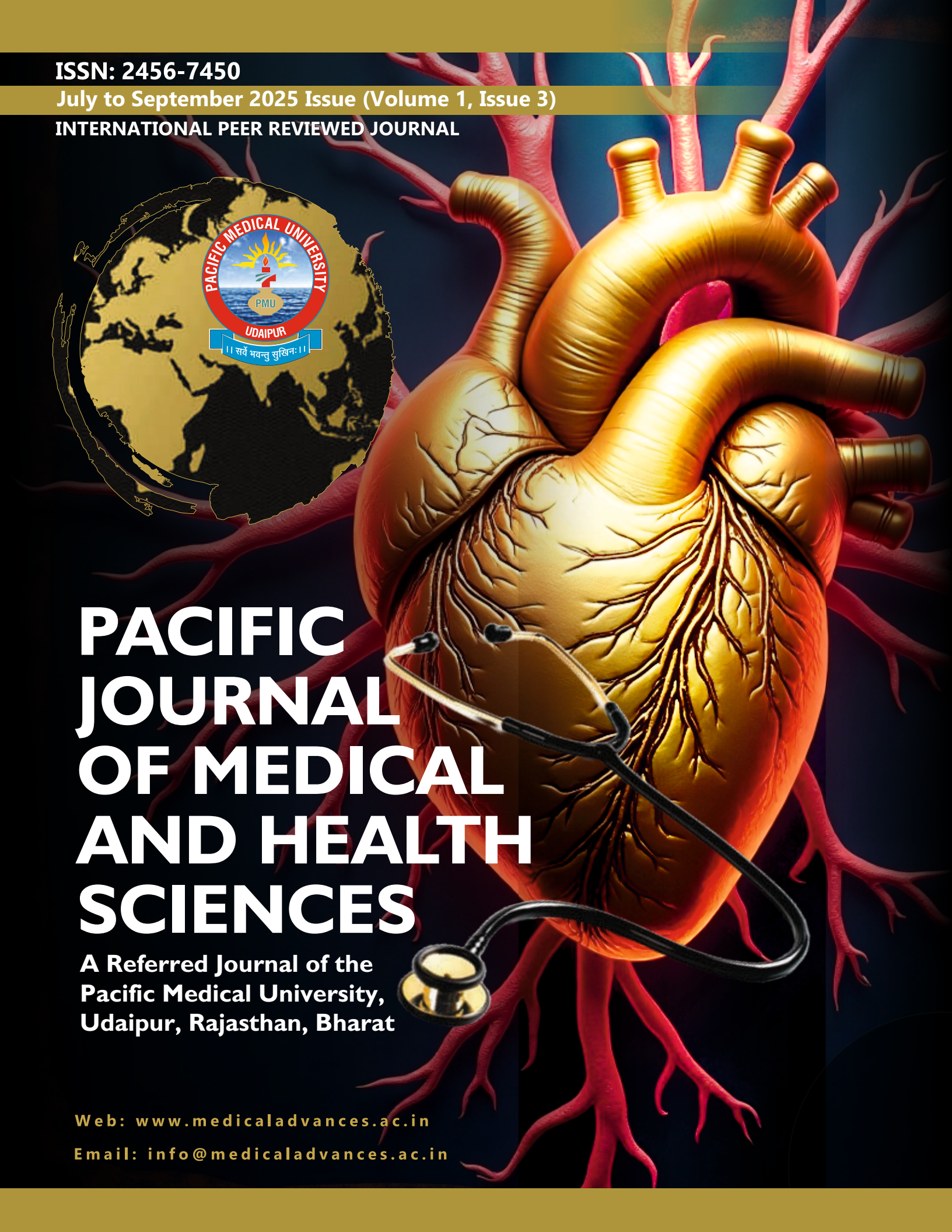

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General Information

The Journal

Pacific Journal of Medical and Health Sciences (ISSN: Print - 2456-7450) is a Multidisciplinary, International Peer Reviewed Quarterly Journal of the Pacific Medical University, Udaipur, Rajasthan, Bharat.

The Journal is published quarterly in the months of January, April, July and October.

The subject areas for publication include Multidisciplinary Subjects within Medical Sciences, viz., Anatomy, Anaesthesia, Biochemistry, Biomedical Sciences, Cardiology, Community Medicine, Dermatology and Venereal Diseases, Diabetes, Endocrinology, Epidemiology and Public Health, Forensic Science, Gastroenterology, Geriatric Medicine, Hematology, Immunology, Infectious Diseases, Internal Medicine, Microbiology, Nephrology, Neurology, Neurosurgery, Obstetrics and Gynaecology, Ophthalmology, Oncology, Orthopaedics, Otorhinolaryngology (ENT), Paediatrics, Pathology, Pharmacology, Physiology, Psychiatry, Pulmonary Medicine, Radiology, Toxicology, Dentistry, Nursing, Health Informatics, and Occupational Safety and Health.

Aims and Scope

Pacific Journal of Medical and Health Sciences is a peer reviewed journal with multidisciplinary approach. The goal of the journal is to publish new, challenging and radical ideas, dedicated to promote innovative and high quality research work in the field of medical and health sciences. The journal provides a platform for advances in basic and advanced clinical medical research for all branches of health-sciences. The journal provides cutting edge updates, developments in the medical arena and helps to synchronise and share knowledge.

The key aims of the Journal are to provide interpretations of growing points in medical knowledge by trusted experts in the field, and to assist practitioners in incorporating not just evidence but new conceptual ways of thinking into their practice.

We focus on the clinical aspects of diseases with basic science contributions in areas of clinical interest.

The journal invites articles related to different aspects of Medical and allied Health Sciences including Dental Sciences. The journal publishes original research articles, reviews, case reports and commentaries. The journal is an important and reliable source of current information on developments in the field of medical and health sciences. The emphasis is always on publishing high quality articles with fast review process.

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Research Paper

Phytochemical, Nutritional Profiles and Antioxidant Potential of *Vigna subterranean* (L) Verdc. Seed Oil Extract

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ABSTRACT

Background:

Bambara groundnut Vigna subterranea (L) Verdc., The Bambara groundnut is a drought-tolerant legume that was traditionally eaten in sub-Saharan Africa. Although its seeds have been identified to be rich in nutrients, there is an insufficient investigation of the seed oil as a rich reservoir of bioactive products and antioxidants.

Objective:

The paper examined phytochemical components, nutritional profile, mineral, and antioxidant property of Vigna subterranea seed oil extract to determine its suitability as a functional food ingredient and nutraceutical.

Methods:

Soxhlet extraction of the seed oil was done in n-hexane as the solvent. Proximate analysis was done (moisture, ash, protein, fat, fibre, carbohydrate and energy value using standard AOAC methods). Atomic absorption spectrophotometry analysis was done on mineral content. The phytochemical screening was done in a qualitative manner whereas antioxidant potential was done by DPPH radical scavenging method and ferric reducing antioxidant power (FRAP) method.

Results:

The proximate composition of the seed sample revealed moisture content (0.10±0.02%), ash (46.33±2.59%), crude lipid (4.82±0.05%), crude protein (23.25±0.15%), crude fiber (3.35±0.04%), carbohydrate (22.07%), and a calorific value of 224.72 kcal/100 g. Mineral analysis showed calcium (14.4±0.5 mg/100 g) was the most abundant, followed by potassium (9.5±0.14 mg/100 g), sodium (7.5±0.42 mg/100 g), magnesium (2.9±0.004 mg/100 g), and trace levels of iron, zinc, copper, manganese, and cadmium. Phytochemical screening confirmed the presence of flavonoids, alkaloids, saponins, tannins, and phenolic compounds. The oil extract demonstrated significant antioxidant activity, with a dose-dependent inhibition of DPPH radicals and strong ferric reducing power, indicating its potential to neutralize oxidative stress.

Conclusion:

The Vigna subterranea seed oil harbour the essential life-enabling phytochemicals, nutrients, and mineral elements, besides its commendable anti-oxidant feature. These results are of interest that the seed oil holds a lot of potential in formulation of functional food, dietary supplement feed and natural antioxidants to promote health and prevent diseases. It is suggested to conduct research on bioavailability and toxicological safety of the oil to contribute to its industrial and medical application.

KEYWORDS: *Vigna subterranean*, Nutritional, Phytochemicals, Minerals, Antioxidant

INTRODUCTION

Vigna subterranea, commonly known as Bambara Groundnut, is an indigenous legume primarily grown in sub-Saharan Africa[1]. It belongs to the Fabaceae family and is botanically classified under the genus Vigna[2]. The plant is recognized for its resilience to harsh climatic conditions, making it a vital crop for food security, particularly in regions prone to drought. The species name "subterranea" refers to its unique growth habit, where the pods develop underground, similar to peanuts[3].

Vigna subterranean is predominantly cultivated in Africa, with countries like Nigeria, Ghana, and Cameroon being key producers. It is also grown in parts of Asia and South America, though at a smaller scale. The crop thrives in marginal soils and is highly resistant to pests and diseases. Its ability to grow with minimal agricultural inputs makes it a promising crop for sustainable agriculture, especially in areas with limited resources. *Vigna subterranean* is considered a complete food due to its balanced nutritional composition[4]. It is rich in proteins (18-25%), carbohydrates (50-60%), and fats (5-8%), making it an excellent source of nutrients for both humans and animals.

Vigna subterranean contains various phytochemicals, including phenolic compounds, flavonoids[5],and tannins[6]. These compounds have been shown to exhibit antioxidant activity, which helps in scavenging free radicals in the body, potentially reducing the risk of chronic diseases such as cardiovascular diseases and cancer. The high antioxidant potential of *Vigna subterranean* contributes to its status as a functional food with potential health benefits beyond basic nutrition.

MATERIALS AND METHODS

Collection and Identification of *Vigna subterranean*

The mature and dry seed of *V. subterranean* were purchased at Oja Tuntun Market, Ilorin, Kwara, Nigeria, and taxonomically identified and authenticated at the Department of Plant and Environmental Biology, Kwara State University, Malete, Nigeria.

Proximate Composition

A 2 g of *V. subterranean* seeds was put into clean-dried crucible and weighed. The crucible and its content were oven dried at 102-105^{o}C for an interval of two hours, cooled in a desiccator, and weighed to constant weight. The difference in weight before and after drying was recorded as the moisture content of the seed[7]. Ash content was quantified according to the method described by Ceirwyn (1998), which involved dry ashing2.0 g of the sample and incinerated in muffle furnace at 550^{o}C for 4 hours until greyish white ash was obtained. Crude lipid content was determined where 50g of the sample was macerated in n-hexane (95%) at room temperature (27±2^{o}C) for 72 hours. The extract was decanted, filtered, and concentrated under reduced pressure by rotary evaporator at 40 °C[7].Crude protein of the sample was determined by multiplying the value obtained from Kjeldahl's nitrogen analysis by a protein factor of 6.25[7]. The total carbohydrate contents of the sample were obtained using the equation;

% Total carbohydrate contents = 100 – (% moisture + % protein + lipids + ash + crude fibre contents).

Mineral Quantification

Oven-dried powdered sample (5 g) was put into a dry crucible and ignited in a muffle furnace at 550 ^{O}C until greyish white ash was obtained. The sample was removed and cooled in a desiccator. A 2.0 g of the sample was weighed into a clean digestion flask 15 mL of concentrated HNO_3 and 5 mL concentrated HCl (ratio 3:1) was added into the sample in the digestion flask. The whole sample was heated in a hot plate until all the brownish fumes were expelled out (Nitrogenous compound) which confirmed that the sample was digested, and the sample was allowed to cool at and a few mLs of distilled water was added and filtered into a 50mLs volumetric flask using a Whatman no. 42 filter and it was then transferred into plastic reagent bottle for AAS analysis. The concentrations of Ca, Cd, Cu, Fe, Mg, Mn, Ni, Pb and Zn were determined using Atomic Absorption Spectrophotometer (AAS Model SP9) while Na and K were evaluated using flame photometer.

Spectroscopic Analysis

The crude extract was analyzed using SHIMADZU GC-MS QP2010 Ultra coupled with MS-5973-634071 Series, at column oven temperature of 60.0°C (increasing to 270ºC in 7 min at flow rate of 10 ml/min). Injection temperature of

250.0°C with split flow injection and linear velocity flow control modes. The velocity pressure was maintained at 100.0 kPa with total flow rate of 102.6 ml/min, column flow rate of 2.16 ml/min and linear velocity of 37.9 cm/sec. A purge flow rate of 3.0 ml/min and a split ratio of 45.1 were used. The ion source temperature was 230.0°C, interface temperature of 250.0°C, solvent cut time of 4.50 min. The MS start time was 6.0 min; end time was 26.0 min, scan event time of 0.30 sec, scan speed of 1666. The start m/z of 35.00 and end m/z of 450.00.

RESULTS AND DISCUSSION

Proximate Composition

Table 1 shows the results of the proximate composition of *Vigna subterranea* seeds, and showed distinctly low moisture content of 0.16%. This is much lower than 3.467% recorded on *V. subterranean* seeds by Chelanga*et al.* (2023), and this shows that the seeds were highly dried up in this research[8]. This moisture content is beneficial since the food can be stored and has a long shelf-life because of lesser chance of spoilage and microbial contamination.

The proportion of carbohydrates was found to be 22.07% and is less than the proportion of carbohydrates reported by Dewole*et al.*, (2013) of Cola acuminata (58.09%) and Cola nitida (66.45%)[9]. Carbohydrates are needed as dietary macronutrients, and usually, provide most of the calorie energy in a standard diet.

The energy content of the seeds of *V. subterranea* estimated in this experiment was 224.72 kcal/100g,which exceeded the 155.04 1.60 kcal/100g recorded by Mathew *et al*. (2014), further supporting the notion that the seeds have a high energy value[10].The quantity of proteins was fairly high (23.25 0.15%), which confirms the reputation of the legume as a source of proteinous food. That favors its utility as a superior vegetable source of protein, particularly in this age of scarce animal protein because of cost and availability in some places. The measured protein level is however graciously lower than that which was considered by Chinedu & Nwinyi, (2012),to be of *V. subterranea*, i.e., 32.40 + 0.02%.Its fat content was moderately high of 4.82% and this is good within the nutritional range[11]. It is said that a diet containing 1 % or 2 % of its caloric energy as fat is sufficient for human health, but a high intake amount of fat can raise the possibility of developing cardiovascular diseases[12].Mineral element in the seed was found to be considerable as the total ash attributed to 46.33%. Another significant parameter is ash content which indicates overall mineral content of food. Calcium, potassium, magnesium as well as iron are minerals that are often related to V. subterranea and are related to metabolic processes, bone formation and cardiovascular health respectively.

All values excerpted are the means of triplicate determination with standard deviations.

Table 1: Proximate Composition of *Vigna* subterranea (% Dry weight)

PARAMETER	CONTENTS
Moisture	0.16 ± 0.02
Ash	46.33 ± 2.59
Crude Protein	23.25 ± 015
Crude Fiber	3.35 ± 0.04
Crude Lipid	4.82 ± 0.05
Drying Matter	99.84
Carbohydrate	22.07
Calorie Value (kcal/100g)	224.72

Table 2: Mineral Composition of *Vigna subterranea*

MINERAL	CONCENTRATION (mg/100g)
Calcium	14.4 ±0.5
Cadmium	0.1±0
Copper	0.9±0.001
Iron	0.2±0.002
Potassium	9.5±0.141
Magnesium	2.9±0.004
Manganese	0.6±0.004
Sodium	7.5±0.424
Nickel	0±0
Lead	0.1±0.001
Zinc	0.2±0.003

MINERAL COMPOSITION

Table 2 presents the result of mineral composition of *Vigna subterranea* seeds. The findings suggest that the mineral levels that were the highest were potassium and calcium. This observation is in line with that of Musah *et al.* (2021), in which they also devoted the main mineral in the *V. subterranea* seeds to potassium[13]. Potassium is quite an important element associated with the maintenance of acid-alkaline balance in the body[14]. Mathew *et al*. (2017) in a related investigation also found that the content of potassium was high at 122.91 1.02 mg/100 g in the seeds of V. subterranea collected in Kure Market[10].

In comparison, manganese and lead were found in a comparatively lower rate with 0.6 + 0.004, mg/100 g and 0.1+0.001, mg/100 g respectively. These levels are rather minimal compared to those noted by Musah *et al.* (2021),who determined higher levels of the elements in *V. subterranea* seeds. All the reported values are in the form of mean of triplicate determinations with standard deviations[13].

In as far as sodium intake is concerned, the body should be taken in a quantity of 1500 mg a day by both genders aged 9 -50 years and 1300 mg a day amongst those aged 59 years and above the recommendation by Westrick *et al.,*(2014)[15]. The not very high content of sodium may be observed during this research alongside the low iron concentration, giving the assumption that seeds of *V. subterranea* could be useful to people with high blood pressure. This is affirmed by the results of the studies by Tiong *et al*., (2018), which insisted on applying such a nutrient profile in dietary measures of controlling high blood pressure[16].

GC-MS ANALYSIS

Table 3: Result of GCMS Analysis of *Vigna Subterranean* Oil Extract

S/N	Compound Name	Molecular Formula	Molecular weight	Retention time	% Area
1	Hexadecenoic acid, methyl ester	$C_{17}H_{34}O_2$	270	21.205	21.78
2	9,12-Octadecadienoic acid, methyl ester	$C_{19}H_{34}O_2$	294	23.580	53.91
3	Phytol	$C_{20}H_{40}O$	296	23.750	1.66
4	Methyl stearate	$C1_9H_{38}O_2$	298	23.855	12.27
5	trans-Geranylgeraniol	$C_{20}H_{34}O$	290	24.980	3.17
6	Squalene	$C_{30}H_{50}$	410	26.435	4.41
7	Methyl 18-methylnonadecanoate	$C_{21}H_{42}O_2$	326	26.740	2.80

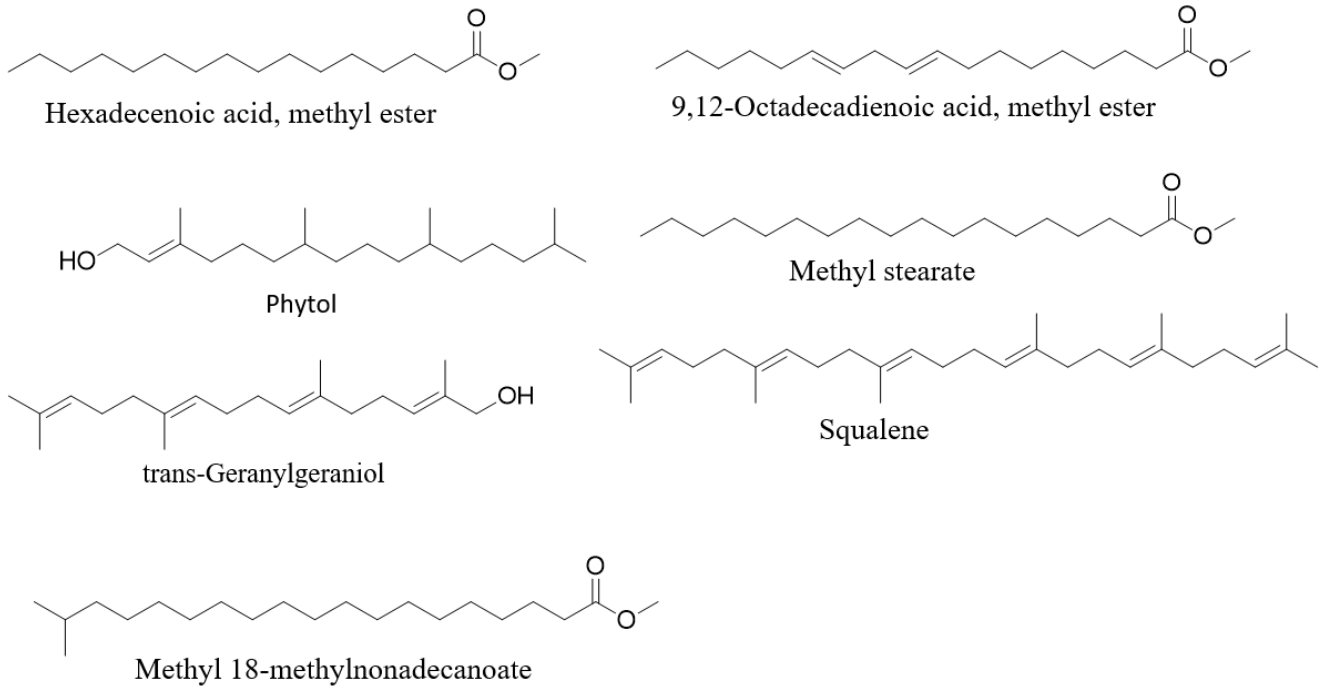

Table 4: Biological Properties of The Bioactive Compounds

S/N	COMPOUND	BIOLOGICAL ACTIVITIES	REFERENCE
1	Hexadecenoic acid methyl ester	Antioxidant, Hypocholesterolemic, Nematicide and Pesticide	Siswadi*et al.,* 2021
2	9,12-Octadecadienoic acid, methyl	Anti-inflammatory properties in addition to analgesic and ulcerogenic properties	ImadHadi Hameed *et al.,*
3	Phytol	Anxiolytic, metabolism-modulating, cytotoxic, antioxidant, autophagy, apoptosis -induing, anti -inflammatory, anti -nocicentive, immune -modulating and anti-microbial effect.	Muhammad Torequl Islam *et al.,* 2018
4	Methyl stearate	Anti-inflammatory, Antioxidant, Antifungal, Nematocidal	Kalpana*et al.,* 2012
5	trans-Geranylgeraniol	Prevent inhibition of the osteoclast formation and bone resorption in vitro	PratimaAnputa*et al.,* 2021
6	Squalene	Emollient for skin, anti -oxidant and for hydration and it's anti-tumor activities	ZIih-Rou Huang *et al.,* 2021
7	Methyl 18 -methylnonadecanoate	Anti-oxidant, anti-microbial and cytotoxic activities	ZIih-Rou Huang et al 2021

Antioxidant Assay Result

Sample	DPPH	ABTS	FRAP Reducing effect (mmolFe²+/g)
VS	55.84±0.36	35.37±0.60	1.45±0.03
BHT	18.45±0.40	7.62±0.08	1.38±0.04

The assay of antioxidant showed that the oil extract of *Vigna subterranea* seeds had moderate to high antioxidant activity. Such was its ability to scavenge free radicals in both the DPPH and ABTS tests and the ability to reduce iron ions in the form FRAP test. IN the DPPH and ABTS radical scavenging assays, the extract had lower results of radical scavenging ability as compared to the standard antioxidant butylated hydroxytoluene (BHT), whereas the results were comparable or relatively higher in the FRAP radical scavenging test. The above-derived results imply that the seed oil extract possesses bioactive compounds with high electron-releasing capacity, which play a critical part in the prevention of oxidative agents. It also has the potential to be of antioxidant due to the presence of phytochemicals which include phenolics, flavonoids, and saponins. In support of this finding, a study conducted by Ijarotimi *et al.* (2022) claimed that Vigna subterranea flour possessed high FRAP values, an attribute that makes it a substance that can alleviate oxidative stress[17;18]. These findings substantiate the usefulness of the Vigna subterranea seed oil extract as a potential source of high-quality natural antioxidants that have prospective use in food preservation and control of diseases that arise as a result of oxidative stress.

CONCLUSION

This research papers point out the phytochemical composition, nutritive value, and antioxidant power of the oil extract in the seeds of *Vigna subterranea* (L.) Verdc. The oil extract was discovered to have high amounts of bioactive compounds such as in flavonoids, saponins, alkaloids and phenolics, related to multiple health promoting factor. Nutritional study revealed that the seed oil is a rich source of essential fatty acids, proteins, vitamins, and minerals, and it makes it an ideal constituent of functional foods.

There was also a significant antioxidant action observed in the extract, implying its possible usage in reducing oxidative stress and inhibiting resulting degenerative disorders. Besides, the low moisture content that is seen increases the shelf life and stability, making both the nutritive and phytochemical integrity persist even through transportation and storage. Therefore, the results justify the future use of Vigna subterranea seed oil in food and pharmaceutical and cosmetic sectors as a natural compound with health effects and food functionality points.

CONFLICT OF INTEREST: None

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Research Paper

Ageratum conyzoides (Billy Goat Weed) Investigation on Aluminium chloride induced Testicular Toxicity in Male Wistar Rats

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ABSTRACT

Background:

Ageratum conyzoides (Billy Goat Weed) is a medicinal plant known for its antioxidant and anti-inflammatory properties. Aluminium chloride ($AlCl_3$), a common environmental toxin, induces oxidative stress, leading to testicular damage and infertility. The aim of this study is to investigate the protective effects of Ageratum conyzoides against $AlCl_3$-induced testicular toxicity in male Wistar rats, aiming to explore its potential in preserving testicular structure, improving sperm quality, and maintaining hormonal balance under toxic conditions.

***Methodology**:*

Twenty male Wistar rats were randomly assigned into four groups, each comprising five animals. Group A (control) received distilled water, Group B received aluminium chloride ($AlCl_3$) at 100 mg/kg, Group C received Ageratum conyzoides extract at 100 mg/kg, and Group D received both $AlCl_3$ (100 mg/kg body weight) and Ageratum conyzoides extract (100 mg/kg). All treatments were administered orally for 28 consecutive days.

Results:

$AlCl_3$ significantly reduced ($p<0.05$) testosterone, FSH, LH, sperm count, motility, morphology, and GPx activity, while Ageratum conyzoides significantly increased ($p<0.05$) these parameters. Histology showed preserved testicular structure in Ageratum conyzoides and combination groups, unlike $AlCl_3$-treated rats.

Conclusion:

Aluminium chloride ($AlCl_3$) is known to induce reproductive dysfunction through oxidative damage, while Ageratum conyzoides mitigates $AlCl_3$ toxicity and enhances sperm quality in male Wistar rats.

KEYWORDS: *Ageratum conyzoides*, Aluminium chloride, Sperm, Toxicity, Reproductive dysfunction

INTRODUCTION

Aluminium (Al) is a widely used industrial metal, found in consumer products such as cookware, food packaging, and water treatment systems. Its prevalence in modern society has led to growing concern about its environmental and health risks. Although aluminium exposure is considered unavoidable in modern life, its adverse effects, particularly on the male reproductive system, have attracted increasing attention in scientific research[1,2]. Studies have indicated that aluminium exposure, particularly in the form of aluminium chloride ($AlCl_3$), leads to reproductive dysfunction in male mammals, including humans. This dysfunction is largely attributed to oxidative stress, which can damage tissues and impair sperm quality and function[3].

Aluminium's toxicity is primarily mediated through the production of reactive oxygen species (ROS), which can overwhelm the body's antioxidant defenses and lead to cellular damage. The testicular tissue is particularly susceptible to this damage due to its high metabolic activity and vulnerability to oxidative stress. Exposure to $AlCl_3$ has been shown to induce histopathological changes such as degeneration of the seminiferous tubules, degeneration of Leydig cells, and impaired spermatogenesis, leading to reduced fertility[4,5].

Infertility in males is a critical concern worldwide, with environmental toxins playing a significant role in the rising incidence of reproductive issues. Male infertility can result from a variety of factors, including hormonal imbalances, genetic defects, and environmental exposure to toxicants. Aluminium is considered a significant contributor to male infertility, as its effects disrupt sperm count, motility, morphology, and the integrity of the testes. In addition to direct toxic effects, aluminium exposure can alter hormonal profiles, including a decrease in testosterone and other reproductive hormones like follicle-stimulating hormone (FSH) and luteinizing hormone (LH)[5,6].

Given the prevalence of environmental toxicants, there is an increasing need to explore natural remedies to mitigate the detrimental effects of these agents. *Ageratum conyzoides*, also known as Billy Goat Weed, is a medicinal plant with a long history of use in traditional medicine. This plant is renowned for its anti-inflammatory, antimicrobial, and antioxidant properties. Recent studies have shown that *Ageratum conyzoides* contains bioactive compounds such as flavonoids, alkaloids, and terpenoids, which have been implicated in scavenging free radicals and reducing oxidative stress[7,8].

The protective effect of *Ageratum conyzoides* against oxidative stress has been demonstrated in various organ systems, including the liver and kidney. However, its potential to alleviate reproductive toxicity induced by aluminium chloride remains largely unexplored. Preliminary studies suggest that *Ageratum conyzoides* may have a protective role in mitigating oxidative damage and preserving testicular architecture in animals exposed to $AlCl_3$[8,9].

This study aims to investigate the protective effects of *Ageratum conyzoides* on $AlCl_3$-induced testicular toxicity in male Wistar rats. Specifically, this research will examine the impact of *Ageratum conyzoides* on sperm quality, testicular histology, and reproductive hormone levels, including testosterone, FSH, and LH. The findings of this study may also contribute to the broader understanding of how natural antioxidants can protect reproductive health from environmental stressors.

MATERIALS AND METHOD

Preparation of Compound and Procurement of Animals

Sixty milligrams (60mg) of aluminium chloride ($AlCl_3$) were accurately weighed using a sensitive balance and dissolved in 250 mL of distilled water. The solution was stirred until fully dissolved. $AlCl_3$ was administered daily to the rats via oral canula at a dose of 100 mg/kg body weight. The experimental animals were procured from Lord's Farm International, Osogbo, Osun State, and were allowed ad libitum access to food and water. The animals were acclimatized to the laboratory conditions for two weeks prior to the start of the study.

Collection and Preparation of *Ageratum conyzoides*

The leaves were collected from Oke baale area, Osogbo, Osun State in the southwestern part of Nigeria in July, 2020. Leaves of *Ageratum conyzoides* leaves were cleaned, air-dried, ground into fine powder. The dried powder was soaked into 500ml of ethanol for 48 hours with occasional agitation. The solution was filtered and evaporated using a rotary evaporator, giving a dry residue. The dry extract was then re-dissolved in distilled water and stored in capped bottles in a refrigerator at 4°C until required.

Experimental Design

20-adult male Wistar rats averagely weighing 165g were used and the animals were randomly assigned into four groups (A, B, C and D). Group A: Control group received distilled water only for 28 days. Group B: Aluminium chloride only (received 100mg/kg of aluminium chloride) for 28 days. Group C: *Ageratum conyzoides* extract only (received 100 mg/kg of the extract) for 28 days. Group D: Aluminium chloride and *Ageratum conyzoides* (received 100mg/kg of Alcl3; 100mg/kg of the leaf extract) for 28 days.

Sacrifice of Experimental Animals, Sample Collection and Hormonal Assay

Blood was withdrawn from the apex of the heart (left ventricle) of the 20-adult male wistar rats, which were first anesthetized with 80 mg/kg of ketamine hydrochloride, 12 hours after the last administration just according to Saha et al., (2005)[10]. The blood was then dispensed into red-topped tubes for hormonal analysis. The testes were excised following an abdominal incision, and they were fixed in Neutral buffer Formalin for histological analysis. It was then dehydrated progressively in stronger alcohols, cleared in Xylene and infiltrated in paraffin wax, before being embedded in molten paraffin wax. A rotary microtome was then used to slice the paraffin block containing the tissue into 4 µm thick sections. The sections were then transferred to a glass slide, floated in a water bath set at 40 degrees Celsius, and stained with hematoxylin and eosin dyes.

Hormonal Assay

Serum samples were assayed for FSH, LH in batches with the control sera at both physiological and pathological levels by the standard Quantitative Enzyme-Linked Immunosorbent Assay(ELISA) technique with microwell kit which was manufactured by Syngenemed. The manufacturer instructions that accompanied the assay kits were strictly adhered to.

STATISTICAL ANALYSIS

The mean and standard error of mean (S.E.M) of all data were calculated. Comparison of means was made by one way analysis of variance (ANOVA) using Graphpad Prism 7. Tukey's test was used to adjust for multiple comparisons. P value < 0.05 was considered to be statistically significant.

RESULTS

Table 1 illustrates that rats exposed to $AlCl_3$ experienced a significant reduction in FSH, LH, and testosterone levels ($p<0.05$). However, these hormone levels increased notably in the groups treated with *Ageratum conyzoides* compared to the control. Additionally, the level of FSH and LH in the Ageratum + $AlCl_3$ group were significantly higher than those in the $AlCl_3$ treated group only.

Table 1: Effects of $AlCl_3$ and *Ageratum conyzoides* on hormonal analysis in the treated rats

Variables	Control	$AlCl_3$	Ageratum	$AlCl_3$+Ageratum
FSH(ng/ml)	0.80±2.24	0.68±1.80	0.61±1.43	0.88±0.86
LH(ng/ml)	2.23±0.98	1.72±0.32	2.11±1.97	1.83±1.24
Testosterone(ng/ml)	1.28±1.90	1.15±0.30	1.33±2.05	1.12±1.02

Table 2: Effects of $AlCl_3$ and *Ageratum conyzoides* on biochemical analysis in the treated rats

Variables	Control	$AlCl_3$	Ageratum	$AlCl_3$+Ageratum
SOD (u/mL)	1.85±1.02	1.25±1.40	1.86±1.07	1.75±2.12
Gpx (u/L)	125.03±1.55	100.52±1.40	136.30±1.58	122.45±1.25
MDA (mg/dl)	1.05±0.32	2.85±2.07	0.89±0.34	1.09±0.30

Table 2 illustrates that GPx levels were significantly reduced in the $AlCl_3$-treated group but significantly increased following treatment with *Ageratum conyzoides*. Compared to the other groups, rats exposed to $AlCl_3$ exhibited a significant decrease ($p<0.05$) in SOD levels and an increase in MDA levels. However, the *Ageratum conyzoides* + $AlCl_3$ group demonstrated a significant reduction in MDA levels and a notable increase in SOD levels compared to the $AlCl_3$-treated group.

Table 3: Effects of $AlCl_3$ and *Ageratum conyzoides* on sperm analysis in the treated rats

Variables	Control	$AlCl_3$	Ageratum	$AlCl_3$+Ageratum
Sperm count ($\times 10^6$)	82.0±1.50	59.3 ± 2.00^a	85.2 ± 1.68^b	79.5 ± 0.97^c
Sperm motility(%)	81.2±1.60	70.5 ± 1.89^a	82.4 ± 2.30^b	79.0±1.05
Sperm morphology(%)	90.5±1.96	62.3 ± 1.85^a	90.7 ± 2.80^b	80.2±1.80

$P < 0.05$ a-As compared to control, b-As compared to all groups, c-As compared to $AlCl_3$

Table 3 demonstrated that sperm quality was significantly improved ($P < 0.05$) in rats treated with *Ageratum conyzoides*. In contrast, $AlCl_3$ treatment led to a significant impairment ($P < 0.05$) in sperm quality compared to all other groups. However, sperm quality was notably enhanced ($P < 0.05$) in the *Ageratum conyzoides* + $AlCl_3$ group compared to the $AlCl_3$-treated rats, suggesting a protective effect of *Ageratum conyzoides* against $AlCl_3$-induced reproductive toxicity.

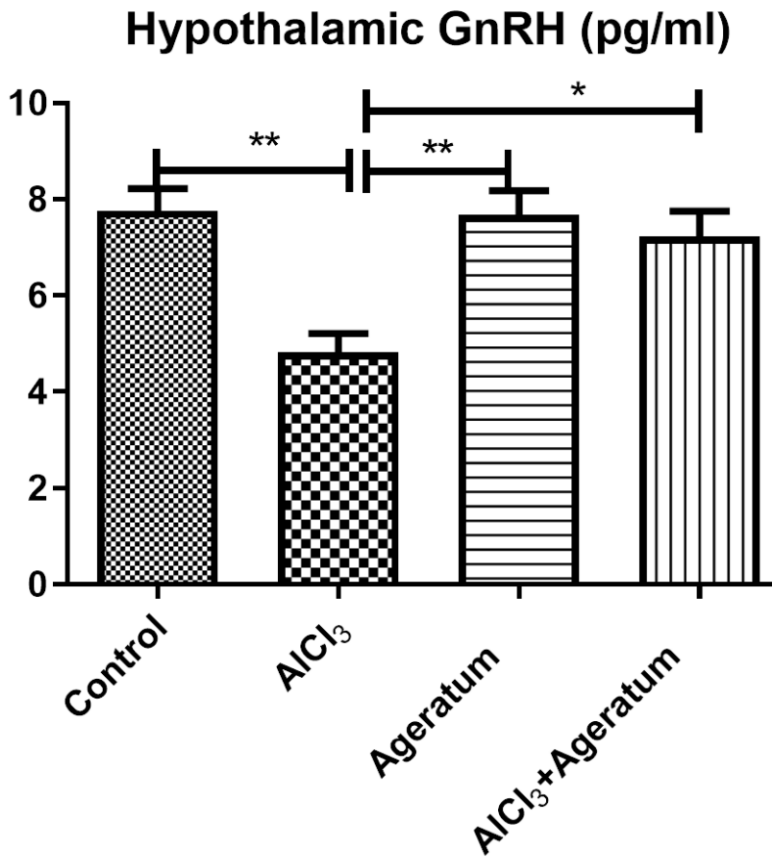

Figure 1: Comparison in Hypothalamic GnRH Concentration among the Groups after the Administration of $AlCl_3$, Ageratum and Co-administration of $AlCl_3$ and Ageratum. n=5; *P<0.05

The mean values of hypothalamic GnRH concentration, as shown in Figure 1, reveal a significant decrease in the $AlCl_3$-treated group compared to the control, *Ageratum conyzoides*-treated, and co-administration ($AlCl_3$ + Ageratum) groups. Furthermore, there was no significant difference in GnRH concentration among the control, *Ageratum conyzoides*-treated, and co-administration groups.

Histological Examination of the Testes of the Wistar Rats

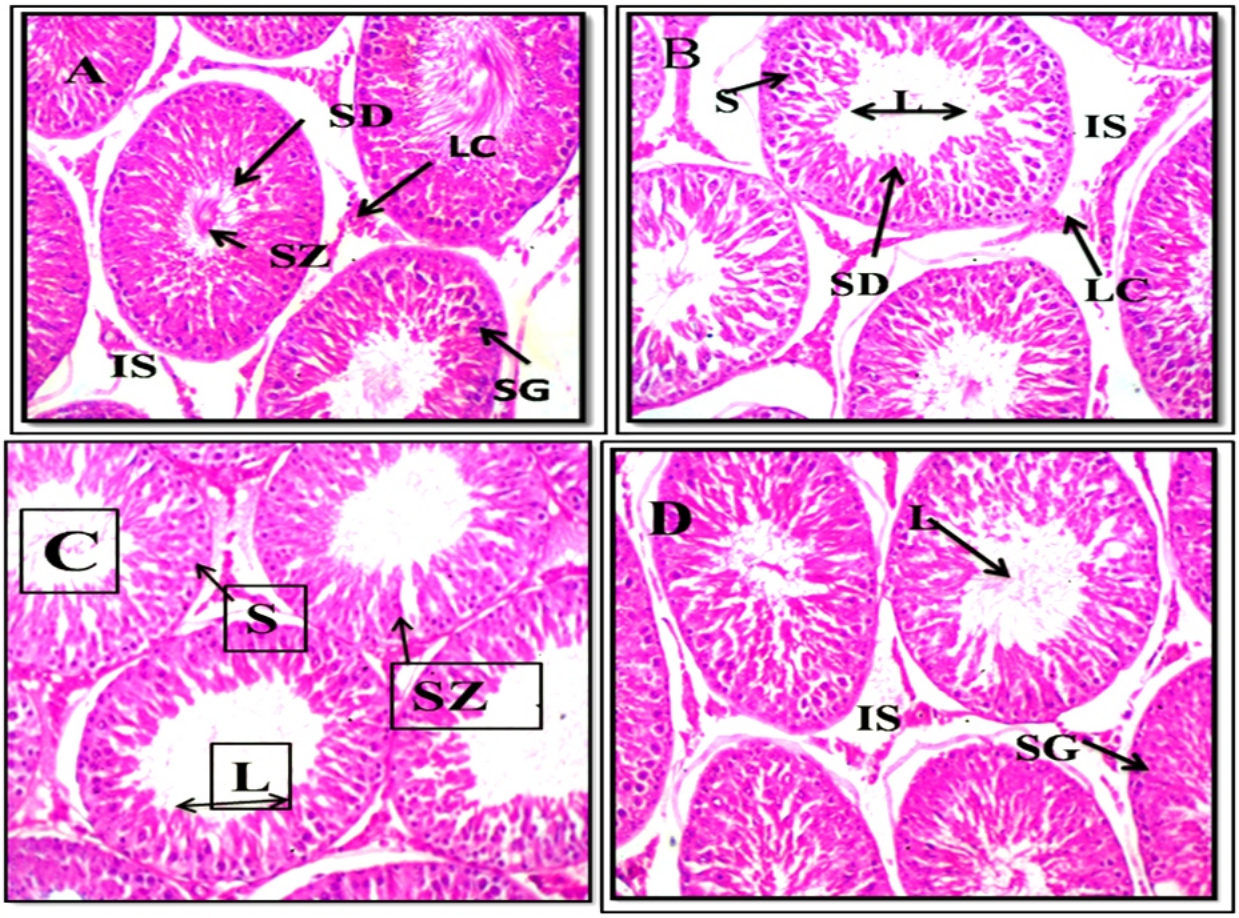

Figure 2: Testicular Architecture of the Control Group and the *Ageratum conyzoides*

In Figure 2, the photomicrograph shows the results obtained and exhibits that the control group and the *Ageratum conyzoides* treated group showed normal testicular architecture without any observable presentation of spermatogenic arrest and the lumen could also be observed with the presence of spermatozoa. The basement membrane is thin and the interstitial space contains Leydig cells. The $AlCl_3$ treated group contrastingly, showed severe observable degenerative changes characterized by maturation arrest of the spermatogenic cell line in several seminiferous tubules, widened lumen that lack spermatozoa, fragmented and basement membrane. Interestingly, the Ageratum conyzoides+$AlCl_3$ treated group showed mildly similar morphological presentation with similar staining intensity and cellular density when compared with the control and *Ageratum conyzoides* treated groups. The testicular cytoarchitecture was well structured and delineated as against the $AlCl_3$ treated group.

DISCUSSION

The findings of this study suggest that *Ageratum conyzoides* (Billy Goat Weed) exhibits protective effects against Aluminium Chloride ($AlCl_3$)-induced testicular toxicity in male Wistar rats. $AlCl_3$ exposure resulted in significant oxidative stress, hormonal imbalance, and impaired sperm quality, all of which were mitigated by *Ageratum conyzoides* treatment.

Oxidative stress is a major factor in $AlCl_3$-induced testicular toxicity, as evidenced by the significant reduction in GPx and SOD levels and the increase in MDA levels in the $AlCl_3$-treated group. These changes indicate compromised antioxidant defense mechanisms and elevated lipid peroxidation, leading to cellular damage in the testes[11,12]. However, administration of *Ageratum conyzoides* significantly enhanced GPx and SOD levels while reducing MDA levels, suggesting that its antioxidant properties counteracted $AlCl_3$-induced oxidative stress. Previous studies have reported similar findings,

highlighting the antioxidant capacity of *Ageratum conyzoides* in scavenging free radicals and protecting against oxidative damage[13].

The significant reduction in hypothalamic GnRH concentration in the $AlCl_3$-treated group further supports the toxic effects of aluminum exposure on the hypothalamic-pituitary-gonadal (HPG) axis. GnRH is a key regulator of FSH and LH secretion, which in turn control testosterone production and spermatogenesis[14]. The increase in GnRH levels in *Ageratum conyzoides*-treated and co-treated groups suggests that the plant may support normal HPG axis function and prevent $AlCl_3$-induced disruptions. These findings align with earlier studies showing that medicinal plants with antioxidant and anti-inflammatory properties can modulate reproductive hormones and improve testicular function[15].

The significant impairment in sperm quality observed in the $AlCl_3$-treated group, as reflected in reduced motility, count, and morphology, further confirms the toxic effects of aluminum exposure. This is consistent with previous reports demonstrating that $AlCl_3$ induces spermatogenic dysfunction and structural damage to the testes[16]. However, rats treated with *Ageratum conyzoides* showed marked improvement in sperm parameters, indicating its potential role in restoring normal spermatogenesis. The observed enhancement in sperm quality in the Ageratum + $AlCl_3$ group suggests that *Ageratum conyzoides* may attenuate $AlCl_3$-induced testicular toxicity, possibly through its antioxidant and anti-inflammatory effects[17].

This study highlights the protective role of *Ageratum conyzoides* against $AlCl_3$-induced testicular toxicity, particularly through its antioxidant, hormonal-regulating, and reproductive-enhancing properties. The plant significantly mitigated oxidative damage, restored hormonal balance, and improved sperm quality in $AlCl_3$-exposed rats. These findings suggest that *Ageratum conyzoides* could be a potential therapeutic agent for preventing or managing male reproductive toxicity induced by environmental toxins like $AlCl_3$.

CONFLICT OF INTEREST: None

FINANCIAL SUPPORT: None

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Review

Hyponatremia

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ABSTRACT

Hyponatremia, a prevalent electrolyte disturbance in hospitalized patients, particularly affects the elderly and ICU populations. This study highlighted hypertension, diabetes mellitus, and thiazide diuretics as significant risk factors. Complex etiologies involving chronic liver disease, congestive heart failure, and syndrome of inappropriate antidiuretic hormone secretion were also notable contributors. Effective management strategies, including judicious use of hypertonic saline for severe cases, emphasize the importance of gradual sodium correction to prevent osmotic demyelination syndrome. Vigilant monitoring and management, especially in patients with neurological symptoms, are crucial. The study underscores the need for a systematic diagnostic approach integrating comprehensive history-taking, clinical examination, and precise laboratory assessments. Such an approach promises to enhance evaluation and therapeutic management of hyponatremia, potentially reducing morbidity and mortality rates, particularly in patients with complex medical backgrounds like advanced cirrhosis. In conclusion, advancing our approach to managing hyponatremia is essential for optimizing patient care and safety in hospitals, reflecting ongoing efforts to improve clinical outcomes through proactive medical practices.

KEYWORDS: Electrolytes' disturbances, SIADH, Antidiuretic hormone

INTRODUCTION

Hyponatremia, characterized by serum sodium levels below 135 mEq/l, is the predominant electrolyte condition in hospitalized patients[1-5]. It is linked to death and morbidity rates between 5% and 50%, contingent upon severity and initial acuity[6].

Hyponatremia manifests in a wide range of patients. It affects both sexes and all age groups equally, but it is most frequently observed in elderly individuals due to an increased prevalence of comorbidities that can reduce serum sodium levels, such as cardiac, hepatic, or renal failure[7-9].

Patients who have a serum sodium concentration of 130 mEq/L or higher are typically asymptomatic, while those with lower values may experience symptoms. Anorexia, nausea, and vomiting are typically the initial symptoms of hyponatremia. Some patients may experience irritability and headaches. Patients develop neuropsychiatric symptoms as serum sodium levels continue to decrease. Restlessness, altered consciousness, lethargy, seizures, and coma comprise these

symptoms. Hyponatremia and its management are associated with severe neurological sequelae[10].

The diagnosis of hyponatremia is challenging to establish due to the significant variation in symptomatology. Accurate history-taking, clinical examination, and a variety of investigations are necessary for a comprehensive evaluation of hyponatremia. The early identification and optimal management of hyponatremia in hospitalized patients may reduce in-hospital mortality and symptom severity, enable less intensive hospital care, reduce the duration of hospitalization and associated costs, and enhance the treatment of underlying co-morbid conditions and the quality of life of the patient.

Depending on the patient's volume status, hyponatremia is not a uniform condition; it can be classified as either euvolemic, hypervolemic, or hypovolemic11. Different treatment strategies are necessary for each type and etiology of hyponatremia. Depending on the region, the etiological profile may be influenced by the climate, demography, personal behaviors, health education, availability of health care services, and disease distribution pattern of the associated systemic illness.

Consequently, this investigation was conducted to ascertain the prevalence, varieties, and consequences of hyponatremia at the time of admission in patients who were visiting our tertiary care hospital, which is situated in the southern region of Rajasthan.

REVIEW OF LITERATURE

A serum sodium content of less than 135 mEq/L is considered hyponatremia, albeit the precise definition varies according on the set values used by the particular laboratory. Twelve An excess of total body water relative to total body sodium content causes hyponatremia, a common electrolyte imbalance.[12] Edelman supported the idea that the ratio of total body solutes (such as total body potassium and sodium) to total body water determines serum sodium concentration rather than total body sodium.[13] An imbalance in this ratio, where the total body water exceeds the total body solutes, is what defines hyponatremia. One-third of total body water (TBW) is made up of extracellular fluid (ECF), with the other two-thirds being made up of intracellular fluid (ICF). Whereas potassium is the main solute in ICF, sodium is the main solute in ECF.

ETIOLOGY

The etiology of hyponatremia can be categorized according to the volume status of the extracellular fluid. Sodium is the predominant solute in extracellular fluid (ECF). A patient can be categorized as hypovolemic, euvolemic, or hypervolemic based on the volume of extracellular fluid (ECF)[14].

Hyponatremia may be caused by physiological causes that cause vasopressin release in conjunction with increased fluid intake. An increase in vasopressin secretion may result from hypothyroidism and adrenal insufficiency. Hypovolemic hyponatremia, or intravascular volume depletion, and hypervolemic hyponatremia, or decreased effective intravascular volume, are physiological stimuli for vasopressin release. The etiologies of different forms of hyponatremia are delineated below:

Drugs causing hyponatremia are following:

- Analogs of vasopressin, such as oxytocin and desmopressin
- Several antidepressants, morphine, other opioids, selective serotonin reuptake inhibitors, and other medications can either increase the effects of vasopressin or cause its release.
- Thiazide diuretics are among the medications that prevent urine dilution.
- Carbamazepine and its analogs, vincristine, nicotine, antipsychotics, chlorpropamide, cyclophosphamide, and nonsteroidal anti-inflammatory drugs are among the drugs that cause hyponatremia.
- Illegal drugs like ecstasy or methylene dioxy-methamphetamine (MDMA)[20]

Table 1: Causes of Hyponatremia Based on Types

Hypovolemic Hyponatremia (A reduction in total body sodium is more significant than a fall in TW.)[5]
• Loss of digestive fluids (vomiting or diarrhea) • The third fluid interval (small bowel obstruction, hypoalbuminemia, and pancreatitis) • Diuretics • Osmotic dieresis (mannitol, glucose) • Nephropathies caused by salt waste • Urinary salt wasting, which may be brought on by elevated brain natriuretic peptide, is known as cerebral salt wasting syndrome. • Deficiency in mineralocorticoids
Hypervolemic Hyponatremia (TBW rises more than the total sodium in the body does.)[16]
• Nephrotic syndrome, acute renal failure, and chronic renal failure are examples of renal causes. • causes outside the kidneys (cirrhosis, congestive heart failure) • Iatrogenic
(TBW rises when total body sodium remains constant.)
Non-osmotic, As with euvolemic hyponatremia, pathologic vasopressin release can happen when volume status is normal. Causes of euvolemic hyponatremia include: • Drugs • Syndrome of inappropriate antidiuretic hormone(SIADH) • Addison's disease • Hypothyroidism • High fluid intake in conditions like primary polydipsia; or potomania, caused by a low intake of solutes with relatively high fluid intake • Excessive fluid-related medical testing, like heart catheterization or colonoscoy[17-19] • Iatrogenic

EPIDEMIOLOGY

Hyponatremia is the predominant electrolyte condition, occurring in 20% to 35% of hospitalized patients. Hyponatremia is prevalent among critically ill patients in the intensive care unit (ICU) and postoperative individuals. This phenomenon is particularly prevalent among elderly patients because to several comorbidities, polypharmacy, and limited access to meals and beverages[19].

PATHOPHYSIOLOGY

Blood pressure (BP), fluid and electrolyte balance, and the preservation of normal cellular homeostasis all depend on sodium, an essential nutrient. Because of its significant osmotic activity, it plays a critical function in regulating the volume of ECF. It is also essential for the excitability of muscle and nerve cells as well as for the movement of nutrients and substrates across plasma membranes[50].

In extracellular fluid, sodium is the most abundant cation [ECF2 (1 mmol, or molar equivalent, amounting to 23 mg of sodium)]. An adult male's average sodium content is 92g, of which 46g are found in the extracellular fluid at a concentration of 135–145 mmol/L, 10 mmol/L in the intracellular fluid, and 35 g in the skeletal system. By actively moving sodium and potassium across the cell membrane against their concentration gradients and using energy from ATP, the sodium-potassium pump preserves the concentration gradient between the extracellular fluid and intracellular fluid. Through certain channels or transport mechanisms, sodium enters the polarized cells of the intestinal wall or renal tubular epithelium from the tubular lumen or gut. A pump that is primarily found on the cell's basolateral surfaces then extrudes the sodium into nearby capillaries. In these cells, the movement of sodium is mostly associated with the movement of other substrates, including glucose, galactose, amino acids, and phosphates.

Sodium absorption transpires nearly entirely in the distal small intestine and the colon. The body's sodium balance is intricately connected to water balance and is meticulously regulated by the kidneys. The sodium filtered by the glomeruli is reabsorbed in a range of 0.5% to 10%, contingent upon tubular requirements, with angiotensin II, norepinephrine, aldosterone, and insulin promoting reabsorption, while dopamine, cAMP, cardiac natriuretic peptides, and prostaglandins induce a natriuretic effect. Typically, little sodium losses transpire through feces and perspiration; these losses escalate with heightened sodium consumption, but a portion is essential.

An imbalance in water regulation, where there is usually an excess of bodily water in relation to the total sodium and potassium content, is the core characteristic of hyponatremia. Disruptions in vasopressin, sometimes referred to as antidiuretic hormone, which controls water balance, are frequently the cause of this illness. Vasopressin activity is typically required for the development of hyponatremia, even in circumstances involving renal salt loss. Serum sodium levels and osmolality are controlled by the stimulation of thirst, the release of antidiuretic hormone (ADH), and renal control of filtered salt. The normal range of plasma osmolality is between 275 and 290 mOsm/kg. Changes in sodium concentration and related anions are the main cause of variations in serum osmolality. Distinguishing "effective osmolality" or tonicity from "total osmolality" is crucial. Total osmolality denotes the concentration of all solutes per unit of water, regardless of their capacity to traverse biological membranes.

Effective osmolality or tonicity refers to the osmoles that affect water flow between intracellular and extracellular compartments. This notion relies on the permeability of the membranes that delineate these fluid compartments. Effective solutes, such as sodium, generate osmotic pressure gradients across cell membranes, facilitating the transport of water between intracellular and extracellular compartments.

To sustain appropriate osmolality, water consumption must equal water elimination. An imbalance between water intake and excretion results in hyponatremia or hypernatremia. The thirst system regulates water intake, with osmoreceptors in the hypothalamus activating thirst when body osmolality attains 295 mOsm/kg. Antidiuretic hormone (ADH), which is made in the hypothalamus and kept in reserve in the posterior pituitary gland, carefully controls water excretion. ADH secretion is either increased or inhibited by variations in tonicity. Renal water reabsorption is caused by increased ADH secretion, whereas the opposite occurs when it is decreased. Although they are less sensitive than osmoreceptors, baroreceptors in the carotid sinus can cause the release of ADH. In reaction to pharmacological drugs, pain, nausea, stress, and decreased effective circulation volume, baroreceptors trigger the release of ADH[21].

Cells are fundamentally immersed in a solute solution of water, potassium, and sodium. Sodium is predominantly extracellular and expelled from the cell via Na+-K+ ATPase in favor of potassium, which is mainly intracellular. Water traverses the cell membrane through aquaporin channels; under normal physiological conditions, osmotic gradients are rapidly dissipated by the diffusion of water across the membrane[43].

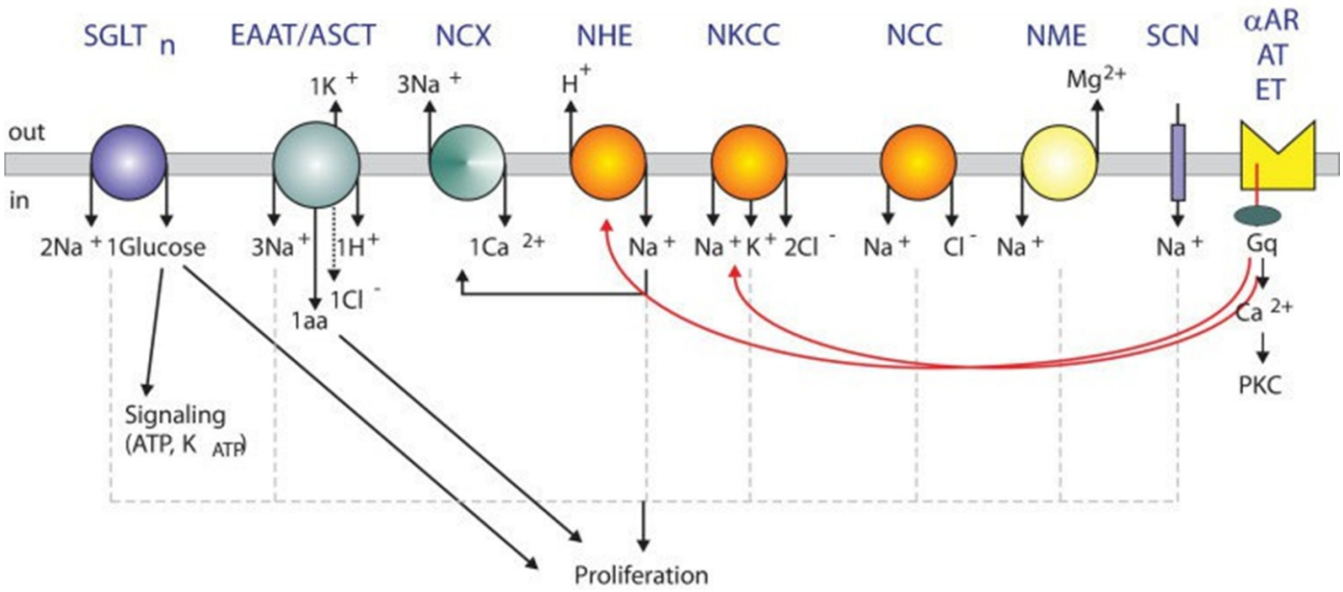

Figure 1: Sodium Dependent Transporters

Sodium readily passes through capillary membranes in peripheral blood vessels. However, in brain capillaries, tight endothelial junctions prevent sodium from crossing. Alterations in sodium levels cause water to move in to brain cells due to this restriction on sodium diffusion out of the cells. This can result in brain cell swelling or shrinkage in response to changes in plasma sodium levels.

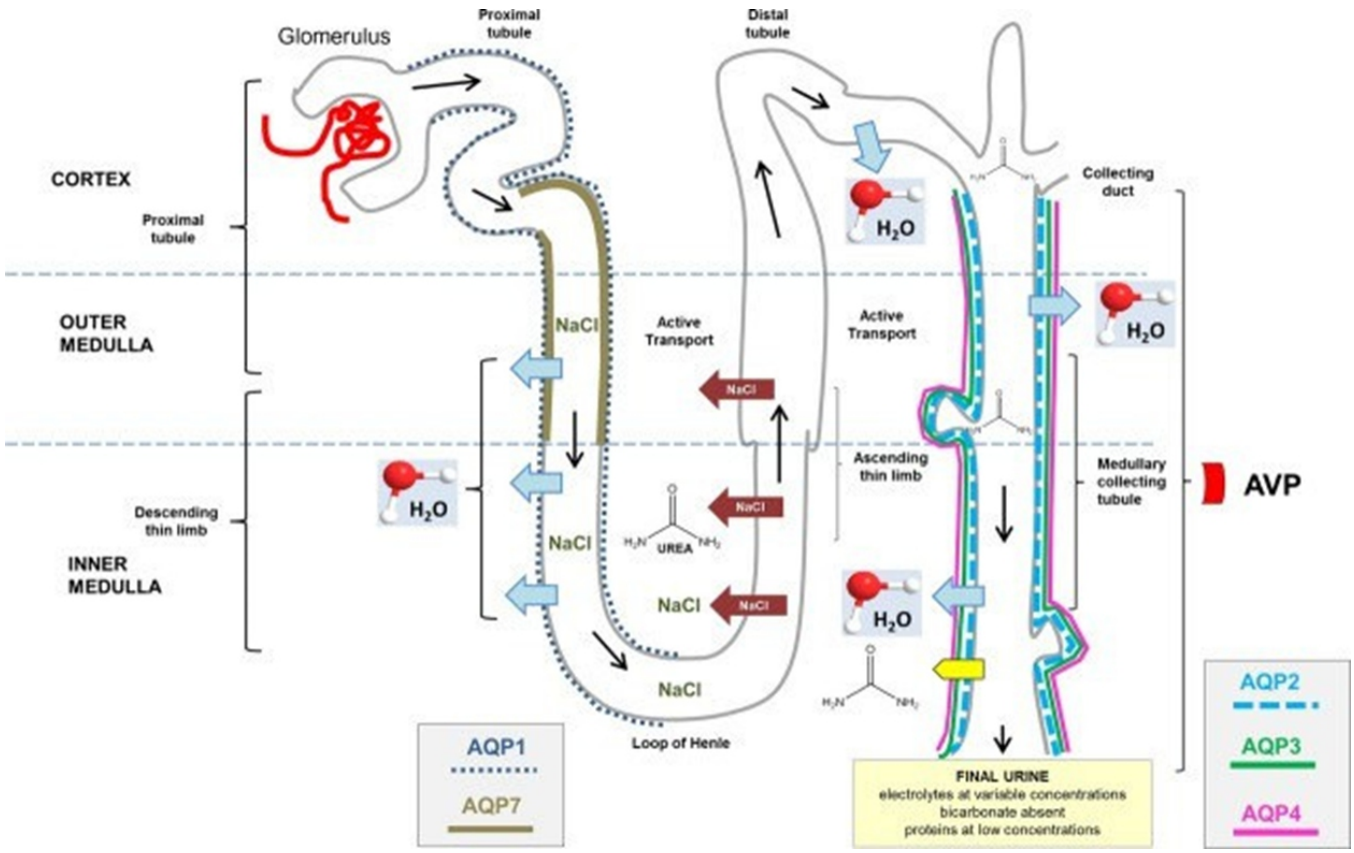

Figure 2: Nephron and Collecting Duct Anatomy, as well as the Distribution of several Aquaporins (AQPs) in the Kidneys that are impacted by Vasopressin (AVP).
Water and Sodium chloride (NaCl) Reabsorption Sites are shown.
In the Collecting Duct, Type-intercalated Cells' Internal Vesicle Membranes contain AQP6[46].

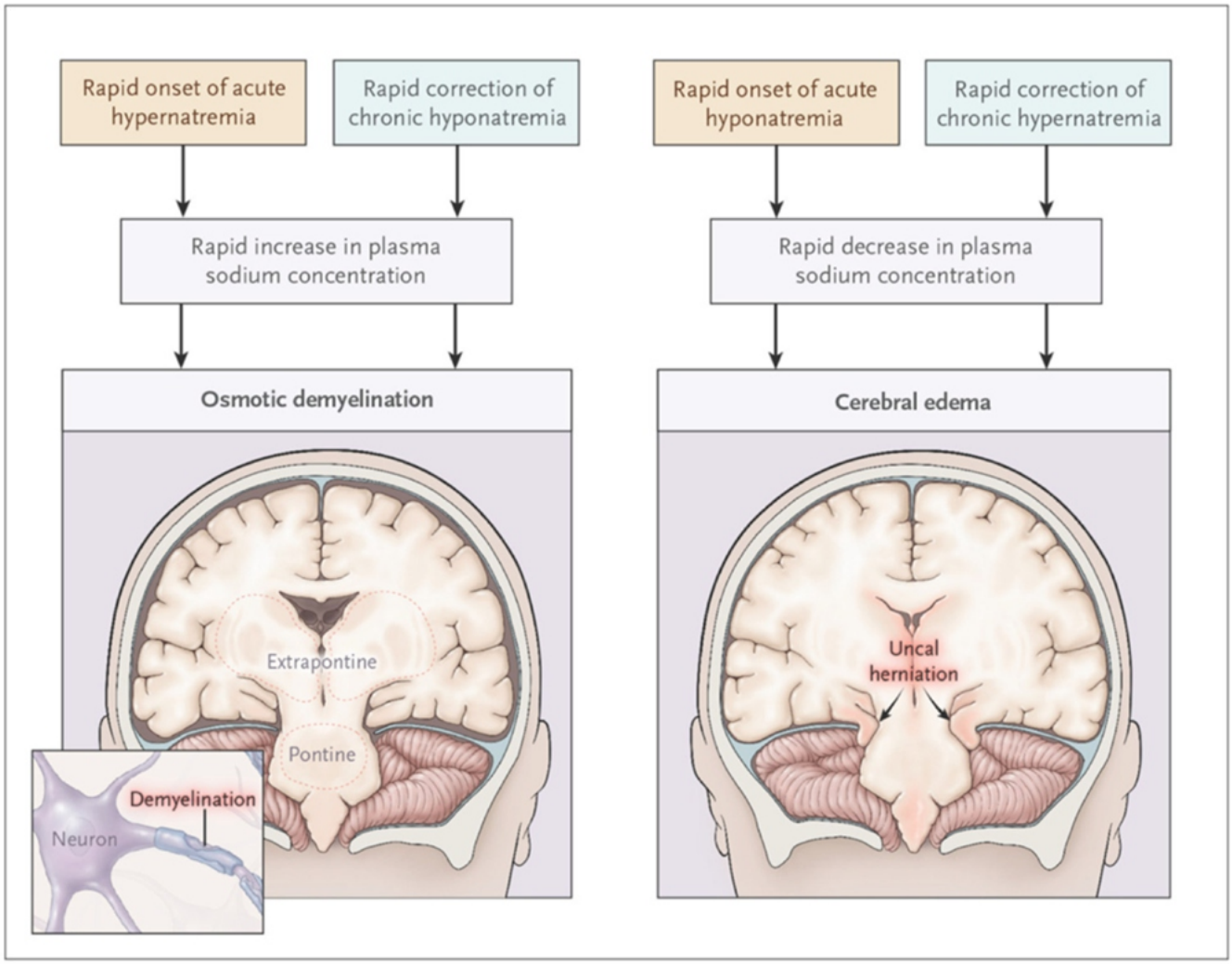

Figure 3: Consequence of Rapid Change in the Plasma Sodium Concentration

Table 2: Types of Hyponatremia based on Tonicity

Hypertonic Hyponatremia (Serum osmolality exceeding 290 mOsm/kg)
• Hyperglycemia • Mannitol
Isotonic Hyponatremia Serum osmolality ranging from 275 mOsm/kg to 290 mOsm/kg
• A laboratory artifact is pseudo-hyponatremia. Hypertriglyceridemia, hyperproteinemia (monoclonal gammopathy, intravenous immunoglobulin [IVIG]), and cholestasis (lipoprotein X) are the most frequent causes. Because two-thirds of clinical labs still employ direction-selective electrode technology, this problem still exists.
• Non-conductive irrigation solutions containing sorbitol, glycine, or mannitol are used in urological and gynecological operations, such as transurethral resection of the prostate (TURP).[22]
Hypotonic Hyponatremia (Serum osmolality of less than 275 mOsm/kg)
An excess of free water is represented by hypotonic hyponatremia. There are two possible causes for this excess free water: • Increased intake of free water: The patient consumes more free water than the kidneys can eliminate (more than 18 liters per day or more than 750 milliliters per hour). Psychogenic polydipsia, marathon running, water - drinking contests, and ecstasy are a few examples of this. • Decreased free water excretion: Patients ingest abnormal volume of free water, yet the kidneys cannot eliminate the water for whatever reason.

There are three mechanisms involved in the inability of kidneys to excrete water:

1. **Elevated ADH Activity: High ADH can result from three distinct mechanisms:**
   - Decreased effective arterial blood volume (EABV): Antidiuretic hormone (ADH) is released when the EABV is lowered by 15% or more. This occurs when there is hypovolemia (as in vomiting or diarrhea), decreased cardiac output (as in heart failure), or vasodilation (as in cirrhosis).
   - SIADH: Autonomous secretion of ADH. Brain diseases, lung disorders, medications (like SSRIs), and other conditions (including pain and nausea) are the four main causes of this. Deficiency in cortisol: Cortisol inhibits the release of ADH. Large amounts of ADH are released when cortisol levels are lowered. This process is due to adrenal insufficiency[23] .
   - Deficiency in cortisol: Cortisol inhibits the release of ADH. Large amounts of ADH are released when cortisol levels are lowered. The mechanism is due to adrenal insufficiency[23].
2. **Low Glomerular Filtration Rate (GFR):** The kidney's capacity to eliminate water would be hampered by a low GFR. Acute kidney injury (AKI), chronic kidney disease (CKD), and end-stage renal disease (ESRD) are common examples.

3. **Low Solute Intake**: Patients on a normal diet eat 600 mOsm to 900 mOsm of solute every day. When it comes to water, solutes are substances that the glomeruli may effortlessly filter but that the tubules find either entirely or partially difficult to reabsorb. The two main solutes are urea, which is created during protein metabolism, and electrolytes, including salt. The solute burden is not influenced by carbohydrates. Solute intake and urine solute burden are equal under steady-state conditions. As a result, 600–900 mOsm of solute should be excreted in the urine by these patients. The urine solute load affects urine volume and, consequently, water excretion. The volume of urine produced must increase with the amount of solute that must be eliminated. The volume of urine that must be produced decreases with the amount of solute that must be eliminated. Under steady-state conditions, patients who consume a small quantity of solute daily (e.g., 200 mOsm/day) will also excrete a small amount of solute in their urine, which means they will do so in a lesser volume of urine. The kidneys' ability to eliminate water will be restricted by this reduced urine volume. The tea-and-toast diet and beer potomania are typical instances of this.

SIADH (Syndrome of Inappropriate Antidiuretic Hormone Secretion)[24]

This disease results in hyponatremia due to poor kidney water excretion caused by incorrect ADH secretion despite normal or increasing plasma volume.

Since there is not a single test that can validate the diagnosis, SIADH is an exclusionary diagnosis. The patients are euvolemic[25] and hyponatremic.

Causes of SIADH :

- Any condition affecting the central nervous system (CNS)
- Ectopic ADH production (most often lung small cell cancer)
- Medication (including carbamazepine, oxcarbazepine, and chlorpropamide)
- HIV
- TB and pneumonia are examples of pulmonary illnesses.
- Patients recovering from surgery (pain medication)

Treatment includes fluid restriction and the use of vasopressin-2 receptor inhibitors[26,27].

EVALUATION

The severity and chronicity of hyponatremia determine the symptoms. Minimal symptoms are seen in patients with mild-to-moderate hyponatremia (more than 120 mEq/L) or a progressive drop in sodium (longer than 48 hours). Individuals who have severe hyponatremia (less than 120 mEq/L) or a sharp drop in sodium levels exhibit a wide range of symptoms[28].

From headache, muscle cramps, nausea, vomiting, and anorexia to altered mental status, agitation, seizures, and even coma, symptoms can vary widely[29].

In addition to symptoms, it is critical to collect a thorough medical history that includes any history of pulmonary and central nervous system illnesses, all prescription drugs taken at home, and any social history of increased beer consumption, MDM usage, or ecstasy use.

Assessing neurological and volume status is part of the physical examination.

To avoid irreversible brain damage, patients with neurological symptoms and indicators must receive treatment right away[26].

Figure 4: Diagnostic algorithm of Hyponatremia[49]

Table 3: Laboratory Investigations Aiding in Diagnostic Algorithm of Hyponatremia

Plasma Osmolality (275 mOsm to 290 mOsm/kg)	• The distinction between hypotonic, isotonic, and hypertonic hyponatremia can be aided by it. • Patients who are hypotonic are truly hyponatremic.
Osmolality of Urine	• Primary polydipsia or reset osmostatis is indicated by urine osmolality below 100 mOsm/kg. • A high ADH condition is typically indicated by urine osmolality greater than 100 mOsm/kg.
Volume Status (ECF status)	• euvolemic, hypervolemic, and hypovolemic.
Urine Sodium Concentration	• Extra renal fluid loss (from remote vomiting and diuretic treatment) is indicated by urine sodium levels below 10 mmol/L. • Greater than 20 mmol/L of urine sodium indicates renal loss of urine (salt-wasting nephropathies, vomiting, diuretics, and cortisol deficit).
Other Investigations	• Thyroid-stimulating hormone (TSH) in serum • Adrenocorticotropic hormone (ACTH) in serum • Tests for liver function and serum urea • CT scan of the head or computed tomography (CT) scan of the chest

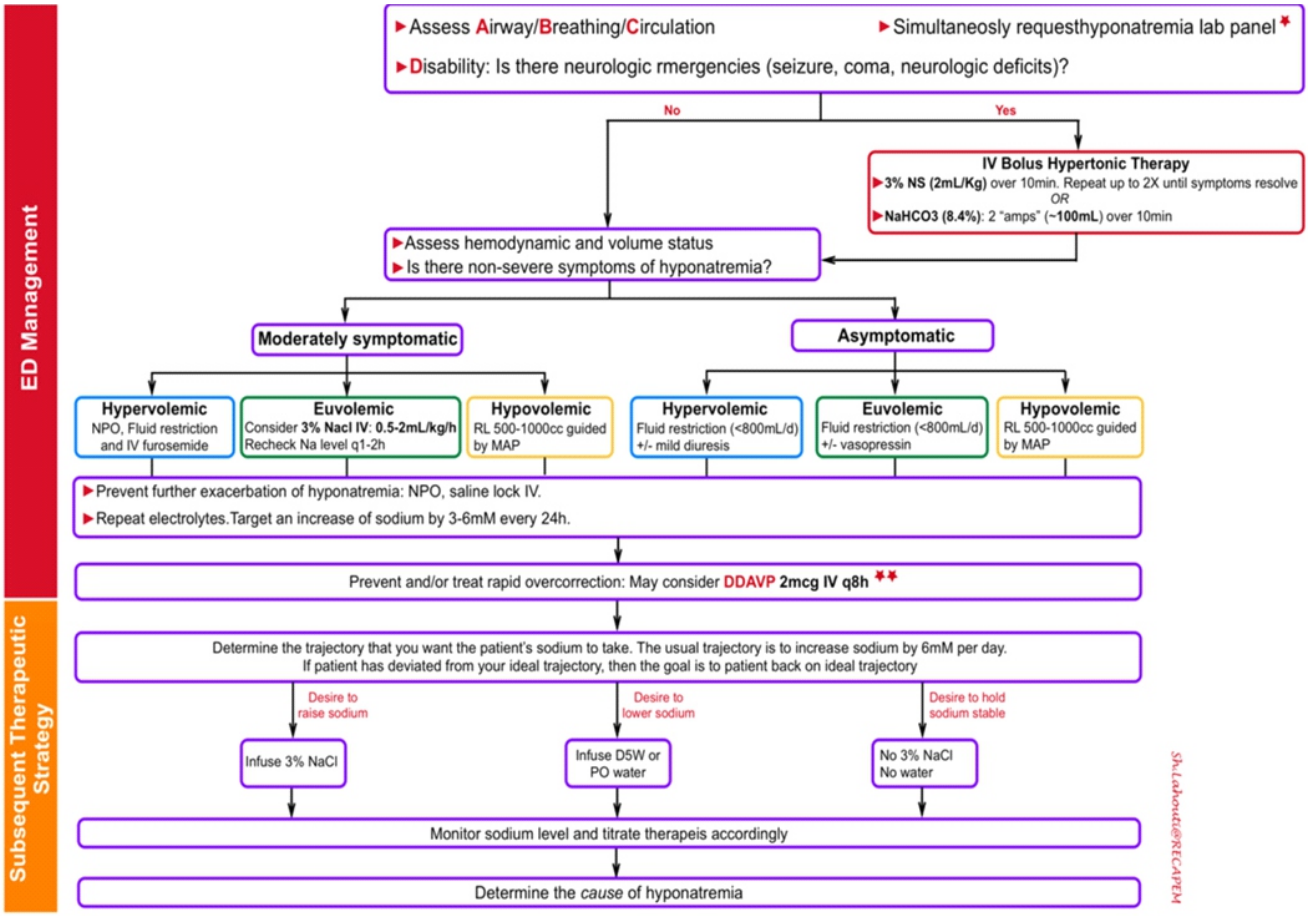

Figure 5: General Approach to Management of Hyponatremia[50] - Acute Symptomatic Hyponatremia

TREATMENT AND MANAGEMENT

The intensity of symptoms, volume status, duration, and degree of hyponatremia all affect how hyponatremia is treated.

In cases of severe hyponatremia, provide a 100 mL intravenous (IV) bolus of 3% sodium chloride (repeat up to thrice if symptoms persist).

Hyponatremia characterized by mild to moderate symptoms: 3% sodium chloride, gradual infusion (compute the infusion rate using the sodium deficiency formula, then recalculate it with regular sodium monitoring).

Chronic Asymptomatic Hyponatremia

- Hypovolemic hyponatremia: the provision of isotonic fluids and the retention of any diuretics.
- Treat the underlying ailment, limit fluid and salt intake, and use loop diuretics to treat hypervolemic hyponatremia.
- Fluid restriction to less than one liter per day is known as euvolemic hyponatremia.

Medication: Recently, selective vasopressin-2 receptor antagonists have been employed. They raise serum sodium levels by increasing the kidneys' excretion of water without influencing sodium levels. If the aforementioned measures are ineffective, these drugs are utilized in patients with euvolemic and hypervolemic situations (apart from liver failure)[30,31].

Correcting sodium by no more than 10 mEq/L to 12 mEq/L in any 24-hour period is the aim of the correction. Osmotic Demyelination Syndrome (ODS) risk factors include alcohol consumption, liver illness, hypokalemia, and malnourishment.

Limit of Correction

- ODS high-risk: less than 8 mEq/Lin over a 24-hour span
- ODS risk is typically less than 10 mEq/Lin over a 24-hour period.

If there is no hypovolemic condition, including postural hypotension, faux hyponatremia, or false laboratory hyponatremia, the next step is to assess the urine's osmolarity and salt content. In the absence of quick water intake and low urine salt levels (less than 100 mOsm/kg), the potential for a high fluid, low protein diet, including beer potomania, should be examined. For patients whose severe hyponatremia is less than 120 mEq/L, the chronicity of the hyponatremia should be considered.

Therefore, intravenous 3 percent saline at a dose of 2 milliliters per kilogram of body weight (e.g., 150 milliliters) over 10 minutes is recommended for severe chronic hyponatremia. If severe symptoms continue, it can be repeated twice as needed.[49] Serum sodium levels rise by 2 mEq/L for every 100 mL of hypertonic saline. doing a thorough electrolyte panel 20 minutes after administering hypertonic treatment. Raising Na levels by roughly 3-5 mM is the goal in order to improve clinical outcomes. If the symptoms continue:

- Consider doing more rounds of hypertonic therapy to reach a total rise of roughly 4-6 mM if the sodium gain is less than 4 mM.
- Hyponatremia may not be the root cause if symptoms continue after a 6 mM increase in salt. To look at additional or different conditions, more assessment is necessary.

To avoid unduly quick correction, desmopressin (dDAVP) should also be given to certain patients.

There is now no evidence of vascular thrombosis or extravasation harm, and 3% saline can be safely administered via a peripheral vein. However, some facilities have policies that forbid peripheral infusion of hypertonic saline. These circumstances necessitate central venous infusions or infusions of a lower concentration at higher infusion rates. Tolvaptan is advised when hyponatremia is associated with increased anti-diuretic hormone (ADH) activity.

For patients with normovolemic hypotonic hyponatremia, fluid restriction is sufficient. Malnourished patients with the syndrome of inappropriate antidiuretic hormone secretion (SIADH) may require a high protein diet because it raises the solute load for renal excretion, which leads to a greater elimination of free water. Patients with SIADH have low serum osmolality (less than 280 mOsm/kg) and hyponatremia (plasma sodium level of less than 135 mEq/L), according to laboratory results. Additionally, urine osmolality (usually above 100 mOsm/L) and sodium levels (higher than 20 mMol/L) are elevated in SIADH patients[32].

Differential Diagnosis

- Hypo osmolality is linked to true hyponatremia. First, it is important to distinguish between the conditions that cause hyperosmolar hyponatremia and iso-osmolar hyponatremia (also known as pseudo-hyponatremia).[33]
- Elevated blood sugar levels
- Overdose of Mannitol
- Elevated cholesterol levels
- Elevated protein levels

Differential Diagnosis for Hypo-Osmolar Hyponatremia

- Gastroenteritis
- Diuretic use
- Congestive heart failure
- Liver failure
- Psychogenic polydipsia
- Renal causes
- SIADH
- Adrenal Crisis
- Hypothyroidism

Prognosis

The severity of hyponatremia and the underlying illness producing it determine the prognosis for patients with this disorder. Patients with acute hyponatremia, severe hyponatremia, and elderly patients have a bad prognosis[34].

Complications

Patients with hyponatremia may experience seizures, rhabdomyolysis, altered mental status, and even coma if they get insufficient or no treatment.

Osmotic demyelination syndrome may result from the quick correction of chronic hyponatremia (more than 10 mEq/L to 12 mEq/L of sodium in 24 hours).

Rapid sodium correction in individuals with persistent hyponatremia[35] can result in osmotic demyelination syndrome, originally termed as central pontine myelinolysis. Within 48 hours, the brain of hyponatremia patients adjusts to a drop in serum sodium levels without experiencing cerebral edema. If the initial salt is greater than 120–125 mmol/L, osmotic demyelination is uncommon[44].

Patients with chronic hyponatremia are therefore typically asymptomatic. Osmotic demyelination syndrome results from the brain's quick sodium correction once it has adapted to low serum sodium levels. Seizures, confusion, and even coma are among the irreversible neurological symptoms that make up the clinical manifestations, which are usually a few days later. Patients who are badly impacted may have "locked-in" syndrome. These patients are conscious, but they can only move or speak with the aid of their eyes[36].

Previous Evidence showing Clinical Spectrum of Hyponatremia

Sood et al. (2020) reported that 1.17% of hospitalized patients had hyponatremia. The average age of the study participants was 62.25±17.7 years. There were 1.25 times as many men as women. The most common neurological symptom was altered

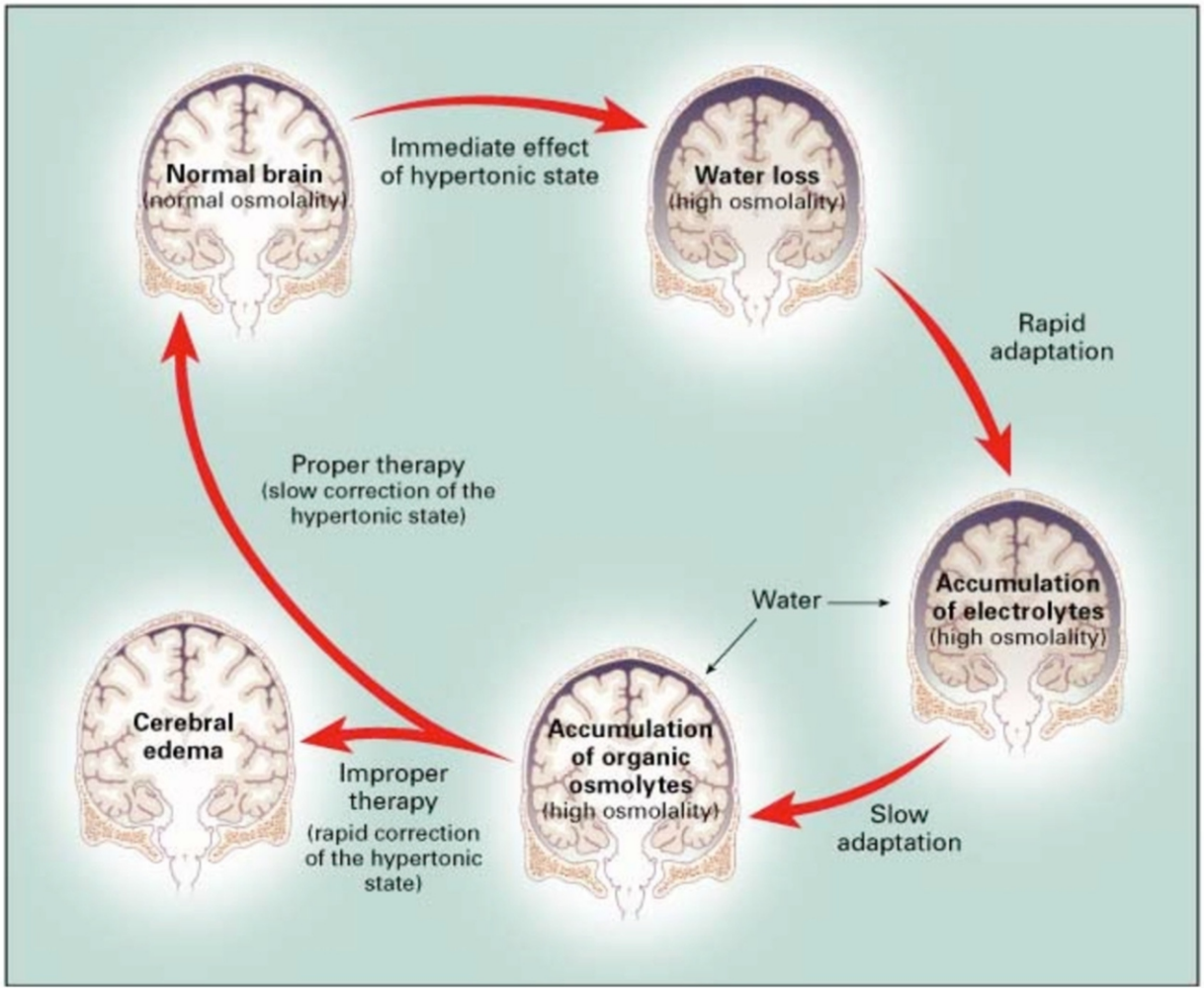

Figure 6: Effects of Hypernatremia on the Brain and Adaptive Responses

sensorium. Ninety percent of the patients had poor osmolarity. 38 (40%) of the 94 patients had euvolemia. Chronic obstructive pulmonary disease (COPD) with cor pulmonale and right-sided heart failure was the most common cause of hypervolemic hyponatremia (n = 9, 31%). The most common cause of hypo-volemic hyponatremia (n = 13, 48%) was acute gastroenteritis. Syndrome of inadequate anti-diuretic hormone secretion (SIADH) was the most common cause of euvolemic hyponatremia (n = 20, 53%). Out of the 106 patients, 11 (10.38%) passed away[37].

A study by Oommem et al. (2019) involved 904 patients who were admitted to AIMS, Kochi. They were divided into three groups (Mild, Moderate, and Severe) according to their serum sodium levels. The most typical manifestation of hyponatremia is altered sensorium. Compared to severe hyponatremia (20%), disorientation was more common in moderate hyponatremia (64%). The primary cause of hyponatremia was identified as the syndrome of inappropriate antidiuretic hormone secretion (SIADH). The most common causes of SIADH were respiratory conditions such as pneumonia, asthma, and obstructive airway disease (OAD). Of the several forms of carcinoma, genitourinary and lung cancer were the primary causes of SIADH. Cellulitis (14%), chest infections (15%), and urinary tract infections (UTIs) (68%) were the infections linked to hyponatremia. Of the 42.0% of people with hyponatremia who had diabetes mellitus, 64% had peripheral neuropathy, and 10% developed necrotizing fasciitis and diabetic foot[8].

One hundred hyponatremia patients were enrolled by Suresh et al. (2017). Of the patients, 46% had no symptoms. Lethargy affected 33% of patients, postural dizziness affected 28%, and aberrant behavior affected 19%. In hospitalized patients, the overall incidence of hyponatremia was 4.58%, however in intensive care unit patients, it was 22.4%. Hypertonic saline infusion was used to treat twelve patients with symptomatic severe hyponatremia, 25% of patients received loop diuretics with oral sodium chloride supplementation for free water excretion in SIADH cases, 44 patients were advised to restrict their fluid intake, 36 patients received oral sodium chloride supplementation, and 64 patients received normal saline. Five of the nine study participants who passed away had advanced liver cirrhosis as their underlying cause. Osmotic Demyelination Syndrome (ODS) occurred in one patient[39].

According to Rai et al. (2017), hyponatremia (serum Na+≤130 mEq/L) occurred in 100 out of 100 cases.The mean sodium level was 118.2 ± 8.1 mEq/L, and 56 patients had severe hyponatremia. 38 patients experienced vomiting, 7 experienced hiccups, 6 experienced seizures, 38 hyponatremic patients were asymptomatic, and 43 patients experienced altered levels of consciousness in the form of lethargy, disorientation, irrelevant talking, or coma. Our study found that euvolemic hyponatremia was the most prevalent kind, accounting for 71% of cases, followed by hypervolemic (27%) and hypovolemic (2%). SIAD was responsible for 94.4% of the euvolemic hyponatremia in our research[40].

In a cross-sectional study of 250 patients aged >18 with hyponatremia (<130meq/l), Mittal et al. (2016) discovered that 154 (61.6%) of the patients had euvolemic hyponatremia, 53 (21.2%) had hypervolemic hyponatremia, and 43 (17.2%) had hypovolemic hyponatremia. Acute gastroenteritis, CLD, and CNS infections were the most frequent causes of euvolemic, hypervolemic, and hypovolemic hyponatremia, respectively. Severe hyponatremia was associated with more neurologic symptoms than mild hyponatremia (69.7% versus 8.1%). 44 patients (17.6%) experienced seizures related to hyponatremia, and all of them had severe hyponatremia.

Mortality was 14% overall. Patients who had severe hyponatremia were more likely to die than those who had mild hyponatremia[41].

In 2012, Chatterjee et al. recruited 201 patients (16.4%) whose serum Na level was less than 135 meq/l. 75 (37.31%) of the patients were female, while 126 (62.69%) were male. Thirty patients (2.4%) had severe hyponatremia (Na < 120 meq/l). The largest proportion of hyponatremic patients were euvolemic [102 (50.74%)] and hypervolemic [54 (26.86%)]. and low blood sugar [45 (22.4%)]. Sixty-six patients fulfilled the criterion of SIADH. The most common underlying risk factor for hyponatremia in our case series was fluid loss from diarrhea or vomiting. During their hospital stay, 13.5% (15/201) of hyponatremic patients died, while 8.5% of normonatremic patients did the same[42].

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Review

Confined in the Realm of the Digital Era: A Short Review on Nomophobia

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ABSTRACT

Nomophobia is the fear or anxiety people feel when they don't have their mobile phones with them. In today's world, where the internet is everywhere and smartphones are a part of daily life, more and more people are becoming dependent on their phones, which can lead to stress and mental health problems. This article explains what nomophobia is, how common it is in different groups of people, and how modern technology and being constantly connected have made it worse. It also looks at how it affects our emotions and behaviours. The review talks about tools like the Nomophobia Questionnaire (NMP-Q) that help figure out how serious someone's phone-related anxiety is. It also suggests ways to manage it, like learning about the problem, therapy, and changing habits to use phones in a healthier way. The article highlights the importance of spreading awareness and teaching people strategies to handle their phone use better and reduce its negative effects. This paper underscores the critical interplay between digital wellbeing and mental health, stressing the need for research and interventions that support healthy technology use and emotional resilience in today's connected society.

KEYWORDS: Anxiety, Digital well-being, Nomophobia, Smart phone dependency, Mental health

INTRODUCTION

In the rapidly evolving digital landscape, smartphones have become ubiquitous, integrating deeply into daily life and, in some cases, fostering a relatively new phenomenon known as nomophobia[1]. This term, an acronym for “no mobile phone phobia," describes a psychological condition characterized by the fear of being disconnected from one's mobile phone[2]. This apprehension can manifest as significant anxiety and distress when an individual is unable to use their smartphone or fears losing access to it[3]. This review aims to explore the multifaceted aspects of nomophobia, encompassing its formal definition, diagnostic criteria, global and Indian prevalence, contributing factors, impact on mental health, and potential management strategies[4,5]. The pervasive nature of mobile technology has transformed communication and social interaction, but it has also introduced novel psychological challenges that warrant comprehensive academic scrutiny[6].

BACKGROUND AND CONTEXT

The pervasive use of mobile devices has led to an emergent addictive disorder, necessitating extensive research to understand its impact on global health[7]. Specifically, nomophobia, often termed a "digital disease" due to excessive smartphone usage, warrants detailed investigation into its association with various psychological traits and overall well-being among young adults[8]. This review synthesizes current research on nomophobia to provide a holistic understanding of this contemporary psychological phenomenon, which is increasingly prevalent among adolescents and young adults[9,10]. It explores the intricate relationship between nomophobia and other psychiatric conditions, such as depression, anxiety, and stress, which are increasingly observed in individuals who exhibit fear of being without their mobile phones[11]. Moreover, it delves into the factors influencing the development and exacerbation of nomophobic tendencies, while also addressing the broader implications for mental health and potential therapeutic interventions[12,13]. This review further aims to consolidate the understanding of nomophobia's etiology, presentation, and management, thereby providing a robust framework for future research and clinical practice in addressing this modern-day affliction[13,14]. Specifically, the aim of this review is to synthesize existing literature on nomophobia, evaluating its relationship with problematic smartphone use and its implications for psychological well-being[15]. It also seeks to underscore the necessity for continued vigilance and adaptive mental health strategies in an era defined by constant technological advancement and interaction[16]. The rise in smartphone usage among children and young people, for instance, has paralleled an increase in poor mental health outcomes, prompting concerns about problematic smartphone use[17]. This paper will address the growing concern over nomophobia by examining its conceptualization, diagnostic challenges, epidemiological patterns, etiological factors, psychological sequelae, and intervention strategies to provide a comprehensive understanding of this contemporary mental health issue[18]. The global increase in problematic smartphone use underscores the urgent need to critically evaluate and synthesize existing research on its association with mental health, particularly in regions experiencing rapid technological adoption[19]. This review aims to systematically analyse the complex interplay between problematic smartphone use and various mental health indicators, including anxiety and depression, particularly in these rapidly digitizing contexts[20,21].

Definition of Nomophobia

While the term "nomophobia" is widely recognized, a formal, universally accepted clinical definition remains somewhat elusive, often described as the fear of being without a mobile phone or being unable to use it[21]. The concept specifically refers to the anxiety experienced when separated from a mobile phone, when there is no network coverage, or when the device runs out of battery[22]. This fear extends to concerns about losing connection to information and communication facilitated by smartphones, which have become integral to daily life for many[21]. This apprehension specifically encompasses the fear of not being able to communicate, losing connectedness, or lacking access to information, which collectively contribute to significant distress[1]. This emotional state often encompasses feelings of anxiety, panic, and discomfort when an individual is unable to access their mobile device, leading to a palpable sense of disconnection and isolation[17]. Moreover, this psychological construct is increasingly recognized in contexts where smartphone integration has redefined personal communication and professional interactions [23]. The ubiquitous nature of smartphones has led to their essential role in daily activities, such that their absence can provoke significant psychological distress, akin to what is observed in anxiety disorders[24].

DIAGNOSTIC CRITERIA

Given the psychological distress associated with nomophobia, researchers have begun exploring its potential inclusion as a recognized condition within standardized diagnostic manuals. While it is not yet formally recognized in the Diagnostic and Statistical Manual of Mental Disorders or the International Classification of Diseases, various researchers have proposed criteria for its diagnosis based on observed behavioural and psychological symptoms[19]. These proposed criteria typically revolve around the intensity of anxiety or discomfort when separated from a smartphone, the duration of such feelings, and the resulting impairment in social, occupational, or other important areas of functioning[8]. Furthermore, the clinical manifestations often include preoccupation with the device, withdrawal symptoms when access is denied, and significant time spent engaging with the phone, indicating a pattern consistent with behavioural addictions. The term "nomophobia" itself is a portmanteau of "no mobile phone phobia," originating from a 2008 UK Post Office study investigating anxiety among mobile phone users who lost contact with their devices[25]. This initial study highlighted the emerging phenomenon of anxiety triggered by smartphone

separation, signalling the need for more in-depth psychological investigation[26]. Since then, various scales, such as the Nomophobia Questionnaire, have been developed to assess the severity and characteristics of this fear, offering a quantitative approach to its evaluation[2,14]. These instruments aim to measure the multidimensional aspects of nomophobia, including the inability to communicate, loss of connectedness, and discomfort from not having access to information[27]. New technologies, particularly smartphones, have profoundly altered lifestyles and daily routines, making them indispensable for many individuals[28]. This ubiquitous integration has inadvertently fostered a reliance that, for some, manifests as distress when disconnected, mirroring symptoms seen in other behavioural addictions[29,30]. This perspective suggests that nomophobia, though not an official diagnosis, shares phenotypic similarities with behavioural addictions, characterized by preoccupation, withdrawal symptoms, and functional impairment[31]. Consequently, many scholars advocate for a deeper examination of nomophobia within the framework of behavioural addictions, recognizing its potential to cause significant impairment in daily life[32,33]. The conceptual overlap between nomophobia and problematic smartphone use further complicates its precise categorization, as both constructs describe maladaptive patterns of smartphone engagement that result in distress or impairment[34]. This distinction is crucial for developing targeted interventions, as problematic smartphone use encompasses a broader range of maladaptive behaviours, whereas nomophobia specifically centers on the anxiety of being without the device[28].

ICD & DSM Criteria Considerations

While neither the DSM-5 nor ICD-11 currently include nomophobia as a distinct diagnostic entity, the growing prevalence of problematic smartphone use necessitates a consideration of its symptomatology within existing diagnostic frameworks[35,34]. Given the substantial impact of digital technologies on mental health, future revisions of these classifications may need to integrate criteria that capture technology-related behavioural patterns, including those associated with nomophobia and broader problematic use[36]. This integration would allow for a more nuanced understanding and appropriate clinical response to the emerging mental health challenges posed by pervasive digital engagement[30]. Furthermore, the shared features between nomophobia and behavioural addictions, such as salience, mood modification, and withdrawal, highlight the potential for its future classification alongside other recognized technological dependencies[37]. However, the distinction between nomophobia, excessive smartphone use, and general addiction remains a subject of ongoing debate among researchers[38,39]. This ongoing discussion underscores the necessity for clearer diagnostic boundaries and a deeper understanding of the underlying psychological mechanisms to differentiate these overlapping constructs effectively[40].

Global and Indian Prevalence

The global prevalence of problematic smartphone use, a broader category encompassing nomophobia, has seen a significant increase, particularly exacerbated by the COVID-19 pandemic[41]. Studies indicate that this period led to increased screen time and reliance on digital devices for communication, work, and entertainment, subsequently escalating the incidence of smartphone - related anxieties and dependencies[42,43]. This surge has resulted in a substantial portion of the population exhibiting symptoms consistent with nomophobia, though precise global figures for nomophobia specifically are still under active investigation. Despite this, estimations from various regional studies suggest that a significant percentage of smartphone users experience nomophobic tendencies, ranging from mild discomfort to severe anxiety[44]. For instance, some research indicates a global prevalence of depressive episodes ranging from 3.2% to 4.7%, with mood disorders reaching 5.4%, suggesting a broad landscape of mental health concerns that may intersect with technological dependencies. However, specific epidemiological data on nomophobia itself remains less consolidated, varying widely across different populations due to diverse methodologies, cultural factors, and diagnostic tools used. In India, while comprehensive national data specifically on nomophobia are still emerging, studies on related conditions like depression offer some insights into the broader mental health landscape. However, recent studies among university students in Bangladesh and Bahrain have provided more specific insights into nomophobia prevalence, with one study reporting a mean nomophobia score of 88.55 out of 140, and prevalence rates of 9.4% for mild, 56.1% for moderate, and 34.5% for severe nomophobia[45, 2]. In India, a study conducted among college students revealed a problematic mobile phone use prevalence of 26.8%, correlating significantly with psychological distress, where 5.8% experienced psychological distress and 13.2% reported lower self-esteem[46]. These figures highlight a growing concern regarding technology overuse in academic populations and suggest a potential for nomophobia

within these demographics, warranting further focused epidemiological studies in India.

Factors Influencing Nomophobia

Understanding these influencing factors is crucial for developing targeted prevention and intervention strategies to mitigate the adverse effects of nomophobia and related digital dependencies.

Sociodemographic Factors

Age, gender, educational status, and socioeconomic background are key sociodemographic variables consistently identified as modulating the risk and severity of nomophobia[47]. Generally, younger individuals and adolescents, particularly those with higher screen time and smartphone ownership rates, exhibit a heightened susceptibility to problematic smartphone use[48]. This demographic, often characterized by increased social media engagement and reliance on digital platforms for communication and entertainment, faces elevated risks of developing nomophobic tendencies[15]. For instance, adolescents in India show high rates of smartphone addiction, which is significantly associated with urban living and higher socioeconomic status[49]. Moreover, studies indicate that adolescents have the highest rate of smartphone overdependence at 37.0%, compared to other age groups[50]. Conversely, older adults demonstrate a lower prevalence of smartphone overdependence at 17.5%, suggesting an inverse relationship between age and this particular digital dependency[50]. Gender differences also play a significant role, with some research suggesting females may exhibit higher nomophobia rates than males due to varying social media use patterns and communication styles. However, other studies report no significant gender differences or even a higher prevalence among males in certain populations[51]. These discrepancies underscore the need for culturally sensitive and context-specific research to elucidate the precise interplay of gender and nomophobia[52]. Educational attainment also presents a complex relationship, with some studies linking higher education levels to increased awareness and potentially reduced vulnerability, while others find elevated nomophobia among university students due to academic pressures and social networking[53]. Family environment, including parental mediation strategies and family cohesion, also significantly shapes an individual's vulnerability to nomophobia[53].

Psychological Factors

Various psychological factors, including anxiety, depression, low self-esteem, and neuroticism, have been strongly correlated with an increased predisposition to nomophobia[54]. For example, individuals experiencing higher levels of anxiety or depression often report greater reliance on their smartphones as a coping mechanism, leading to a vicious cycle of dependency[55]. Low self-esteem, often exacerbated by the curated realities presented on social media, also significantly contributes to nomophobia, as individuals may seek constant validation and connection through their devices[51,56]. Furthermore, personality traits such as neuroticism have been identified as significant predictors, indicating that individuals prone to negative emotional states are more susceptible to developing nomophobic behaviors[45]. The intricate relationship between mental health and smartphone overdependence is further highlighted by studies indicating that approximately 30% of college students exhibit smartphone overdependence, influenced by factors such as stress, anxiety, self-esteem, and family communication[51]. Additionally, an inclination towards reassurance-seeking behaviours, often observed in psychologically vulnerable individuals, propels continuous smartphone use to maintain relationships and garner affirmation[55]. This constant digital engagement, driven by psychological vulnerabilities, can in turn exacerbate feelings of isolation and inadequacy, perpetuating the nomophobic cycle.

Technological Factors

Technological factors, such as instant notification systems, ubiquitous access, and the highly engaging design of mobile applications, significantly contribute to the development and perpetuation of nomophobia by fostering a continuous need for digital connectivity[57]. The pervasive nature of social media platforms and the gamification elements embedded within many applications are particularly effective in creating compulsive usage patterns, blurring the lines between necessity and addiction[58]. This perpetual digital engagement often leads to a fear of missing out, where individuals feel compelled to constantly check their devices to stay updated, further solidifying their reliance on smartphones[55].

Impact on Mental Health

Excessive smartphone usage and nomophobia have profound and multifaceted negative impacts on an individual's mental well-being, manifesting as increased anxiety, depression, and significant disturbances in sleep patterns[59,60].

Anxiety and Stress

The incessant need to be constantly connected, a hallmark of nomophobia, often triggers heightened levels of anxiety and chronic stress, characterized by persistent worry regarding

device availability, battery life, or network connectivity[61]. This pervasive apprehension can escalate into generalized anxiety disorder or even panic attacks when individuals are separated from their devices, underscoring the severity of this digital dependency[62]. Moreover, problematic smartphone use has been empirically linked to increased prevalence and incidence of anxiety and depressive disorders, particularly among young adults, with college students exhibiting alarmingly high rates[63].

Depression

The association between problematic smartphone use and depressive symptoms is well-established, with meta-analyses confirming a robust correlation[20]. This link is further exacerbated by the constant exposure to curated online lives, which can foster feelings of inadequacy and social comparison[64]. Additionally, individuals experiencing higher levels of depression often report an increased reliance on their smartphones as a maladaptive coping mechanism, perpetuating a detrimental cycle of dependency[65]. This maladaptive coping, in turn, can intensify feelings of isolation and inadequacy, further entrenching nomophobic behaviors[66]. This problematic engagement with smartphones can lead to a decrease in real-world interactions and a corresponding increase in feelings of loneliness or social isolation[67]. The pervasive nature of smartphone addiction has also been consistently associated with various mental health outcomes, with anxiety and depression being frequently identified mediators[68].

Other Mental Health Implications

Beyond anxiety and depression, excessive smartphone use is also linked to a range of other adverse mental health outcomes, including difficulties in cognitive-emotion regulation, impulsivity, impaired cognitive function, and low self-esteem[38,69]. These issues often manifest as sleep disturbances, reduced physical activity, and social networking addiction, further compounding the negative effects on mental well-being[38]. This can lead to a significant decline in academic or occupational performance and strained interpersonal relationships, further isolating individuals[63,70]. Furthermore, the inappropriate use of smartphones, often termed phubbing, has been correlated with decreased life satisfaction, increased loneliness, and lower self-esteem[71].

Management Strategies

Addressing nomophobia necessitates a multi-faceted approach, encompassing both individual-level interventions and broader systemic changes. Effective management strategies frequently involve behavioural therapies such as cognitive-behavioural therapy and mindfulness-based interventions, which aim to help individuals develop healthier relationships with their digital devices[72]. These therapeutic approaches often incorporate techniques like digital detoxes and scheduled unplugged times, encouraging individuals to gradually reduce their reliance on smartphones[73]. Moreover, educational initiatives play a crucial role in raising awareness about the psychological impacts of excessive smartphone use, promoting digital literacy, and fostering responsible technology habits from a young age.

Therapeutic Interventions

Cognitive-behavioural therapy stands as a prominent therapeutic intervention for nomophobia, focusing on identifying and modifying maladaptive thoughts and behaviours associated with excessive smartphone use[74]. This therapeutic approach helps individuals challenge irrational fears related to being disconnected and develop coping mechanisms to manage anxiety without immediate reliance on their devices. Mindfulness-based interventions also offer a promising avenue by cultivating present-moment awareness, thereby reducing the automatic urge to check smartphones and promoting a more balanced engagement with technology[4.] Furthermore, the implementation of structured digital detox periods, where individuals intentionally abstain from smartphone use for designated durations, can facilitate the re-establishment of healthy boundaries and reduce compulsive checking behaviours. These interventions are often complemented by psychotherapy sessions that address underlying psychological issues contributing to the addictive behaviour, such as low self-esteem or social anxiety[75]. These therapeutic modalities collectively aim to re-establish a healthier equilibrium between digital engagement and real-world interactions, thereby alleviating the psychological distress associated with nomophobia[76].

Technological Solutions

While behavioural interventions offer substantial benefits, technological solutions also play a critical role in mitigating problematic smartphone use and supporting individuals in developing more mindful digital habits[77]. These tools often include applications designed to monitor screen time, block distracting notifications, and provide personalized insights into usage patterns, thereby empowering users to take control of their digital consumption[8]. Additionally, emerging digital

therapeutics leverage mobile technology itself to deliver interventions for mental health conditions, including those exacerbated by excessive smartphone use, offering accessible and scalable solutions[78]. These digital interventions can facilitate self-regulation by providing real-time feedback and encouraging deliberate engagement with digital content, thereby fostering a more balanced relationship with smart devices[5].

Preventive Measures

Proactive strategies aimed at fostering digital literacy and critical thinking skills from an early age are essential to mitigate the development of nomophobic tendencies. This includes educating individuals about the potential psychological impacts of excessive smartphone use and promoting a balanced approach to technology integration in daily life. Moreover, public health campaigns can raise awareness regarding the implications of problematic smartphone use, encouraging individuals to self-assess their digital habits and seek assistance when needed[79]. These initiatives can be integrated into school curricula and community programs to foster a generation that is more resilient to the addictive aspects of digital technology. Furthermore, policies promoting mindful technology design that prioritizes user well-being over engagement maximization could contribute significantly to prevention efforts.

CONCLUSION

This comprehensive review has elucidated the multifaceted nature of nomophobia, tracing its definition, prevalence, causative factors, and profound impacts on mental health. From its formal diagnostic criteria to its widespread global prevalence, particularly among younger demographics, the evidence consistently points to a growing public health concern. The pervasive integration of smartphones into daily life necessitates a continued focus on preventive strategies and effective interventions to mitigate the adverse psychological consequences associated with nomophobia.

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Case Report

Rehabilitation of Hemimandibulectomy Patient with Class II Cantor-Curtis Defect Using Modified Guiding Flange and Palatal Ramp Prosthesis: A Clinical Report

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ABSTRACT

Loss of mandibular continuity after segmental resection often results in mandibular deviation, facial asymmetry, and impaired oral function. Although immediate reconstruction with vascularized fibula free flaps restores continuity, masticatory function may remain compromised. This case report describes early prosthodontic rehabilitation of a hemimandibulectomy patient having class II Cantor-curtis mandibular defect using modified guide flange prosthesis and a palatal ramp to assist mandibular guidance and function.

KEYWORDS: Oral squamous cell carcinoma, Hemi-mandibulectomy, Guide flange prosthesis, Palatal ramplasty

INTRODUCTION

Segmental mandibulectomy is a common treatment for oral squamous cell carcinoma (OSCC) involving the mandible[1,2]. Resection leads to deviation of the residual mandibular segment, compromised occlusion, and masticatory dysfunction due to muscular imbalance and loss of skeletal continuity. Cantor and Curtis have classified the mandibular defects into 6 categories:

Class I: Mandibular resection involving alveolar defect with preservation of mandibular continuity;

Class II: Resection defects involve loss of mandibular continuity distal to the canine area;

Class III: Resection defect involves loss up to the mandibular midline region;

Class IV: Resection defect involves the lateral aspect of the mandible, but is augmented to maintain pseudo articulation of the bone and soft tissues in the region of the ascending ramus;

Class V: Resection defect involves the symphysis and parasymphysis region only, augmented to preserve bilateral temporomandibular articulations;

Class VI: Similar to class V, except that the mandibular continuity is not restored.

Although vascularized free fibula flap (FFF) reconstruction provides excellent anatomical replacement, functional outcomes vary[3,4]. FFF reconstruction provides excellent anatomical replacement, functional outcomes vary. Early prosthodontic management can play a pivotal role in retraining mandibular movements and minimizing deviation during the healing phase in retraining mandibular movements and minimizing deviation during the healing phase[5].

Patient Information

A 51-year-old male came to OPD of Department of Prosthodontics, Pacific Dental College and Research Center, Udaipur, Rajasthan with a chief complaint of inability in chewing and deviation of jaws for 6 months [Figures 1,2 and 3].

Figure 1: Deviation of Mandible in Frontal View

Figure 2: Deviation of Mandible to the Defect Side (Left Side)

Figure 3: Extra-oral Profile Post-operative before the Prosthesis
(a - Frontal View, b - Lateral Left Profile, c - Lateral Right Profile)

As stated by patient he was apparently asymptomatic 2 years back (2023), when he noticed oral ulcers on left buccal mucosa and went for biopsy, when ulcers didn't respond to the given medication. Biopsy turned out to be normal in that year, but later in August 2024 there was sinus formation on the left cheek. This time histopathological examination of biopsy confirmed Oral Squamous Cell Carcinoma of left buccal mucosa. Patient was operated in September 2024 and underwent segmental hemi-mandibulectomy from left condyle to parasymphyseal region with modified neck dissection involving lymph nodes level I to V and an immediate flap reconstruction was done at one of the Medical Colleges in Udaipur, Rajasthan. He underwent radiotherapy after a month of surgery and received 30 doses till December 2024. Following the surgery he developed class II Canton-Curtis defect on left side with mandibular deviation, restricted mandibular movements and aesthetically evident facial asymmetry.

Patient was a known case of diabetes mellitus for past 6 months and is under medication for the same.

Past Surgical History: Segmental Hemi-mandibulectomy (left side from condyle to parasymphyseal region), Modified Neck Dissection (level I to level V), Immediate Flap Reconstruction.

Personal History: There was history of smoking and chewing tobacco for past 10 years. Patient is on cessation for 2 years.

On Intra-oral examination, it was revealed that patient's mouth opening was reduced to 30mm.

Teeth present were

8-1	1-4
8-1	1-4

Root stump

7	

Carious

8	

Xerostomia and mucositis were observed in the oral cavity.

With stains +, Calculus ++

Clinical and Radiographic Findings

Extra-oral examination revealed mandibular deviation toward the left with associated facial asymmetry. Intra-oral examination showed surgical scarring, limited vestibular depth on the left, and a reconstructed mandibular segment. Panoramic radiographs revealed osseous discontinuity defect [Figure 4].

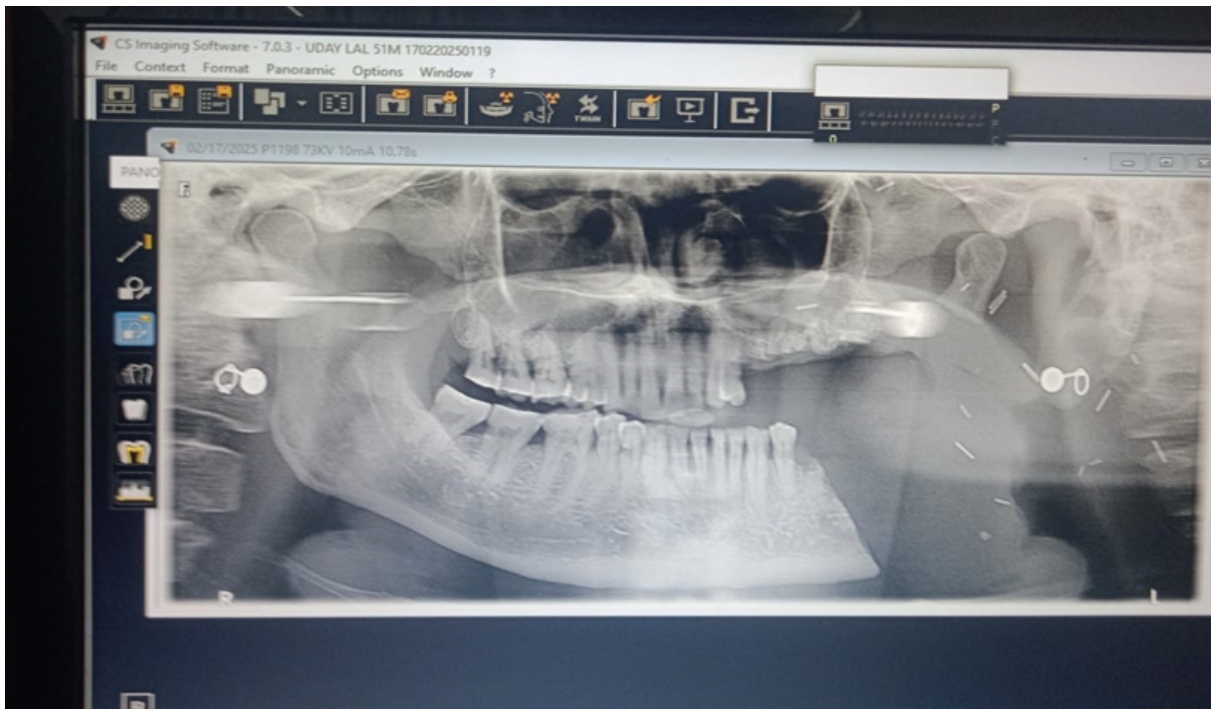

Figure 4: Post-op Radiograph of Hemi-mandibulectomy

Prosthodontic Management

Prosthodontic rehabilitation was planned during the initial healing phase to improve mandibular function and prevent maladaptive muscle patterns.

1. Guide Flange Prosthesis (GFP): A modified GFP was fabricated in clear cold-cure acrylic resin to guide the deviated mandible into proper mediolateral occlusion. Buccal extensions were shaped to engage the maxillary dentition and provide gliding contact during closure [Figure 5].

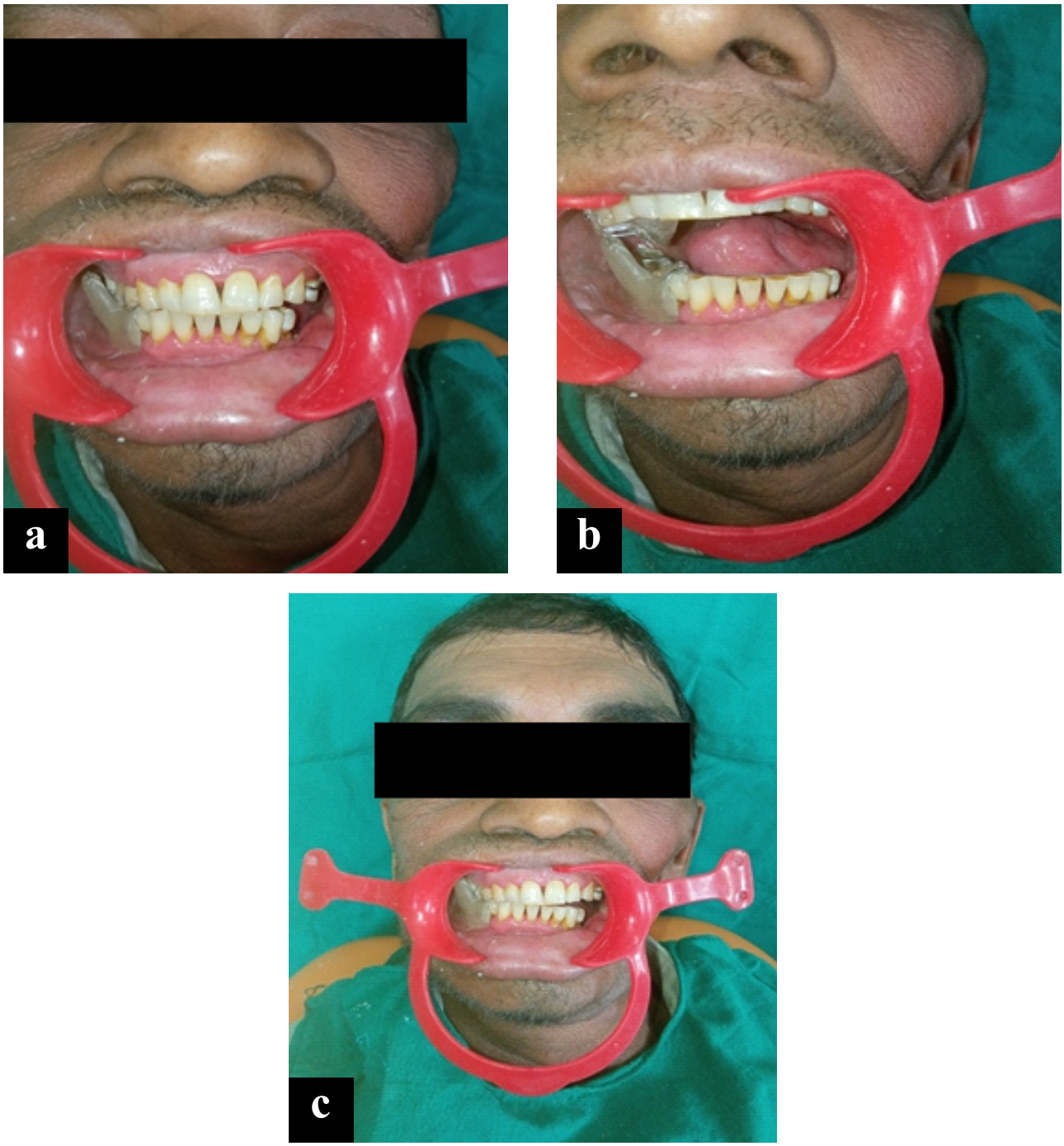

Figure 5: Placement of Buccal Guiding Flange Appliance which Assists and Guides the Mandible to its Original Position (a - Frontal View, b - Frontal View with Open Mouth, c - Frontal View with Close Mouth)

1. Palatal Ramp: A palatal ramp was fabricated on the maxillary prosthesis using cold-cured acrylic to provide vertical and lateral guidance to the mandible. This addition helped in redirecting the mandible during closure, prevented maxillary tooth extrusion, and enhanced functional efficiency [Figure 6].

Treatment Outcome

The patient reported a noticeable improvement in chewing ability, mandibular control, psychological well-being and speech clarity. Facial symmetry improved, and deviation on mouth opening was significantly reduced. Regular follow-up visits confirmed continued adaptation and favorable response.

DISCUSSION

Loss of mandibular continuity results in deviation due to the unopposed action of contralateral muscles and soft tissue contraction due to the unopposed action of contralateral muscles and soft tissue contraction[1,6]. Segmental resection leads to rotation of the occlusal plane and a shift in the midline, making functional rehabilitation complex. Although fibula flap reconstruction reestablishes form and continuity, studies indicate that masticatory function remains impaired in over 50% of cases, even after reconstruction[4,7].A review by Komisar found that only 4% of mandibular reconstruction patients had documented functional outcomes, and just 2% received prosthetic rehabilitation[5].

Patil et al. emphasized early prosthetic intervention using guide flange prostheses to retrain the mandible and reduce deviation[6]using guide flange prostheses to retrain the mandible and reduce deviation. In their case, a modified Guiding Flange Prosthesis and Palatal Ramp (maxillary stabilization plate) helped guide the mandible into consistent occlusion. Our approach extends this concept by combining a guiding flange prosthesis with a palatal ramp, offering multidirectional guidance and enhancing vertical closure[5,8] by combining a Guiding Flange Prosthesis with a palatal ramp, offering multidirectional guidance and enhancing vertical closure. The appliances were made using 21-gauge stainless steel orthodontic wires and assembled in cold cure clear acrylic [Figure7].

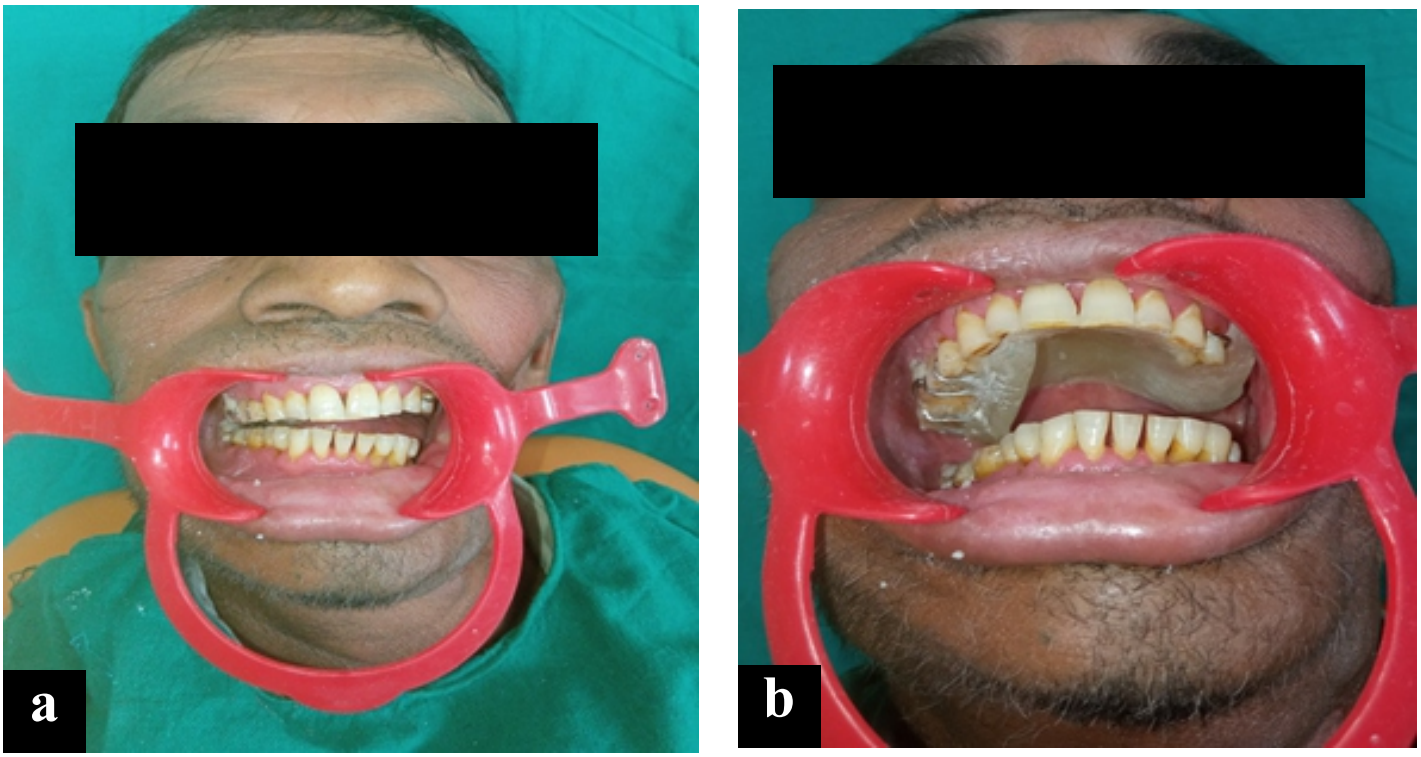

Figure 6: Placement of Palatal Ramp Appliance which Prevents the Return of Mandible to the Defect Side (Left Side)
(a - Frontal View, b - Occlusal View)

Figure 7: The Armamentarium

2 - Pin Heads and 2 - C-Claps were made for maxillary arch for passive retention [Figure 8].

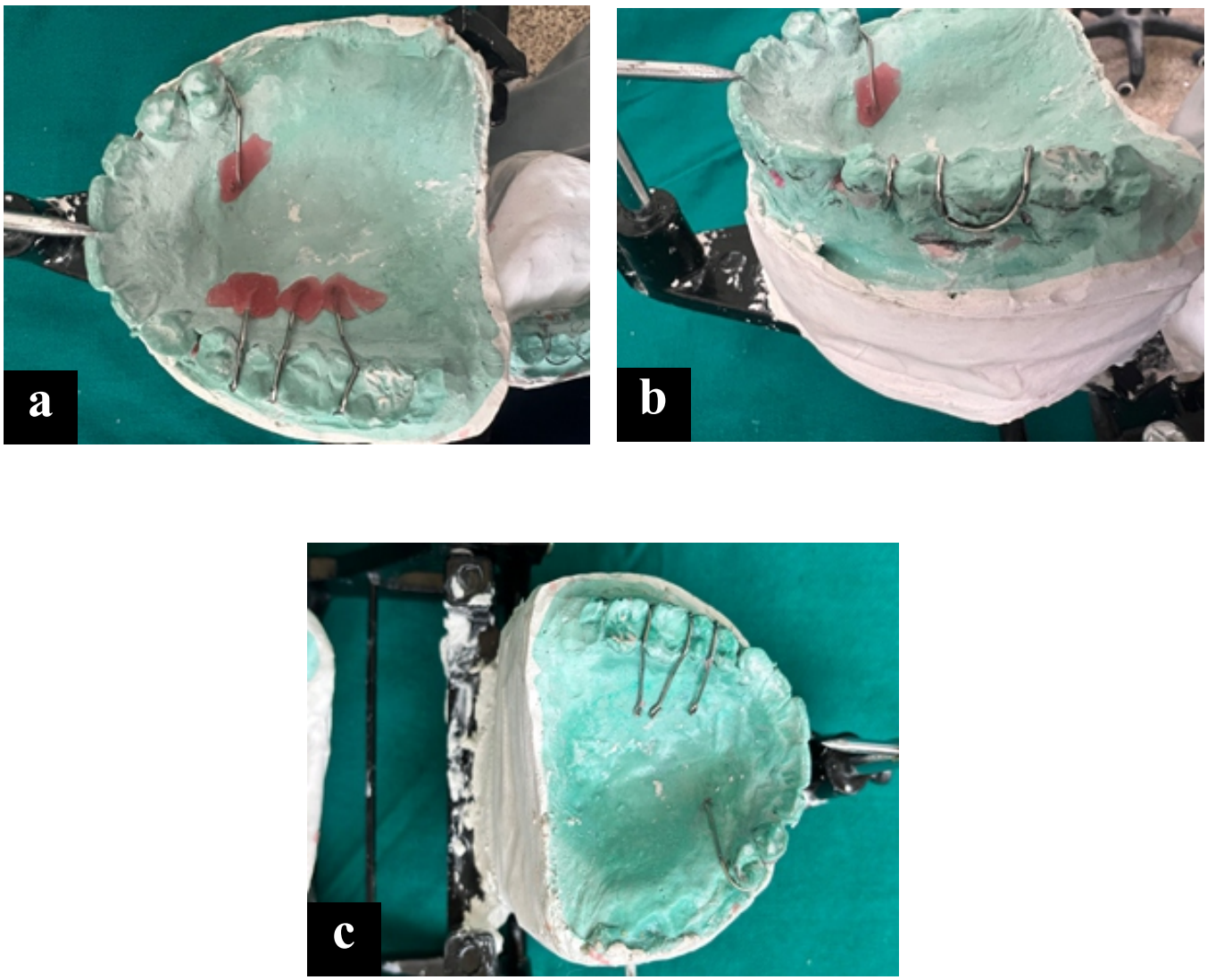

Figure 8: Palatal Ramp Appliance Wire Bending on the Maxillary Cast
(a - Occlusal View, b - Right Lateral View, c - Occlusal View without Wax Stabilization)

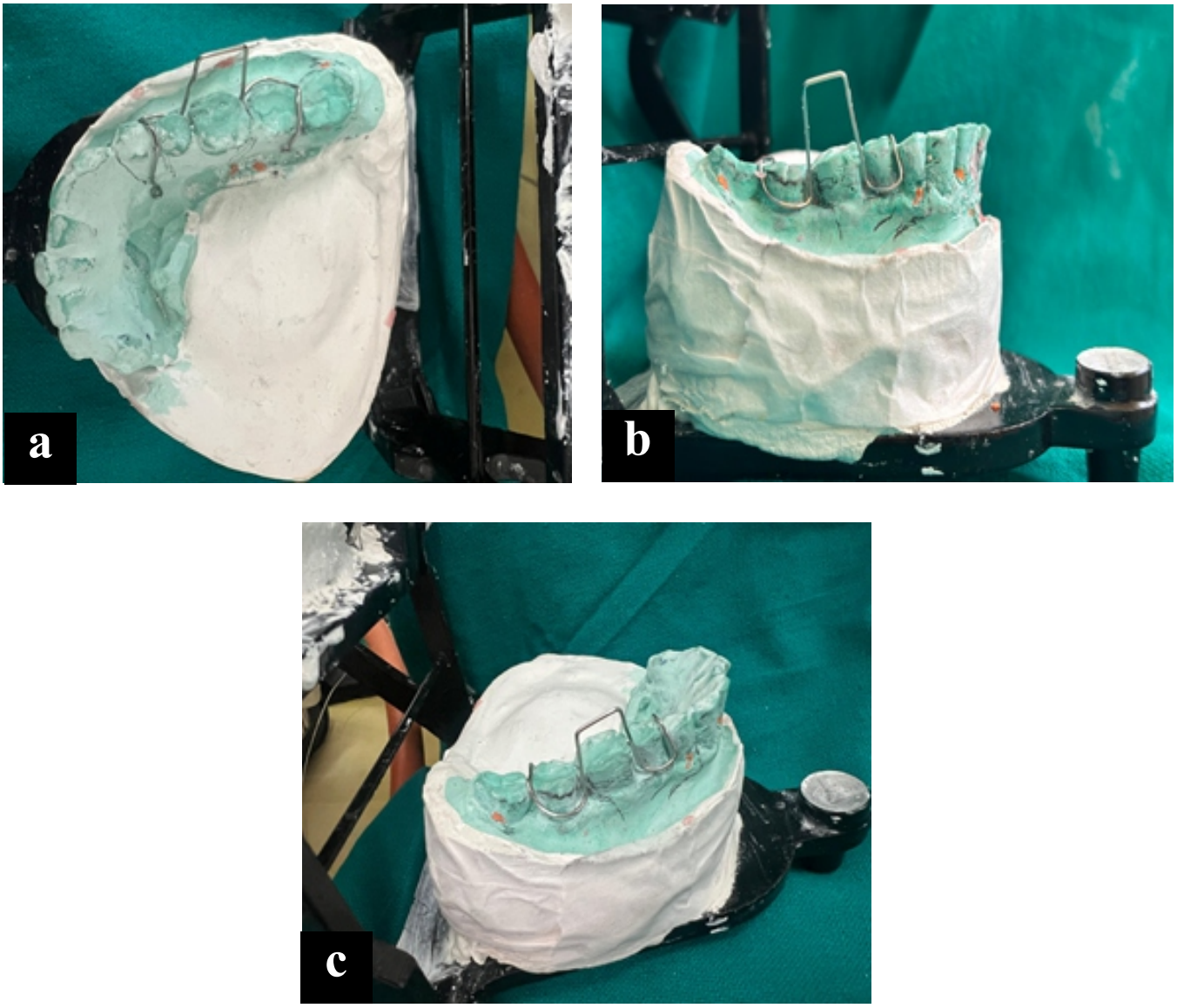

Figure 9: Buccal Guiding Flange Appliance Wire Bending on Mandibular Cast
(a - Occlusal View, b - Right Side View, c - Right Side Lateral View)

A modified wire bending was done in mandibular arch for buccal guiding flange prosthesis [Figure 9], which would facilitate the returning of the mandible to its desired occlusal position.

A palatal ramp in maxillary arch would prevent the mandible from returning back to its pathological position. Impression of maxillary and mandibular arches were made using silicone based Putty and light body for proper recording of details. Bite registration was done using soft Modeling wax (wax was made soft by putting it in hot water-bath). The casts poured out of the impression using type iii gypsum i.e.; Dental stone and base was formed by using type ii gypsum i.e.; Dental plaster. These casts were articulated on Mean value articulator [Figure10], using the registered bite. After articulation wire bending was done on the cast using 21-gauge orthodontic wire and later assembled using clear cold cure acrylic.

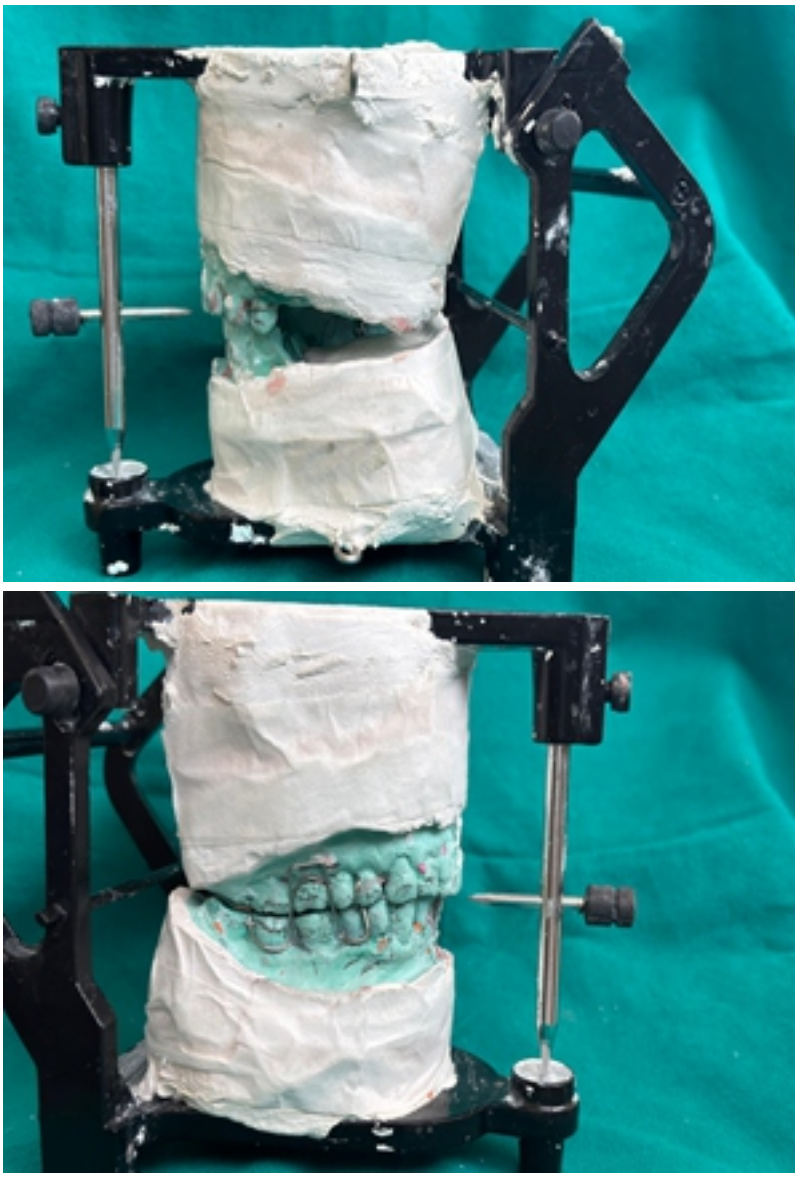

Figure 10: Articulated Casts in Centric Relation on Mean Value Articulator

CONCLUSION

This case demonstrates that a modified guide flange prosthesis, combined with a palatal ramp, can significantly improve psychological and functional outcomes in patients with hemimandibulectomy[5,8,9], combined with a palatal ramp, can significantly improve psychological and functional outcomes in patients with hemimandibulectomy. Early prosthodontic intervention is essential to reduce mandibular deviation, restore mastication, and facilitate long-term rehabilitation[5,8,9].

CONFLICT OF INTEREST: None

FINANCIAL SUPPORT: None

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Case Report

Cu-sil Denture: An Ingenious Way to Preserve Remaining Natural Teeth

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ABSTRACT

The patient's functional, aesthetic, and emotional needs are all negatively impacted by edentulism, which affects their oral health. Preserving the remaining natural teeth is currently the prime concern in dentistry. In India, there is an increasing need for prosthodontics that employ alternative approaches based on need. New methods for creating complete dentures have emerged as a result of patients' growing needs. Presence of few teeth in the oral cavity maintain the integrity of the alveolar ridge, improve proprioception, and assist the patient psychologically. For patients who wish to replace their lost teeth while keeping the few teeth they still have, a transitional denture offers an alternate course of treatment. A Cu-sil denture is a more recent kind of transitional denture that has perforations lined with a silicone rubber gasket. The holes thus providing space for remaining natural teeth to emerge into the oral cavity through the denture. Because of the reduced dental arches that cannot hold all of the teeth in the arch, pituitary dwarfism is a challenging condition to treat with prosthodontics. For physiological and psychological reasons, it is critical that these people obtain dental care. With two teeth still present in the mandibular arch, this case report describes the prosthodontic therapy of a patient with dwarfism using a Cu-Sil denture.

KEYWORDS: Cu-sil denture, Transitional denture, Microstomia, Dwarfism

INTRODUCTION

According to Muller De van, the preservation of what is left is more significant than the careful replacement of what is lost, which is why modern dentistry places a strong emphasis on maintaining oral tissues. Successful treatment is dependent upon the preservation of residual alveolar ridge. Complete denture wearing after complete tooth loss can have a number of negative effects, including as psychological stress, poor stability and retention, residual ridge resorption, diminished aesthetic appeal, impaired masticatory function, etc.The integrity of the alveolar ridge and the periodontium's proprioceptive capacity are maintained when the remaining natural teeth are kept in place[1,2,3].

Patients who have very few natural teeth left can now choose from a variety of treatment alternatives, including as overdentures, transitional dentures, immediate dentures after all remaining teeth have been extracted, or prosthesis supported by implants. Because of contraindications, the

necessity for antecedent care, the misalignment of the remaining teeth, the need for additional patient visits, and financial considerations, overdentures cannot be a solution in every one of these situations. Thus, transitional dentures serve as treatment option for many of such patients[2,3].

One type of transitional denture is the Cu-sil denture, which is used to preserve the few natural teeth that remain and for patients who do not want to have their remaining natural teeth extracted since it would negatively impact their psychological well-being. They are republicized largely as "transitional" dentures. It is a type of complete denture with holes allowing the remaining natural teeth to emerge through the denture. The peripheral seal is disrupted and the suction is broken when a tooth pokes through a hole. The holes are surrounded by the gasket of silicone rubber which clasps the neck of natural teeth, thereby cushioning and splinting each natural tooth from the hard acrylic denture base, allowing a natural suction to form beneath the denture, and keeping food and liquids out. No further laboratory processes or tooth preparation are needed for the production of a Cu-sil denture. If in future the remaining teeth are lost, then existing denture can be modified to occupy its missing place[2,4].

The pituitary is considered as the master gland of the body. Hypopituitarism is caused by compression of anterior pituitary gland or atrophy of the cells or defect in the hypothalamic control of hormonal secretion. The typical evidences in pituitary dwarfism are diminutive but well-proportioned body, fine silky sparse hair on the head and other hairy regions, wrinkled atrophic skin and often hypogonadism. Adult hypopituitarism is typically caused by "Simmonds disease," which is an infarction of the pituitary gland. It is characterized by loss of weight, diminished sexual function, and decreased basal metabolic rate. Changes in the face include thin eyebrows, loss of eyelashes, sharp features, thin lips and an immobile expression. There is decreased salivary flow which leads to increased caries activity and periodontal disease which is the main cause of teeth loss[5]. Here we are presenting a case report with management of pituitary dwarfism who exhibited with only two remaining natural teeth in mandibular arch.

Indications for the Cu-sil Denture

1. Any patient whose teeth are mobile, isolated, or periodontally problematic and whose immediate full denture appears to be their last option.
2. Fixed or other removable partial dentures are insufficient for treating a patient who does not require extraction of his remaining teeth.
3. A patient with few remaining teeth whose overall health or supporting bone indicates a bad outlook for complete dentures.
4. When a mandibular complete denture is to be placed in opposition to natural maxillary teeth[4].

Contraindications for the Cu-sil Denture

1. Patient who has too many remaining teeth.
2. Periodontally compromised patients with poor oral hygiene.
3. Patients whose remaining teeth exhibit unfavourable undercuts[6].

Advantages of Cu-sil Dentures

1. Chairside and laboratory methods demand less time, effort, and accuracy.
2. Vertical dimension is automatically maintained.
3. More affordable since endodontic therapy is not needed. Extraction costs are also reduced.
4. Previous bone loss is rejuvenated. Denture stability and retention are achieved even only one or two teeth are retained.
5. When a patient is not completely edentulous, proprioception is preserved, possible psychological effects are avoided, and less stress is experienced.
6. Eliminate clasps and preserve dentition. With an elastomeric gasket that promotes retention and keeps food out, they splint, cushion, and support teeth.
7. Prevents tooth wear, stress, and damage brought on by metal partials that induce torque[4].

CASE REPORT

A 52-year-old male patient reported to the Department of Prosthodontics, Darshan Dental College and Hospital, Udaipur. His chief complaint was masticatory insufficiency due to missing teeth. Dental history revealed that the missing teeth were extracted due to periodontal reasons. Medical history revealed that the patient has genetic dwarfism. On general examination, patient has small stature with proportioned body, height 3'5" and weight 33 Kg. The patient presented with only two teeth remaining (36 and 46) and all

other teeth were extracted before 1 year. 36 and 46 are periodontally sound (Figure1). Over denture was planned in the mandibular arch and conventional complete denture in maxillary arch. The patient was advised for root canal treatment in remaining two teeth but was not willing for any other procedures other than replacement of missing teeth. Later, treatment plan was modified from mandibular overdenture to mandibular Cu-sil denture as the patient was not willing for any further treatment for remaining two teeth. After case history and careful examination, Cu-sil denture with certain modifications in impression techniques was planned and denture was fabricated.

PROCEDURE

1. Primary impression of maxillary was recorded with medium fusing impression compound material (Y-Dents impression compound) using stainless steel non perforated edentulous zero sized stock tray and mandibular arch was recorded using irreversible hydrocolloid impression material (Orikam NEOALGIN) using stainless steel perforated edentulous zero sized stock tray [Figure 2a]. The stock trays for both the arches were modified due to microstomia.

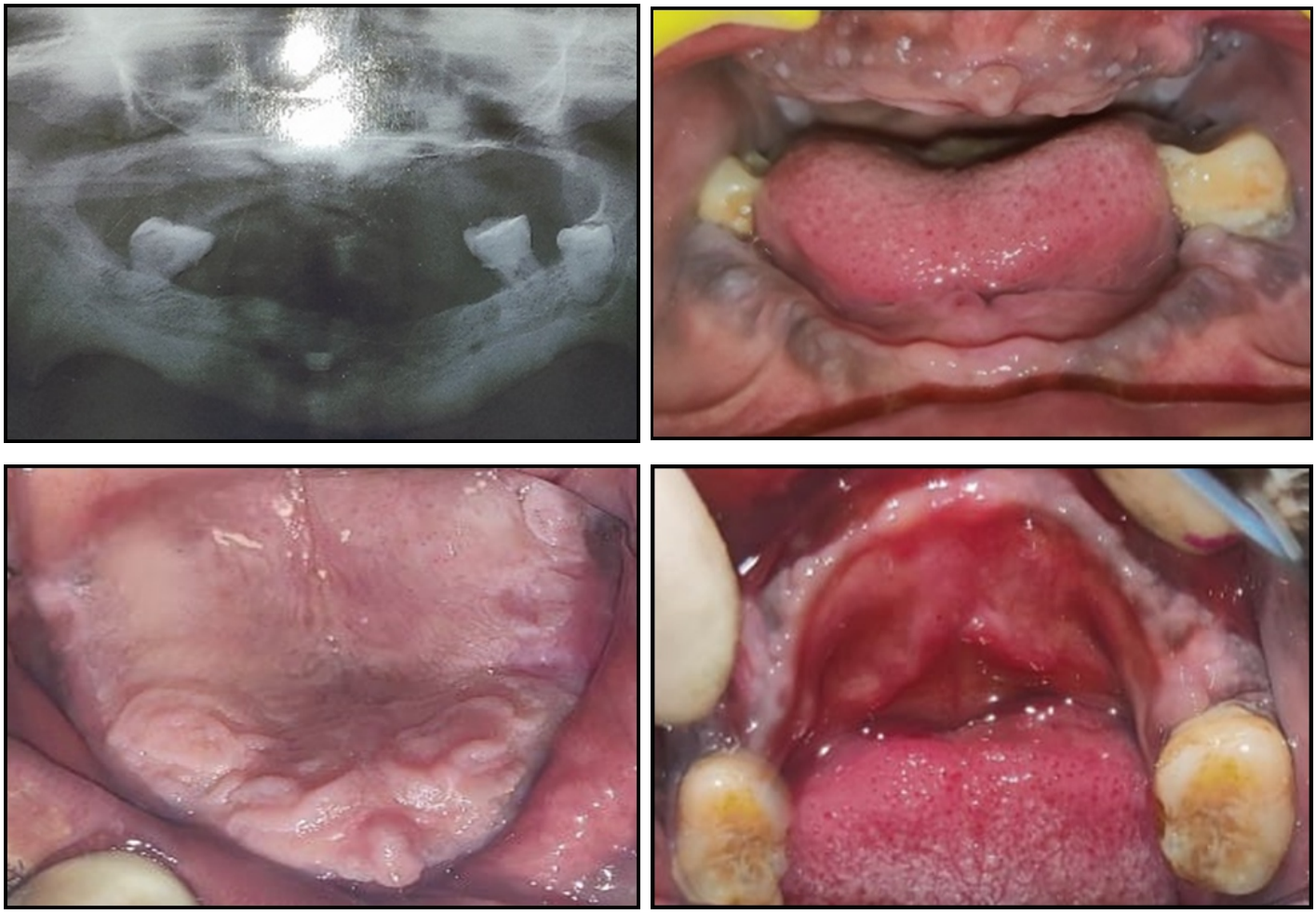

Figure 1: Pre-operative (a) orthopantogram; (b) intraoral view; (c) maxillary arch; (d) mandibular arch

2. The primary cast was poured in dental plaster for maxillary impression and dental stone for mandibular impression [Figure 2b]. The spacer wax was adapted on maxillary and mandibular primary cast. The special tray was fabricated using auto-polymerizing resin with sprinkle on technique.
3. Final impression was made by border moulding with low fusing impression compound (DPI Pinnacle green stick) and wash impression with zinc oxide eugenol impression material (DPI Impression paste) for maxillary arch and monophase impression material (Dentsply Aquasil Ultra) for mandibular arch [Figure 2c]. Master cast was poured in dental stone [Figure 2d].
4. Denture base was constructed and wax rim was prepared. Jaw relation and bite registration was recorded.
5. After the recording of maxillo-mandibular relationship, both casts were mounted on articulator. Artificial teeth arrangement was done with conventional manner and try in [Figure 3a] procedure was performed.
6. The patient's phonetics and aesthetics were evaluated. The wax up of the mandibular denture was done similar to a complete denture except for the holes corresponding to the remaining natural teeth.
7. Before dewaxing mechanical undercuts of the remaining natural teeth were examined with the help of a surveyor and blocked out using dental plaster.
8. The dentures were cured with heat-cure acrylic resin (DPI heat cure). Denture was retrieved consisting of holes in it for emergence of natural teeth and was finished and polished in usual manner [Figure 3b-d].
9. Silicon liner adhesive was applied to the surrounding acrylic neck area of the denture and allowed it to dry for 10 second and inserted in patients mouth [Figure 3c].
10. Silicon liner material (GC soft liner) consisting of base and catalyst was mixed and applied to the space area around the tooth cervical region of denture base, inserted in oral cavity and allowed to set for 3 minutes.
11. Denture with silicon rings was removedand immersed in water for 1 minute.
12. Post-operative instructions were given to patients about use of the denture, maintenance and hygiene [Figure 3e-f]. The use of denture cleanser with antimicrobial agents was recommended, as there were chances of fungal growth on the soft-liner material.

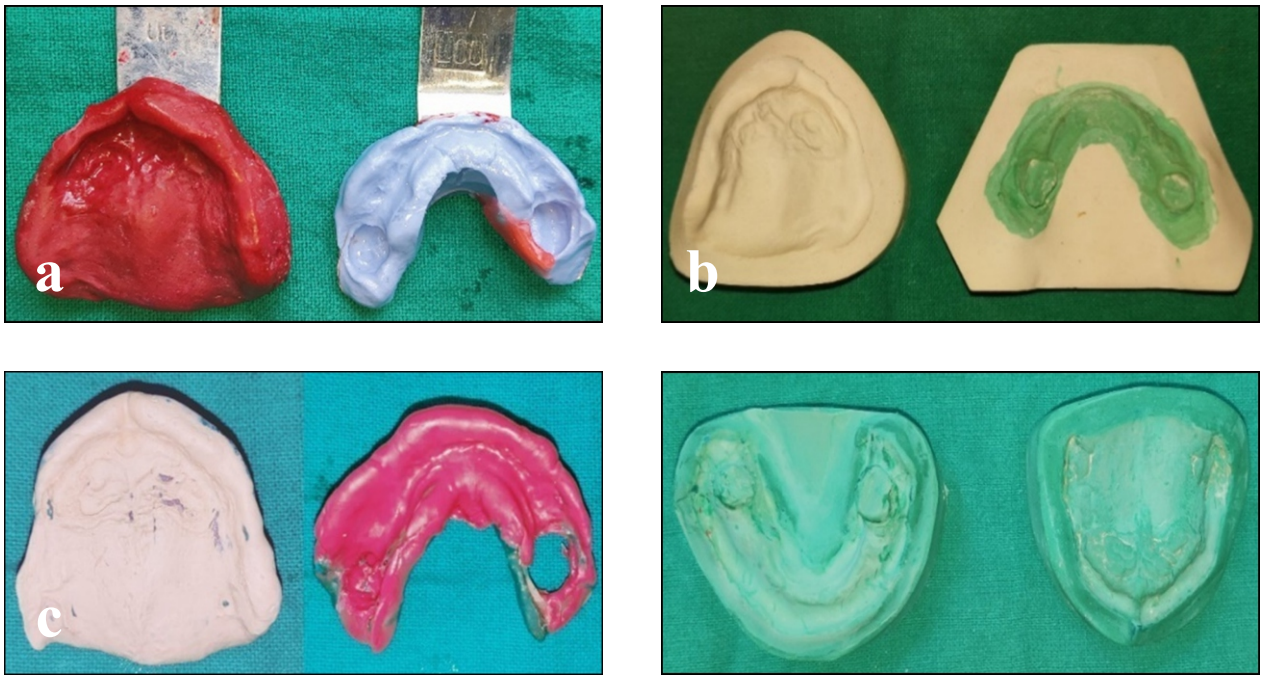

Figure 2: (a) Primary Impression; (b) Primary Cast; (c) Final Impression; (d) Master Cast

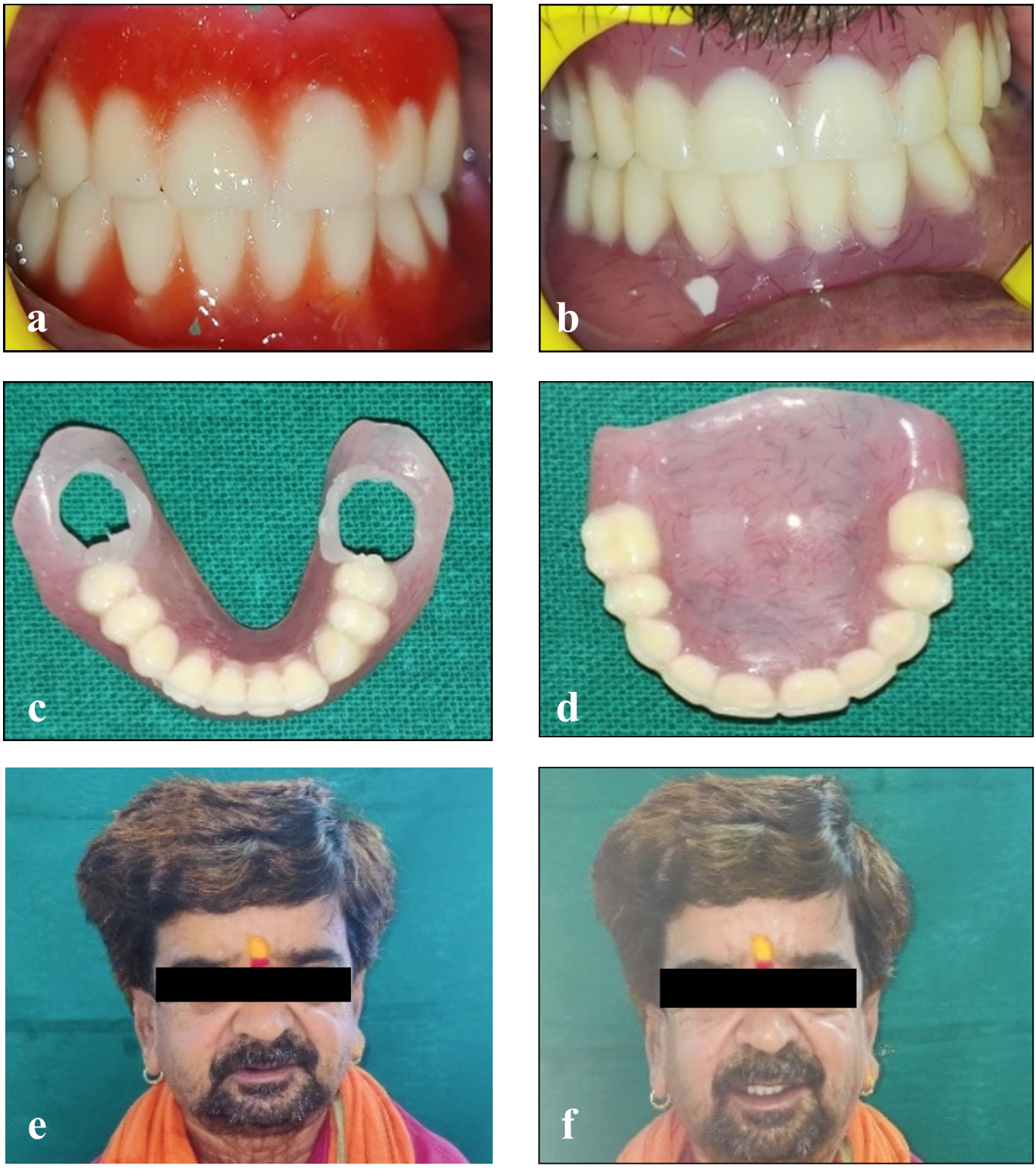

Figure 3: (a) Try In; (b) Denture Insertion; (c) Mandibular Denture with Silicon rings; (d) Maxillary Denture; (e) Pre-operative Frontal View; (f) Post-operative Frontal View

DISCUSSION

The field of prosthodontics focuses on the functional, aesthetic, and psychological rehabilitation of patients. Since total edentulism is a societal shame, patients who have few natural teeth left and a deteriorated periodontal condition suffer psychologically from having those teeth extracted. It was discovered that edentulism significantly affected residual ridge resorption by reducing the height and surface area of alveolar bone, which is necessary for the stability and retention of a full denture. Mandibular dentures in particular have more stability and retention issues than maxillary dentures[1]. Patient with dwarfism poses many difficulties for fabricating a denture due to microstomia and anatomical variations. It's hard to choose proper tray size and thus modified or custom trays are often needed. Gag reflex may be exaggerated in some individuals.

There are numerous alternatives for partially edentulous arches with few natural teeth left, including overdentures, immediate dentures, and transitional dentures. However, certain dental conditions, including as endodontic therapy and strict hygiene maintenance, are necessary for overdentures. Additionally, having multiple teeth extracted at once causes psychological stress for the patient who receives an instant denture. For patients who want to keep their remaining natural teeth, a transitional Cu-sil denture is a very promising option. The remaining teeth in the denture resist lateral displacement, and the elastomeric gasket of the soft liner firmly holds the teeth's neck in place. This creates a seal that allows food to flow over the denture and has a cushion-like effect that can more evenly distribute forces by absorbing energy[1].

It has the advantage of maintaining the patient's vertical dimension, proprioception, aesthetic demand (no metal clasp), and psychological stability. Among its disadvantages are the need for regular soft-liner material repairs and the build-up of plaque due to the complete covering of the tooth's cervical region. In order to replace the missing teeth, this denture can be adjusted to accommodate any future tooth loss.Patients with several evenly spaced natural teeth throughout the dental arch should not wear cu-sil dentures as this will make the appliance weak. They should be avoided in patients with bruxism, severe undercut areas and patient with high smile line[1,7].

CONCLUSION

Patient with pituitary dwarfism not only have difficulties in eating and speaking but can also sense that their appearance is different than others. In this instance, prosthodontic rehabilitation raised the patient's psychological well-being in addition to improving function and appearance. For patients who have very few teeth left, transitional dentures, such as Cu-sil dentures, offer an alternate course of treatment. It increases denture retention without requiring any attachment devices and while preserving the denture's existing vertical dimension. Cu-sil dentures aid in tooth preservation, maintaining the integrity of the alveolar ridge and the periodontium's proprioceptive ability, both of which benefit the patient's psychological state. One of the greatest therapeutic alternatives for preserving the remaining natural teeth in patients who do not choose to have their overdentures or remaining natural teeth extracted is a transitional denture, such as a Cu-sil denture.

CONFLICT OF INTEREST: None

FINANCIAL SUPPORT: None

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Case Report

Guardian of the Temporomandibular Joint: The Occlusal Splints

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ABSTRACT

Temporomandibular joint (TMJ) disorders encompass a broad spectrum of functional and structural conditions that affect the masticatory system. Bruxism—a parafunctional habit characterized by repetitive grinding or clenching of teeth—is recognized as a significant contributing factor to TMJ pain and dysfunction. Its etiology is often multifactorial, with strong links to psychological stress, sleep disturbances, and occlusal factors.The management of TMJ pain in bruxism patients should be individualized and holistic, integrating both mechanical intervention through occlusal splints and psychological support. Early diagnosis and a multidisciplinary treatment approach are essential for effective symptom control and prevention of long-term complications. The case report has been prepared showing effective management of TMJ pain using occlusal splint.

KEYWORDS: Temporomandibular joints, Craniomandibular disorders, Occlusal splint, Bruxism, Muscles, Parafunctional, Deprogrammer, Irreversible hydrocolloid material

INTRODUCTION

The temporomandibular joint (TMJ) connects the jawbone to the skull and is essential for speaking and chewing. Temporomandibular disorders (TMD), also known as craniomandibular disorders (CMD), involve pain or dysfunction in the TMJ and surrounding muscles. Common signs arejaw pain or tenderness, joint sounds (clicking or popping),limited or uneven jaw movement, functional difficulty in jaw use. TMD includes a range of conditions such as TMJ dysfunction syndrome, myofascial pain dysfunction, and facial arthromyalgia. It is most prevalent in individuals aged 20–40. About 33% of people experience at least one symptom, while 3.6%–7% require treatment due to severity. Thecauses and risk factors TMD are multifactorial in origin and may involve muscle strain or spasm, Joint inflammation, parafunctional habits (e.g., bruxism, clenching), stress and anxiety, intra-articular disc abnormalities. Abnormal dental occlusion is not consistently linked to TMD symptoms.The treatment typically begins with conservative, non-invasive methods, as most cases are temporary and self-

limiting.Common therapies includeocclusal splints (night guards or oral appliances) to reduce muscle tension and protect against bruxism, behavioral modifications and stress management, permanent occlusal adjustment when necessary occlusal splints are widely used in dental practice to manage TMD and minimize associated muscle activity and joint strain.
This case report is about occlusal splint its design, application in the diagnosis and management of temporomandibular disorders (TMD).

CASE REPORT

A 36-year-old female patient reported to the Department of Prosthodontics, Crown and Bridge, Pacific Dental College and Research Centre, Udaipur, with the chief complaint of pain in the temporomandibular joint (TMJ) region since month.

Clinical Examination:

On extraoral Examination no remarkable findings such as facial asymmetry, swelling, or deviation during mandibular movement were observed.
On intraoral Examination mild occlusal wear facets were noted on the posterior and anterior teeth of both arches, indicating possible parafunctional activity.
Detailed History: On further questioning, the patient revealed a history of involuntary grinding of teeth (bruxism), particularly during sleep. She also admitted to experiencing high levels of psychological stress due to personal and professional reasons.
Based on the clinical and historical findings, the patient was diagnosed with TMJ discomfort due to stress-induced bruxism.
Treatment objectives alleviate TMJ pain and discomfort, interrupt and reduce the bruxism habit, protect the dentition from further wear, improve patient's psychological and emotional well-being
Treatment Plan: A comprehensive two-phase treatment plan was formulated:
Phase I – Stress Management: counselling sessions were conducted to educate the patient about: The impact of stress on oral health, the relationship between bruxism and TMJ disorders, she was advised on sleep hygiene practices, such as: maintaining a consistent sleep schedule, avoiding the use of electronic devices before bedtime, reducing caffeine intake, especially in the evening. The patient was encouraged to practice relaxation techniques such as: yoga, meditation, breathing exercises. After a week follow-up: at her second visit, the patient reported a noticeable decrease in stress levels and a slight reduction in TMJ discomfort.
Phase II – Occlusal Splint Therapy: in diagnostic procedure preliminary maxillary and mandibular impressions were taken using irreversible hydrocolloid. Diagnostic casts were poured using Type III dental stone for accurate anatomical replication. A deprogrammer was fabricated using green stick compound and inserted anteriorly in the patient's mouth. The patient was asked to protrude the mandible into the most comfortable, natural position and bite gently.
Once the material set, the deprogrammer was removed, rinsed with filtered water, and reinserted for rechecking. A jet bite registration was performed while the patient was maintaining a slightly open mouth position [Figure 1]. Based on the bite registration, the casts were mounted on a semi-adjustable articulator. The occlusal splint was designed with: a labial bow extending from maxillary canine to canine for anterior retention-clasps on both maxillary premolars for additional stability. A special tray was fabricated over the maxillary cast using cold cure acrylic resin. After polymerization, the tray was trimmed and polished [Figure 2]. A U-shaped wax block was moulded and placed on the mandibular arch to simulate vertical dimension and record functional occlusion [Figure 3]. A try-in was conducted at the third appointment to assess fit and occlusion. Final processing dewaxing and deflasking [Figure 4] was done using transparent heat-cure acrylic resin. The appliance was polished, finished, and checked for any pressure points or occlusal discrepancies [Figure 5 and 6].

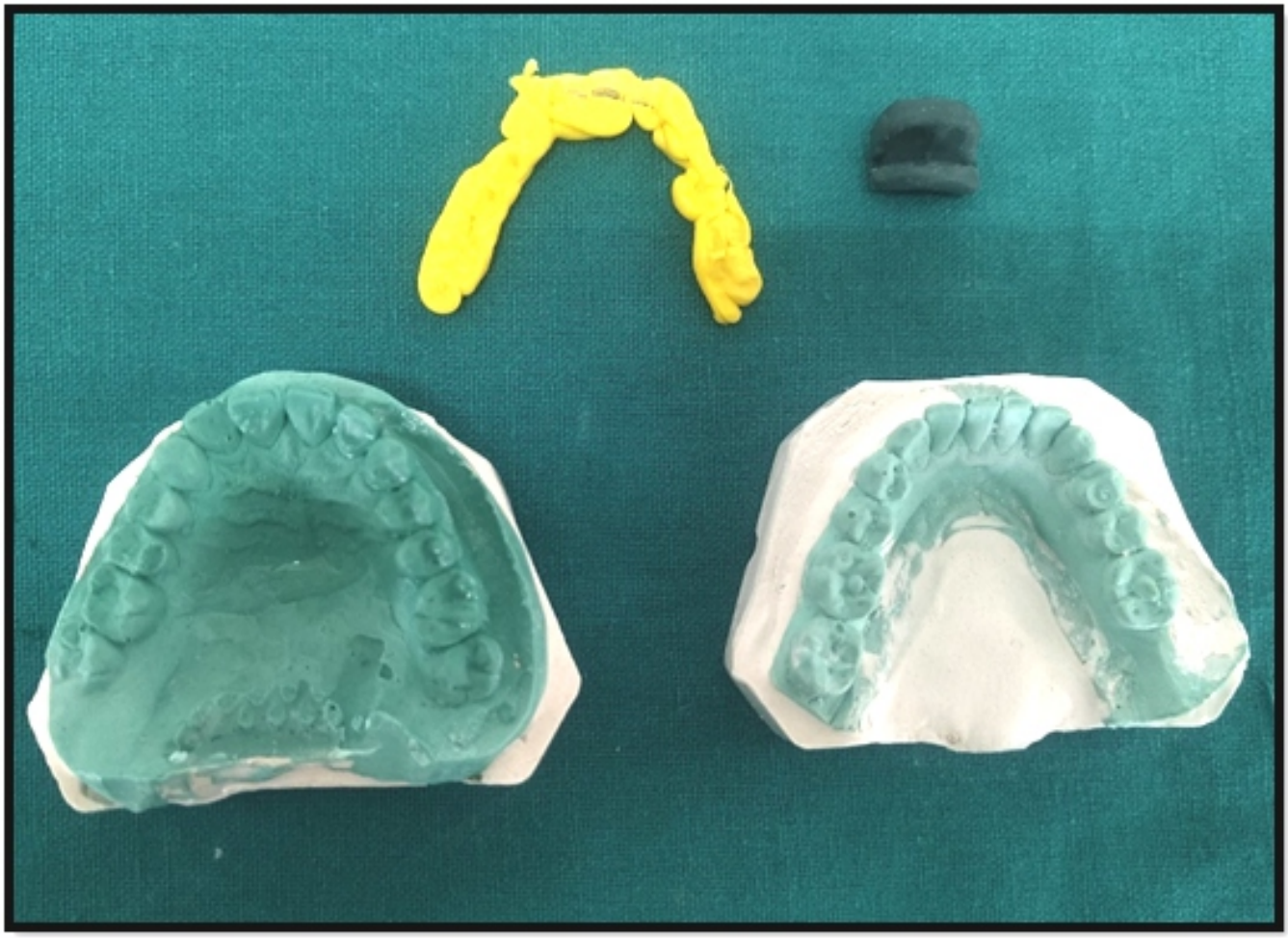

Figure 1: Recorded Jet Bite with Deprogrammer

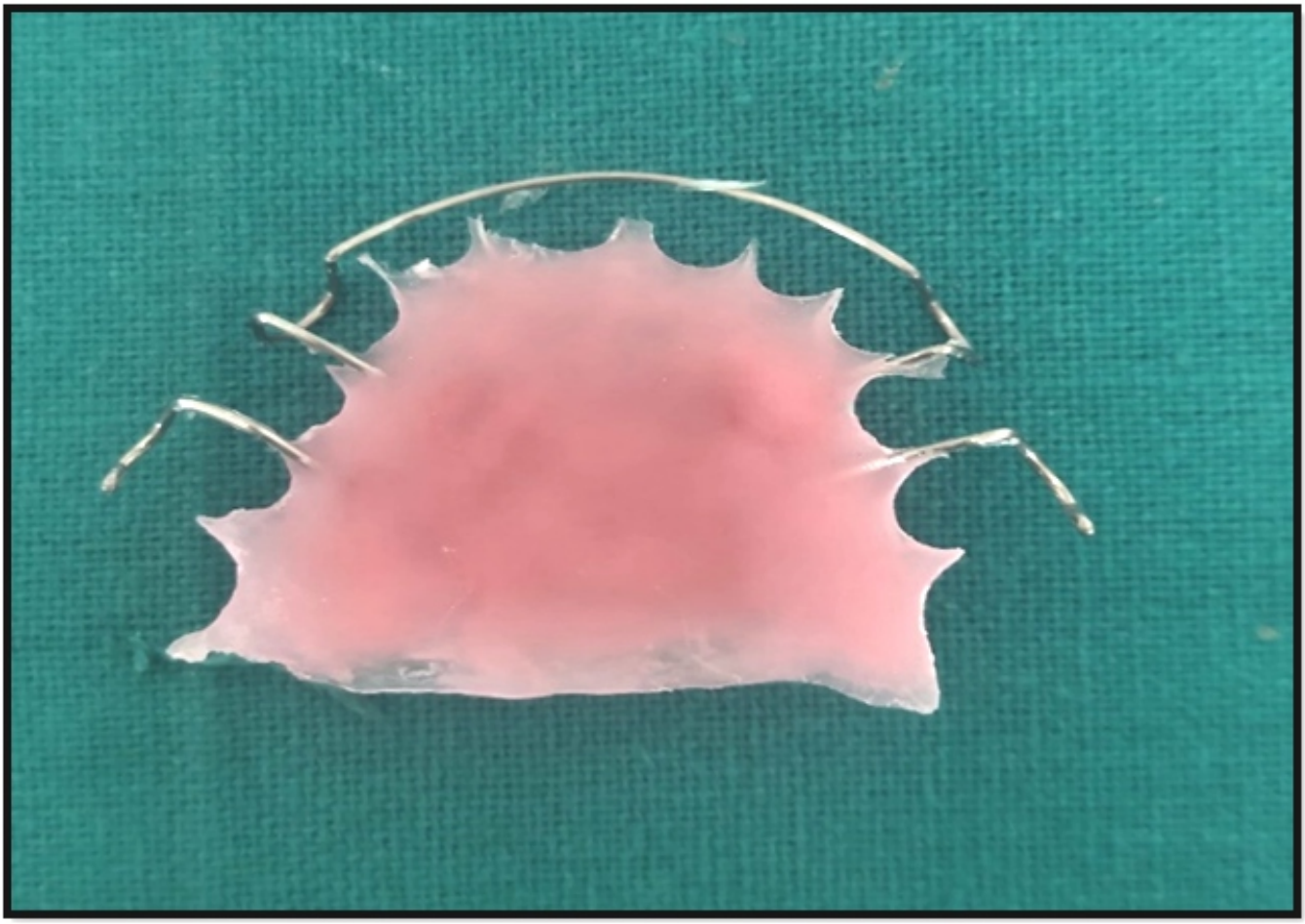

Figure 2 : Acrylic Resin with Labial Bow and C-clasp

Figure 3:Wax Bite

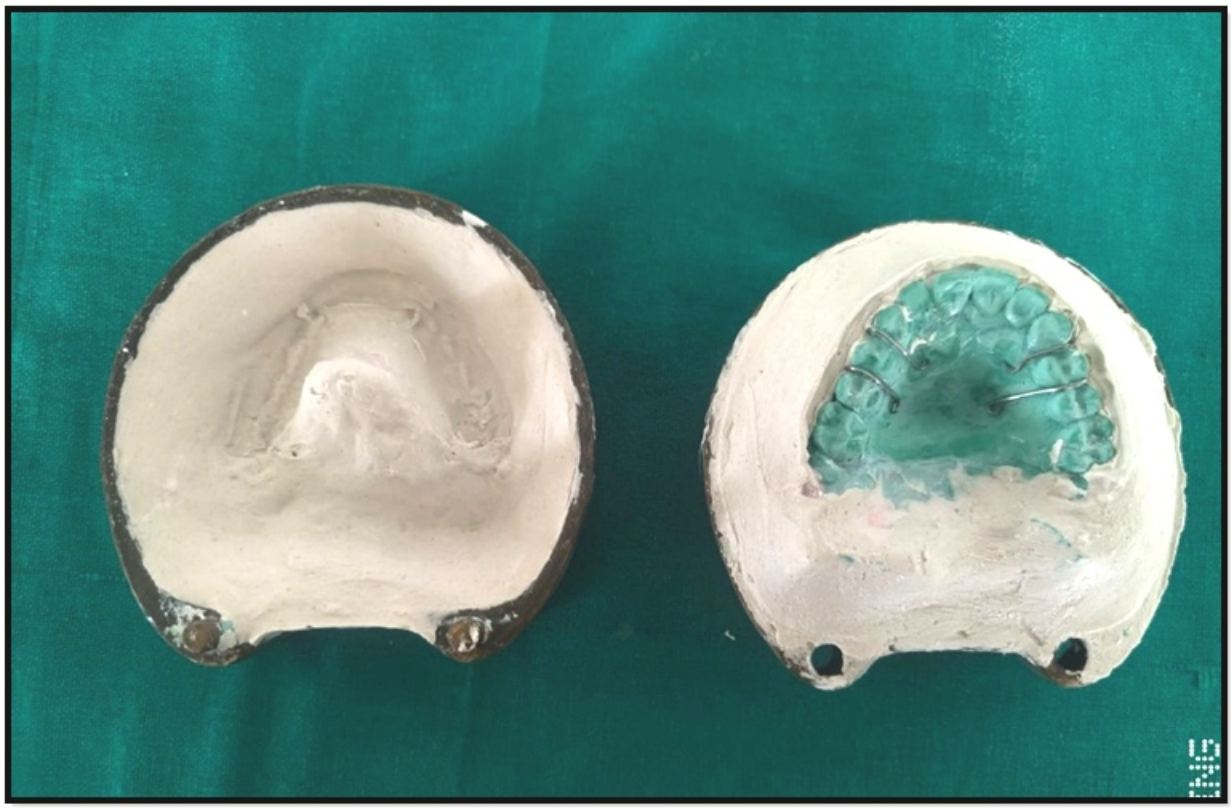

Figure 4: Deflasking

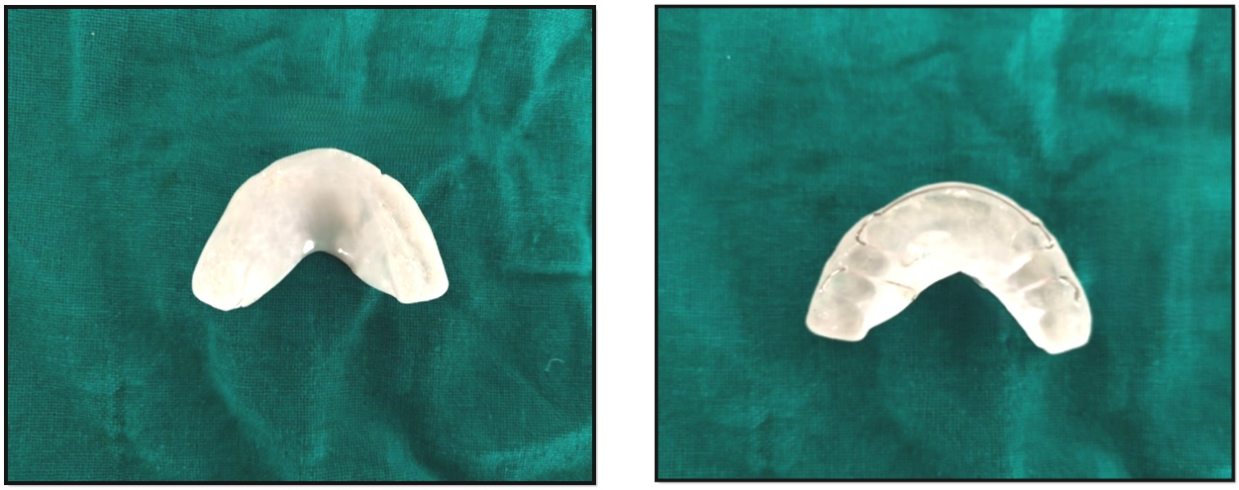

Figure 5 & 6: Polished Occlusal Splint

At the fourth appointment, the final occlusal splint was inserted in the patient's mouth.The patient was instructed on: Proper insertion and removal, cleaning protocol (using mild soap and lukewarm water), wearing schedule (primarily during sleep)

A 14-day follow-up appointment was scheduled. On the 2-week recall visit, the patient reported significant pain relief, improved sleep quality, and reduced clenching/grinding behaviour. She also expressed satisfaction with the comfort and effectiveness of the occlusal splint.

CONCLUSION

This case highlights the importance of a multidisciplinary and holistic approach in managing TMJ disorders. Stress-induced bruxism was effectively controlled by addressing both the psychological components through stress management and the physiological effects via occlusal splint therapy. Early intervention and patient compliance played a crucial role in the successful outcome of this case.

CONFLICT OF INTEREST: None

FINANCIAL SUPPORT: None

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Case Report

A Case of Borderline Personality Disorder: Psychological Interventions by Dialectical Behaviour Therapy Lens

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ABSTRACT

Borderline Personality Disorder (BPD) is a severe and intricate psychiatric condition characterized by widespread emotional instability, impulsive behaviours, disturbances in identity, and impaired interpersonal relationships. This paper offers a comprehensive overview of BPD by integrating key psychological interventions for a case of Borderline Personality Disorder, to explore its definition, etiology, evolution, assessment tools, evidence-based management strategies, premorbid personality traits, and clinical significance. A biopsychosocial framework is utilized to explain how genetic vulnerabilities, neurobiological factors, and environmental stressors contribute to the disorder's emergence and progression. Effective psychotherapies, such as Dialectical Behaviour Therapy and Mentalization-Based Treatment, are highlighted as successful interventions. The discussion also covers the impact of personality development, early diagnosis, and supportive care on prognosis. This review aims to enhance understanding and improve treatment approaches for individuals affected by BPD.

KEYWORDS: Borderline personality disorder, Emotional regulation, Assessment tools, Psychotherapy, Genetics, Premorbid traits, Evidence-based treatment, prognosis

INTRODUCTION

Borderline Personality Disorder is recognized as one of the most challenging psychiatric disorders, affecting approximately 1–2% of the general population and a considerably higher percentage within clinical settings[1]. It is typified by emotional dysregulation, unstable interpersonal relationships, impulsivity, and a distorted self-image, which lead to substantial functional impairments, suicidal tendencies, and psychological distress[2]. The course of BPD is varied; some individuals experience a reduction in symptoms over time, while others continue to struggle with chronic symptoms and difficulties in relationships.

The origins of BPD are multifactorial, involving a combination of genetic, neurobiological, and environmental influences[3]. Childhood trauma, neglect, and adverse relationship experiences interact with a biological susceptibility, resulting in maladaptive coping strategies and issues in personality development. Understanding the significance of premorbid

personality traits, such as heightened emotional sensitivity or impulsivity, is crucial for identifying individuals at risk and implementing early interventions[4].

The progression of BPD indicates that while some patients achieve symptom remission, others face persistent impairment. Assessment methods, including structured clinical interviews and validated self-report measures, are essential for accurate diagnosis and for differentiating BPD from other psychiatric disorders[5]. Management strategies are primarily based on psychotherapy, with strong evidence supporting treatments such as Dialectical Behaviour Therapy[6], Cognitive Behavioural Therapy[7], and Mentalization-Based Treatment (Bateman & Fonagy, 2008). While pharmacological interventions are used adjunctively, their evidence base is less robust (Leichsenring et al., 2011). According to the American Psychiatric Association (2013), Borderline Personality Disorder is recognized by a pervasive pattern that includes emotional dysregulation, an unstable self-image, impulsivity, and highly intense but unstable interpersonal relationships, usually appearing by early adulthood. Common signs of BPD include impulsive actions, an intense fear of being left alone, significant shifts in mood, and repeated suicidal thoughts or gestures.

Diagnostic Classification

ICD -11: Personality Disorders (6D10 – 6D11)

In ICD -11, specific personality disorder types (like BPD) are not separate categories. Instead:

- There is a single diagnosis: Personality Disorder (6D10) Specified by severity: mild, moderate, severe.
- Trait domain qualifiers are added to describe the style (e.g., negative affectivity, disinhibition, detachment, anankastia, dissociality).
- A separate category exists for Borderline Pattern (6D11) to retain continuity with DSM and ICD-10.

ICD -11: Borderline Pattern Qualifier (6D11)

Diagnosis requires that the general criteria for PD (6D10) are met plus at least 4 of the following features:

1. Marked impulsivity: acting rashly without considering consequences.
2. Instability in relationships: intense, alternating between idealization and devaluation, with fear of abandonment.
3. Markedly unstable self-image: disturbance in identity, goals, values, or career plans.
4. Chronic feelings of emptiness.
5. Emotional instability: intense, rapidly fluctuating moods.
6. Recurrent self-harm or suicidal behaviour, threats, or gestures.
7. Transient stress-related paranoid ideation, dissociation, or severe cognitive distortions.

CASE HISTORY

Ms. KL, a 28-year-old unmarried female, is currently pursuing the first year of her MD in dermatology, belonging to the Upper-Middle Socio-Economic status, Hindu religion, and hailing from Udaipur. The information provided was only provided by her, and was adequate and reliable.

Since adolescence, she reported being emotionally sensitive and easily hurt in relationships. She described longstanding difficulties in managing emotions, setting boundaries, and trusting others. These patterns appeared to have gradually intensified over time, particularly during her NEET preparation period and following a breakup, leading to increased emotional instability and self-harming behaviors She reported frequent crying spells, anger outbursts, low self-worth, difficulty in concentrating, and repeated episodes of interpersonal conflict. She also described a pattern of pushing people away during emotional discomfort and then urgently seeking closeness. She expressed confusion about her identity and shared distressing inner thoughts related to being unloved or unwanted. There was no history of previous psychiatric treatment. Mental status examination revealed labile affect, preoccupation with themes of abandonment and worthlessness, and a tendency toward emotional dysregulation. Intellectual Insight was present, and judgment was Intact.

DIAGNOSIS

Emotionally Unstable Personality Disorder, Borderline Type (F60.31)

TEST FINDINGS

1. Structured Clinical Interview for DSM-IV Axis II Disorders (SCID-II): The SCID-II was administered to assess the presence of personality disorder traits. The patient fulfilled the diagnostic criteria for

Borderline Personality Disorder, with the presence of symptoms such as affective instability, fear of abandonment, unstable interpersonal relationships, identity disturbance, impulsivity (including self-harm), chronic feelings of emptiness, and inappropriate anger. Sub-threshold traits of dependent personality were also observed, particularly in her difficulty making decisions and fear of losing support from close others.

2. Beck Depression Inventory-II (BDI-II): The BDI-II was used to evaluate the presence and severity of depressive symptoms. The patient obtained a total score of 21, which falls in the moderate range of depression. Higher scores were noted in items related to sadness, feelings of failure, self-dislike, and crying. There were also mild elevations in loss of interest, fatigue, and self-critical thoughts. No active suicidal ideation was reported at the time of assessment.
3. Difficulties in Emotion Regulation Scale (DERS):The DERS was administered to assess the patient's ability to regulate emotions across multiple domains. She obtained a total score of 119/180, indicating moderate to high levels of emotional dysregulation. Subscale scores were: Non-acceptance = 16/30, Goals = 17/25, Impulse = 15/25, Awareness = 19/25, Strategies = 34/50, and Clarity = 18/25. The profile reflected difficulty in managing emotions during distress, limited access to coping strategies, and occasional confusion regarding emotional states. The results were in line with the patient's clinical presentation of emotional vulnerability, affective lability, and poor impulse control.
4. Sentence Completion Test (SSCT): The patient's responses on the SSCT revealed underlying conflicts in areas of self-concept, familial relationships, and interpersonal functioning. Attitudes toward parents reflected emotional distance, unresolved hurt, and feelings of being emotionally neglected, particularly in relation to the mother. Responses suggested the presence of trust issues and dependency in peer relationships, along with fear of being judged or abandoned. Attitudes toward self showed high levels of self-criticism, confusion, and emotional vulnerability, with recurrent themes of not being good enough and uncertainty about identity. Conflicts were seen around emotional expression and fear of closeness. Fears centered on rejection and not being understood, while future aspirations appeared present but clouded by self-doubt. Overall, responses reflected significant emotional insecurity, interpersonal dependency, and difficulties with boundary formation, consistent with borderline personality features.
5. Rorschach Inkblot Test: The patient gave 24 responses. The protocol reflected signs of emotional reactivity and poor modulation of affect. X-% was 0.42, indicating some distortion in perception under emotional stress, while X+% was 0.68, showing generally conventional thinking with occasional lapses. The affect ratio (CF+C>FC) suggested impulsive emotional expression. D score was -1, reflecting limited coping under stress. Sum Y was 3, indicating situational anxiety and difficulty tolerating emotional pressure. Thematic content included feelings of betrayal, confusion about self, and interpersonal mistrust. Overall, the protocol suggested affective instability, disturbed interpersonal schemas, and fragile self-image, consistent with borderline personality dynamics.

DBT Formulation Based on Biosocial Model (Marsha Linehan, 1993)

The patient's emotional and interpersonal difficulties were understood through the biosocial framework, which sees borderline traits as arising from a lifelong interaction between biological vulnerability and a dismissive environment. From early adolescence, she reported heightened emotional sensitivity, experiencing emotions more intensely and struggling to return to baseline once triggered. Minor events caused deep hurt, crying, or anger, which she could not always explain or manage. This pattern indicated a biological vulnerability to emotional dysregulation, a core biosocial feature. She described growing up in an environment where her emotional expressions were often dismissed. For example, her concerns about bullying due to her voice were ignored by her family until diagnosed with a vocal cord issue years later. Surgery eased physical issues but worsened her feelings of being unheard and invalidated, shaping her internal narrative that her emotional needs were unimportant or unbelievable.

Further invalidation occurred through caregivers' inconsistent or emotionally distant responses. Her mother's long-standing psychiatric illness and patterns of emotional unavailability were experienced by the patient as neglectful. She often

perceived her mother as more affectionate toward outsiders or house help than toward her. These repeated invalidating experiences over time appear to have significantly shaped the patient's core beliefs about relationships — particularly regarding trust, closeness, and worthiness of care.

The patient's biological sensitivity and invalidation history likely caused emotional dysregulation, unstable relationships, identity confusion, and impulsive coping. She struggles with boundaries and understanding her needs, depending on others for reassurance but pushing them away when overwhelmed, creating a cycle of closeness and withdrawal. When unmet, she feels abandoned or rejected, even if unintentional, reflecting a fear of abandonment and black-and-white thinking. Self-harming behaviors like cutting and punching her hand appeared to release emotional tension, shift focus from psychological pain, or signal distress when words aren't enough. These acts temporarily eased her chaos, reinforcing them despite long-term harm.

The biosocial model explains this pattern as the outcome of a system in which emotional pain was never reliably acknowledged or regulated through healthy external responses. Over time, the patient developed her own, often harmful, strategies to cope with these emotional storms. In the context of this case, the biosocial framework helped explain how early and ongoing invalidation of emotional experience, paired with a biologically sensitive temperament, contributed to the emergence and persistence of borderline features — including affective instability, unstable self-image, intense fear of abandonment, chronic emptiness, and impulsive behaviors.

This formulation guided the selection of Dialectical Behavior Therapy (DBT) as the treatment approach, focusing on helping the patient develop skills in emotion regulation, distress tolerance, interpersonal effectiveness, and mindfulness, while gradually working toward a more stable sense of self and relational security.

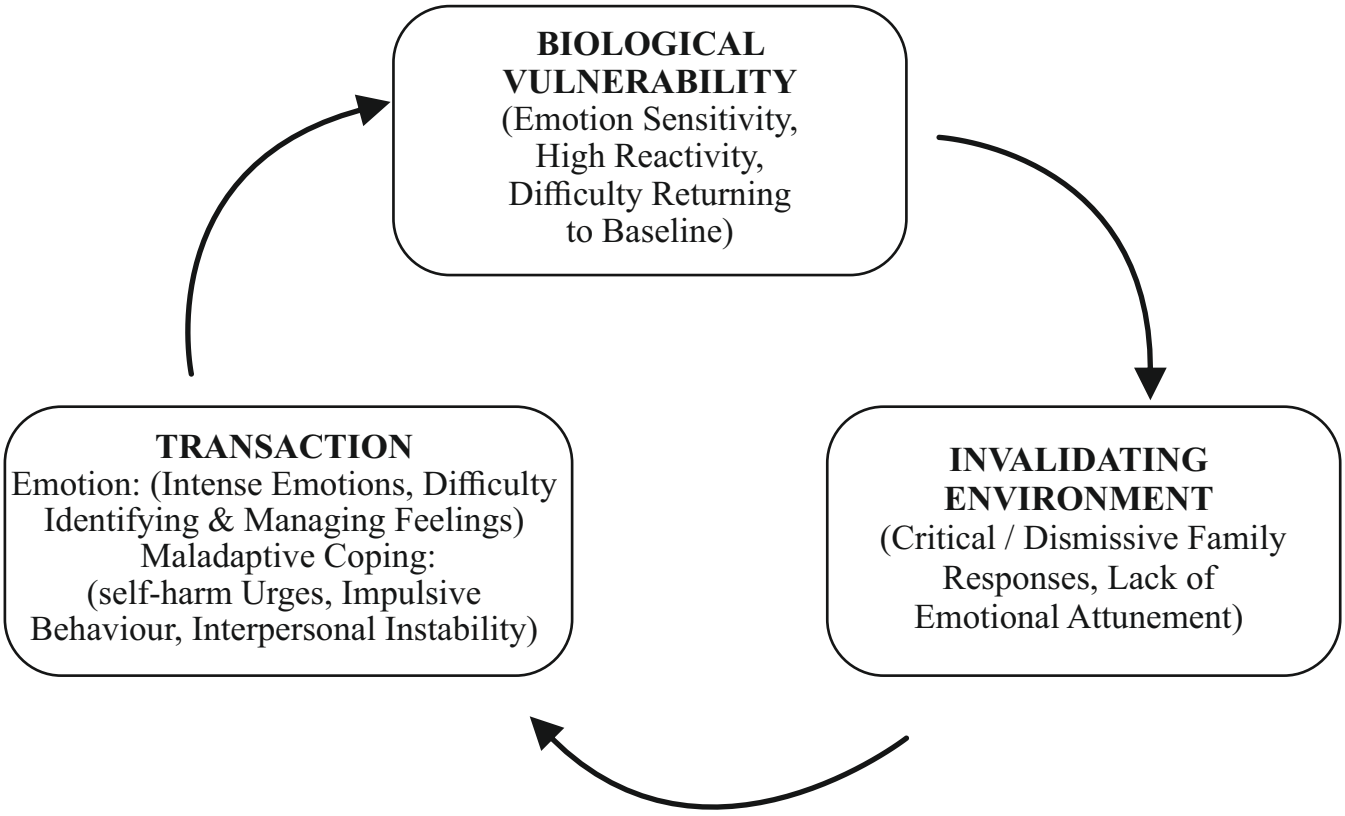

Figure 1: Biosocial Model (Marsha Linehan, 1993)

Focus of Therapy and Psychotherapeutic Strategy Planned

Based on the clinical presentation and formulation, the focus of therapy was to address persistent emotional dysregulation, unstable interpersonal relationships, low self-worth, and impulsive behaviors such as self-harm. The therapy aimed to help the patient build greater awareness of her emotional states, learn healthier ways of managing distress, and improve her functioning in close relationships.

A structured Dialectical Behavior Therapy (DBT) approach was planned to address the core difficulties identified through the biosocial model. The treatment was tailored to target skill deficits in the following areas:

- Mindfulness – to increase awareness of present-moment experiences and reduce reactivity to automatic emotional triggers.
- Distress Tolerance – to build the patient's ability to manage emotional crises without engaging in self-harming behaviors or interpersonal withdrawal.
- Regulation of Emotions – to help her identify and name emotions, reduce vulnerability to mood swings, and increase emotional stability over time.
- Interpersonal Effectiveness – to improve assertiveness, boundary-setting, and the ability to express needs in relationships without escalating conflict.

The therapy also aimed to help the patient develop a more stable sense of identity, reduce black-and-white thinking patterns, and tolerate emotional discomfort without resorting to avoidance or impulsive actions. Psycho-education was included to normalize her emotional experiences and enhance her understanding of how invalidating experiences in the past may have shaped her current difficulties.

The therapeutic strategy was planned as long-term and structured, with an emphasis on collaborative goal-setting, consistent skill-building, and the gradual application of DBT techniques in real-life situations. Family involvement was considered at later stages if appropriate, with the aim of supporting the patient's emotional growth and boundary development.

Therapeutic Strategies Planned

- Psycho-education: To help the patient understand the nature of Emotionally Unstable Personality Disorder and how her emotional sensitivity and past invalidation contributed to her current difficulties. Psycho-education also focused on the biosocial model, helping her recognize patterns in her emotional responses and relationships.
- Mindfulness Training: Introduced to build present-moment awareness, reduce emotional reactivity, and increase attention to thoughts, feelings, and urges without immediate judgment or action. Basic mindfulness skills (observe, describe, participate) were taught and practiced through short daily exercises.
- Distress Tolerance Skills: To help the patient manage high emotional arousal without engaging in self-harm or impulsive actions. Skills such as distraction (ACCEPTS), self-soothing, and grounding techniques were introduced and rehearsed in sessions for use during emotional crises.
- Emotion Regulation Techniques: Focused on helping the patient understand, name, and manage her emotional experiences. Work included identifying vulnerability factors, using the ABC skill (Accumulate positives, Build mastery, Cope ahead), and practicing opposite action to manage urges triggered by intense emotions.
- Interpersonal Effectiveness Skills: Aimed at improving her ability to communicate assertively, maintain self-respect, and build healthier boundaries. Skills such as DEAR MAN, GIVE, and FAST were introduced for situations involving unmet emotional needs or perceived rejection.
- Diary Card and Behavioral Chain Analysis: Used regularly to track urges, emotional states, and behaviors such as self-harm or anger outbursts. These tools were also used to identify triggers and apply learned skills in real-life contexts.
- Validation and Therapeutic Engagement: Efforts were made to validate the patient's emotional experiences while also encouraging responsibility and change. The therapist maintained a balance of acceptance and change-oriented work to strengthen alliance and motivation.

Motivation for Therapy and Prognostic Indicators

The patient appeared motivated for therapy and expressed a desire to understand her emotional difficulties and improve her relationships. She was cooperative during sessions and showed willingness to participate in therapeutic tasks. She acknowledged the impact of her emotions on her academic and social functioning and showed psychological awareness regarding her struggles.

Good prognostic factors included her psychological mindedness, readiness to engage in therapy, and strong academic background. She was able to reflect on her thoughts and emotions and was open to learning new coping strategies. Her ability to form a therapeutic alliance and her consistent attendance further supported a positive outlook.

However, certain factors were noted as potential challenges, such as long-standing emotional dysregulation, low tolerance for distress, and difficulties in maintaining stable interpersonal boundaries. The presence of self-harming behavior was also considered a clinical risk and required careful monitoring throughout therapy. These factors were considered in planning structured, skill-based DBT sessions over a longer duration.

CLINICAL OBSERVATIONS AND DISCUSSION

Working with Ms. K.L. presented important clinical insights into managing cases of Emotionally Unstable Personality Disorder using a DBT framework. In the early phase, the patient appeared emotionally overwhelmed and uncertain about the therapy process. Her narratives were often filled with emotional intensity, and she expressed difficulty in identifying and explaining her own needs. The therapist maintained a validating and non-judgmental stance, which gradually allowed the patient to build trust and open up more freely. One of the initial challenges was her limited tolerance for distress, which often led to impulsive reactions such as self-harm. Therapy sessions had to be paced carefully, with early emphasis on stabilization, safety planning, and teaching distress tolerance techniques. The use of diary cards and chain analysis helped structure her reflection and identify repeated triggers. Emotional validation played a key role in reducing defensiveness and supporting engagement.

The patient found mindfulness exercises difficult at first, often stating that her mind “couldn't stop running.” With consistent practice and gentle repetition, she began to describe moments of pause and space between feelings and reactions. This progress was slow but steady, and reinforced during sessions with praise and structured feedback. Emotion regulation work was a core focus, as the patient struggled with intense mood swings and difficulty labeling emotions. She was taught to track vulnerabilities and apply opposite action when urges became strong. As she learned to name her feelings and connect them to past invalidating experiences, she reported a sense of emotional clarity. Interpersonal work required careful preparation. The patient initially feared that being assertive would lead to abandonment or rejection. Role plays and stepwise introduction of 'DEAR MAN' helped her rehearse conversations in safer ways. She began to report small successes in boundary-setting and found it empowering to express her needs clearly.

One therapeutic difficulty was the tendency to idealize and devalue the therapist in early stages. The therapist-maintained consistency and neutrality while gently addressing these shifts when they emerged. This helped the patient recognize her interpersonal patterns and begin working through them with greater awareness. Termination work involved addressing the patient's fears of losing emotional support and building confidence in her internal coping system. Gradual spacing of sessions was used to support autonomy. Although the patient acknowledged ongoing challenges, she also expressed a sense of pride and readiness to move forward independently. Overall, therapy with Ms. K.L. highlighted the importance of structure, validation, skill-building, and consistent therapeutic presence in working with emotionally vulnerable clients. The DBT framework provided both containment and direction, allowing the patient to make meaningful changes in her emotional, behavioral, and relational world.

CONFLICT OF INTEREST: None

FINANCIAL SUPPORT: None

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Review with Case Report

Paediatric Surgery: A True Blessing "Beyond Saving Lives, Building Futures"

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ABSTRACT

Background:

Paediatric surgery has transformed outcomes for children with congenital and acquired surgical conditions. What was once synonymous with early mortality or lifelong disability is now increasingly compatible with survival, normal growth, improved quality of life and dignity. This article defends the hypothesis that Paediatric surgery is a true blessing—for children, their families, and society at large— drawing on international evidence, World Health Organization (WHO) initiatives[1], and regional experience from Pacific Medical College and Hospital, Udaipur, Rajasthan.

Methods/Approach:

A narrative review of global paediatric surgical practice was conducted, with particular emphasis on data from the World Health Organization (WHO) [1] and the Lancet Commission on Global Surgery[2]. The review integrated published literature, international guidelines, and contextualised findings within the Indian healthcare landscape. Clinical illustrations were incorporated, together with a focused case study of the nine-year journey in establishing paediatric surgical services at Udaipur including 5 years of service at Pacific Medical College and Hospital, Udaipur, Rajasthan. Humanitarian, developmental, and technological perspectives were included to provide a comprehensive understanding of paediatric surgery as both a clinical discipline and a societal necessity.

Findings:

Paediatric surgery saves lives at the earliest stages of human development, facilitates normal physical and psychosocial growth, and restores essential function and quality of life. Beyond its direct clinical benefits, it alleviates the emotional and financial burden borne by families and strengthens long-term human capital by enabling children to become healthy, productive adults.

Global evidence demonstrates significant improvements in survival and outcomes for conditions once considered uniformly fatal, such as tracheoesophageal fistula, anorectal malformations, and congenital diaphragmatic hernia. Advances in neonatal anaesthesia, intensive care, and minimally invasive techniques have been pivotal to these gains.

Despite such progress, access remains profoundly unequal. WHO estimates suggest that between 1.7 and 1.75 billion children worldwide lack timely, affordable, and safe surgical care, with the greatest disparities affecting low- and

middle-income countries (LMICs)[1].

The Udaipur case study, centred on Pacific Medical College and Hospital, illustrates how vision, awareness-building, and collaborative practice can transform regional paediatric surgical care. Over nine years, the establishment of neonatal and paediatric intensive care units, combined with community outreach and multidisciplinary teamwork, has enabled thousands of successful interventions—demonstrating how even resource-constrained settings can achieve world-class outcomes through commitment and innovation.

Conclusion:

Paediatric surgery is not merely a clinical specialty; it is a social, developmental, and humanitarian imperative. By saving lives, preventing disability, and enabling children to achieve their full potential, it exemplifies the highest ideals of medicine. The Udaipur experience at Pacific Medical College and Hospital demonstrates how vision, dedication, and collaboration can transform regional healthcare delivery, even within resource-constrained settings.

To ensure that all children benefit from this blessing, there is an urgent need for sustained investment in surgical systems, workforce training, infrastructure, and equitable access to care. Global collaboration—anchored in the principles of the World Health Organization and the Lancet Commission on Global Surgery—will be essential in narrowing disparities and safeguarding the future health of children worldwide.

KEYWORDS: Paediatric surgery, Congenital anomalies, Neonatal surgery, Surgical access, Global child health, Disability-adjusted life years (DALYs)

INTRODUCTION

Children are not merely small adults; their physiology, disease spectrum, and surgical requirements are distinct and demand specialised expertise. Paediatric surgery has evolved as a discipline uniquely positioned to address congenital anomalies, traumatic injuries, and acquired conditions in early life. What was once associated with near-certain mortality or lifelong disability can now often be managed successfully, ensuring survival, growth, and meaningful participation in society.

This article argues that paediatric surgery is a true blessing—clinically, socially, and economically. It not only saves lives but also restores dignity, prevents long-term disability, and supports the broader goals of human development. Yet, access to paediatric surgical care remains profoundly unequal, particularly in low- and middle-income countries where the burden of untreated surgical disease is highest.

To illustrate this dual reality—its transformative potential and its systemic inequities—we combine international data, World Health Organization (WHO)[1] and Lancet Commission on Global Surgery perspectives[2], with a focused regional case study from Pacific Medical College and Hospital, Udaipur, Rajasthan, India. This integrated approach underscores both the promise of paediatric surgery and the urgent need to expand its reach.

Paediatric Surgery: A Global Blessing

Saves Lives Early

Paediatric surgery addresses life-threatening conditions at the very beginning of life. Congenital anomalies such as tracheoesophageal fistula, congenital diaphragmatic hernia, and intestinal atresia, once uniformly fatal, can now be corrected with high survival rates in centres with appropriate expertise. These interventions transform otherwise terminal diagnoses into opportunities for healthy survival.

Allows Normal Development

Timely surgical interventions prevent long-term morbidity and allow children to achieve developmental milestones. For example, early treatment of Hirschsprung's disease or neural tube defects prevents malnutrition, chronic constipation, urinary dysfunction, and lifelong disability. By restoring normal physiology, paediatric surgery enables children to grow, learn, and integrate fully into society.

Improves Quality of Life

Beyond survival, paediatric surgery focuses on restoring function and dignity. Corrective procedures for cleft lip and palate, hypospadias, or limb deformities enhance both functional and aesthetic outcomes, allowing children to participate confidently in school, play, and social life. Quality of life, not just longevity, is at the heart of the discipline.

Builds a Strong Future

Preventing lifelong disability preserves human capital. A child treated for congenital or acquired surgical disease has the chance to contribute productively to society, thus reinforcing the economic and developmental fabric of their community. Paediatric surgery is therefore an investment in the future, with dividends in health, education, and workforce participation.

Provides Relief to Families

The benefits of paediatric surgery extend to the household. By alleviating the stigma, distress, and financial burden of untreated conditions, it restores stability and hope to families. Parents are spared the anguish of preventable loss or disability, and siblings benefit from a less disrupted family life.

Challenges and Global Disparities

Workforce Shortages

The global distribution of paediatric surgeons is strikingly unequal. In Malawi, there are just 0.17 paediatric surgeons per million children, compared with more than 30 per million in many high-income countries such as the United Kingdom and United States[7,8].

India provides a unique perspective. With 472 million children under the age of 18 (nearly 39% of its total population, based on Census 2011), it bears one of the world's largest burdens of paediatric surgical need[9]. Yet the country has an estimated fewer than 2,500 practising paediatric surgeons to serve this enormous population[10]. This translates to barely 1–2 paediatric surgeons per million children, a figure that is considered grossly insufficient. Moreover, most specialists are concentrated in urban tertiary centres, leaving rural and tribal populations with little or no access to specialised care[11].

Table 1: Survival improvements in major congenital anomalies with paediatric surgery

Condition	Pre-surgical Era Survival (%)	Modern Surgical Era Survival (%)	Key Reference
Oesophageal Atresia with TEF	~0	85–90	Spitz, 2007[3]
Congenital Diaphragmatic Hernia	<10	70–80	Burgos, 2017[4]
Anorectal Malformations	<20	>90	Levitt & Peña, 2007[5]
Intestinal Atresia	<10	>90	Holcomb, 2014[6]

Table 2: Global paediatric surgical workforce distribution

Country/Region	Paediatric Surgeons per million Children	Source
Malawi	0.17	Grabski, 2020[7]
Pakistan	0.4	Grabski, 2020[7]
Sub-Saharan Africa (Average)	<1	Butler, 2017[11]
India	≈ 4.8–5.3 (assuming <2,500 paediatric surgeons; 472M children)	IAPS Diary[10], Census 2011[9]
High-income Countries (e.g., UK, USA)	30+	Wright, 2016[8]

Infrastructure Gaps

Access remains severely limited in low- and middle-income countries. It is estimated that up to 90% of children in sub-Saharan Africa lack timely surgical care, with similar disparities in South Asia[11].

Financial Barriers

Even where surgical expertise is available, out-of-pocket costs push many families into catastrophic health expenditure and poverty. For the most vulnerable households, surgery is not a realistic option without systemic reform and financial protection.

CASE STUDY

Nine-Year Journey of Paediatric Surgery in Udaipur

The development of paediatric surgery in Udaipur over the past nine years exemplifies the transformative potential of this specialty in a regional Indian context. Spearheaded by the paediatric surgical unit at Pacific Medical College and Hospital (PMCH), the journey illustrates how vision, awareness-building, and multidisciplinary collaboration can establish and expand a specialty where none previously existed.

From modest beginnings in a setting with limited infrastructure and low public awareness, paediatric surgical services in Udaipur have grown into a regional hub of excellence. This progress has been achieved through community outreach, the establishment of neonatal and paediatric intensive care facilities, and the cultivation of strong partnerships among paediatricians, anaesthetists, intensivists, and nursing teams.

Achievements (in Numbers)

- Over 3,800 successful paediatric surgical cases have been performed in Udaipur to date.
- At PMCH alone, more than 2,123 surgeries were completed, covering the full spectrum of paediatric surgical care, including:
    - Paediatric Urology: 486
    - Genital Reconstructive Surgeries: 39
    - Inguino-scrotal: 463
    - Abdominal Surgery: 242
    - Laparoscopic Surgery: 145
    - Neonatal Surgery 213
    - Thoracic Surgery: 32
    - Neurosurgery: 67
    - Tumour: 6
    - Other Procedures: 430

This record demonstrates both the breadth and depth of services now available locally, reducing the need for families to travel to distant centres for care.

The Udaipur experience offers an instructive example of how determination and innovation can overcome systemic barriers, creating sustainable paediatric surgical care that directly benefits children, families, and society.

Future Directions: Hope for Tomorrow

Technological Innovations

The future of paediatric surgery will be defined by rapid advances in technology. Minimally invasive and robotic-assisted surgery are already transforming outcomes by reducing pain, shortening hospital stays, and improving precision[12]. Emerging fields such as foetal surgery and regenerative medicine hold the promise of correcting anomalies even before birth or restoring tissue function once thought irreversibly lost. These innovations are steadily moving from experimental settings into mainstream clinical practice, bringing new hope to children and families worldwide.

Global Initiatives

The advancement of paediatric surgical care is also supported by powerful global movements. The World Health Organization's Global Initiative for Emergency and Essential Surgical Care (GIEESC)[13] and the Lancet Commission's *Global Surgery 2030* agenda[14] have placed surgical equity firmly on the international health agenda. Programmes such as KidsOR, which equips operating theatres across low- and middle-income countries, are directly expanding access to safe paediatric surgery[15]. Together, these initiatives highlight the recognition of surgery as an indispensable component of universal health coverage.

Local-Global Synergy

Regional examples, such as the nine-year journey of paediatric surgery at Pacific Medical College and Hospital in Udaipur, India, complement these global efforts. They demonstrate how international frameworks can be adapted to local realities, and how grassroots leadership can amplify the impact of global initiatives. By bridging local innovation with global strategy, paediatric surgery can move closer to the goal of equitable access for every child.

DISCUSSION

Paediatric surgery embodies the fusion of science and humanity. Globally, it saves lives, prevents disability, and restores dignity to children who might otherwise face premature death or life-long impairment. Locally, in Udaipur, the nine-year journey of developing paediatric surgery demonstrates how individual vision and institutional commitment can transform the healthcare landscape of an entire city. The establishment of neonatal and paediatric intensive care services, coupled with community outreach and awareness-building, illustrates the broader truth that systemic change often begins with the dedication of a few committed individuals.

At the heart of this discourse lies an ethical imperative: no child's chance of survival or quality of life should be determined by their birthplace. The stark inequities between high-income countries and low- and middle-income countries highlight the urgent need for coordinated investment in workforce training, infrastructure, and sustainable financing. Bridging these gaps is not only a medical necessity but also a moral duty—one that aligns with the principles of equity and justice that underpin global health.

CONCLUSION

Paediatric surgery is a true blessing—for children, their families, and society at large. By saving lives, preventing disability, restoring quality of life, and safeguarding human potential, it embodies the highest ideals of medicine.

The Udaipur case study demonstrates that even in resource-limited regions, vision, persistence, and teamwork can build sustainable paediatric surgical services that change outcomes for thousands of children. Such regional experiences, when aligned with global strategies, show that equity in paediatric surgical care is both achievable and urgent.

The global community now faces a collective responsibility: to ensure that this blessing is not confined to the privileged few, but recognised as the right of every child, everywhere.

CONFLICT OF INTEREST: None

FINANCIAL SUPPORT: None

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New Drug Approvals

S. No.	Treatment Indication	Drug's Name	Company	Description	Date of FDA Approval
1.	Non-small Cell Lung Cancer	Zegfrovy (Sunvozertinib) Tablets	Dizal	Zegfrovy (Sunvozertinib) is an oral, irreversible, epidermal growth factor receptor (EGFR) tyrosine kinase inhibitor (TKI) for the treatment of locally advanced or metastatic non-small cell lung cancer patients with EGFR exon 20 insertion (exon20ins) mutations.	July 2, 2025
2.	Multiple Myeloma	Lynozyfic (Linvoseltamab -gcpt) Injection	Regeneron Pharma-ceuticals, Inc.	Lynozyfic (Linvoseltamab-gcpt) is a bispecific B-cell maturation antigen (BCMA) - directed CD3 T-cell engager for the treatment of relapsed or refractory multiple myeloma.	July 2, 2025
3.	Hereditary Angioedema	Ekterly (Sebetralstat) Tablets	KalVista Pharma-ceuticals, Inc.	Ekterly (Sebetralstat) is an oral plasma Kallikrein inhibitor for the on-demand treatment of hereditary angioedema attacks in adults and paediatric patients aged 12 years and older.	July 3, 2025
4.	Diabetes Mellitus	Kirsty (Insulin Aspart-xjhz) Injection	Biocon Biologics Inc.	Kirsty (Insulin Aspart-xjhz) is a rapid acting human insulin analogue interchangeable biosimilar to NovoLog (Insulin Aspart) indicated to improve glycaemic control in adults and paediatric patients with diabetes mellitus.	July 15, 2025

Continued ...

S. No.	Treatment Indication	Drug's Name	Company	Description	Date of FDA Approval
5.	Chronic Hand Eczema	Anzupgo (Delgocitinib) Topical Cream	LEO Pharma Inc.	Anzupgo (Delgocitinib) is a topical pan-Janus kinase (JAK) inhibitor for the treatment of chronic hand eczema.	July 23, 2025
6.	High Blood Pressure, Cardiovascular Risk Reduction	Vostally (Ramipril) Oral Solution	Rosemont Pharma-ceuticals Inc.	Vostally (Ramipril) is an oral solution formulation of the approved angiotensin converting enzyme (ACE) inhibitor Ramipril used for the treatment of hypertension and to reduce the risk of cardiovascular events.	July 23, 2025
7.	Phenylketonuria	Sephience (Sepiapterin) Oral Powder	PTC Thera-peutics, Inc.	Sephience (Sepiapterin) is a Phenylalanine hydroxylase activator used for the treatment of patients with phenylketonuria.	July 28, 2025
8.	Presbyopia	Vizz (Aceclidine) Ophthalmic Solution - formerly LNZ100	LENZ Thera-peutics, Inc.	Vizz (Aceclidine) is a cholinergic agonist indicated for the treatment of presbyopia in adults.	July 31, 2025
9.	Malignant Glioma	Modeyso (Dordaviprone) Capsules	Jazz Pharma -ceuticals plc	Modeyso (Dordaviprone) is a protease activator used for the treatment of recurrent H3 K27M - Mutant Diffuse Midline Glioma.	August 6, 2025
10.	Pain	KETARx (Ketamine hydrochloride) Injection	PharmaTher Holdings Ltd.	KETARx (Ketamine hydrochloride) is a general anaesthetic for use in surgical pain management.	August 7, 2025

Continued ...

S. No.	Treatment Indication	Drug's Name	Company	Description	Date of FDA Approval
11.	Non-small Cell Lung Cancer	Hernexeos (Zongertinib) Tablets	Boehringer Ingelheim	Hernexeos (Zongertinib) is a kinase inhibitor used for the treatment of non-squamous non-small cell lung cancer (NSCLC) with HER2 (ERBB2) tyrosine kinase domain activating mutations. FDA granted accelerated approval to Hernexeos (Zongertinib) for previously treated patients with HER2-Mutant Advanced NSCLC.	August 8, 2025
12.	Bronchiectasis	Brinsupri (Brensocatib) Tablets	Insmed Incorporated	Brinsupri (Brensocatib) is a Dipeptidyl peptidase 1 inhibitor for the treatment of patients with Non-Cystic Fibrosis Bronchiectasis.	August 12, 2025
13.	Recurrent Respiratory Papillomatosis	Papzimeos (Zopapogene Imadenovec -drba) Injection	Precigen, Inc.	Papzimeos (Zopapogene Imadenovec-drba) is a non-replicating adenoviral vector-based immunotherapy indicated for the treatment of adults with recurrent respiratory papillomatosis.	August 14, 2025
14.	Fibromyalgia	Tonmya (Cycloben-zaprine hydrochloride) - formerly TNX-102 SL	Tonix Pharma-ceuticals Holding Corp.	Papzimeos (Zopapogene Imadenovec-drba) is a non-replicating adenoviral vector-based immunotherapy indicated for the treatment of adults with recurrent respiratory papillomatosis.	August 15, 2025

Continued ...

S. No.	Treatment Indication	Drug's Name	Company	Description	Date of FDA Approval
15.	Hereditary Angioedema	Dawnzera (Donidalorsen) Injection	Ionis Pharma-ceuticals, Inc.	Dawnzera (Donidalorsen) is a Prekallikrein-directed Antisense Oligonucleotide indicated for prophylaxis to prevent attacks of hereditary angioedema in adult and paediatric patients 12 years of age and older. FDA approved Dawnzera (donidalorsen) as the First and Only RNA-targeted Prophylactic Treatment for Hereditary Angioedema.	August 21, 2025
16.	Immune Thrombo-cytopenia	Wayrilz (Rilzabrutinib) Tablets	Sanofi	Wayrilz (Rilzabrutinib) is a kinase inhibitor indicated for the treatment of adult patients with persistent or chronic immune thrombocytopenia (ITP) who have had an insufficient response to a previous treatment.	August 29, 2025
17.	Bladder Cancer	Inlexzo (Gemcitabine) intravesical system - formerly TAR-200	Johnson & Johnson	Inlexzo (Gemcitabine intravesical system) is a treatment for certain patients with BCG-unresponsive non-muscle invasive bladder cancer.	September 9, 2025

(Ravindra Bangar)
Editor

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Paper be typed	MS. Word
Font	Times New Roman
Font Size	16pt. and Bold for Title of the Paper, 14pt and Bold for heading in the paper, 12pt. for text.
Line Spacing	1.5
Margin	1 inch on all sides.
Layout	Use a single column layout with both left and right margins justified.
Language	English and Hindi
The title page	It should contain title of the paper, followed by name(s) of author(s), Designation, affiliation, e-mail, phone, fax with STD code and Postal Address, Authors should not write their name and affiliations anywhere else in the paper.
Tables, Graphs and charts etc.	In the text, the references for table should be mentioned as Table-1 and so on, not as above table. Same should be followed in case of graphs and charts. Each table, Graph and chart should have its own heading and source.
Abstract	500 Words
Full length paper	5000 Words
References	APA with hanging format.

(Editorial Team)

Peer-Review Policy
Double-blind Peer Review Process

Peer-review is the system used to assess the quality of a manuscript before it is published. Independent researchers in the relevant research area assess submitted manuscripts for originality, validity and significance to help editors determine whether the manuscript should be published in the journal.

In cases where the journal is unable to find sufficient peer reviewers, the Editorial Board may identify suitable reviewers and provide reports to avoid further delays for authors. Manuscripts submitted to Pacific Journal of Medical and Health Sciences are first assessed by our editors.

The aim and objective of the Pacific Journal of Medical and Health Sciences is to ensure the high standards of the original and scientific research papers and articles. With our Journal, a double-blind peer review system is in operation.

In the case of proposed publications, our editorial board will judge and evaluate the proposed manuscript on certain parameters like relevance of the submitted work with the aims and scope of the journal, scientific quality of the work and contribution of the work in respective branch of knowledge. If, the proposed work is found suitable in quick review by the editorial board then the editor will forward copies of an author's work to two experts ("referees" or "reviewers") in the respective field by e-mail or through a web-based manuscript processing system.

These referees or reviewers will return an evaluation of the proposed work to the editor in prescribed format along with weaknesses, problems, and suggestions for improvement. Further, this evaluation will be forwarded by editor after reviewing the comments of referees in context with the scope of the journal to the author for consideration and improvement of the proposed work.

Referees' evaluations usually include an explicit recommendation of what to do with the manuscript or proposed work as per the options available in the prescribed format.

During this peer review process, the role of the referees is advisory, and the editor is typically under no formal obligation to accept the opinions of the referees. Moreover, in the process of scientific publication, the referees do not communicate with each other, do not act as a group, and are not aware of each other's identities or comments.

In particular situations, where the referees disagree considerably about the quality of a manuscript, there are a number of strategies for reaching a decision. When the editor receives positive and negative reviews for the same manuscript by two different reviewers, the editor will ask for one or more additional reviews or on the basis of comments of one reviewer, the editor may take his/her decision about the respective manuscript.

Reviewers' Guidelines

ETHICS AND RESPONSIBILITY

We are committed to upholding the integrity of the work we publish. Pacific Journal of Medical and Health Sciences takes issues of copyright infringement, plagiarism or other breaches of best practice in publication very seriously. We seek to protect the rights of our authors and we always investigate claims of plagiarism or misuse of published articles. Equally, we seek to protect the reputation of our journal against malpractice. Submitted articles are checked with duplication-checking software. Where an article is found to have plagiarized other work or included third-party copyright material without permission or with insufficient acknowledgement, or where the authorship of the article is contested, we reserve the right to take action including, but not limited to: publishing an erratum or corrigendum (correction); retracting the article (removing it from the journal); taking up the matter with the Head of Department or Dean of the author's institution and/or relevant academic bodies or societies; banning the author from publication in the journal in question or appropriate legal action.

We recommend that if reviewers suspect any of the following problems with any article that they are reviewing that they contact the journal editor to discuss the situation without delay. Reviewers should keep all information about such matters confidential and not discuss them with colleagues other than the journal editor.

1. If you suspect that the paper has been either published or submitted to another journal;
2. If you suspect that the paper is duplicating the work of others;
3. If you suspect that there might be problems with the ethics of the research conducted;
4. If you suspect that there might be an undeclared conflict of interest attached to the paper (Editors might have more information about this than you do so it is best to check).

We recommend that reviewers should think carefully about their own potential conflicts of interest relating to the paper before undertaking the review. They should also notify the editor if they become aware of the identity of the author during blind peer review. Additionally, reviewers should be careful not to make judgments about the paper based on personal, financial, intellectual biases or any other considerations than the quality of the research and written presentation of the paper.

PURPOSE OF PEER REVIEW

It is widely accepted that Peer Review is the most valid form of research evaluation and it is a cornerstone in the process of bringing academic research to publication in the following ways:

Evaluation - Peer review is an effective form of research evaluation to help select the highest quality articles for publication.

Integrity - Peer review ensures the integrity of the publishing process and the scholarly record. Reviewers are independent of journal publications and the research being conducted.

Quality - The filtering process and revision advice improve the quality of the final research article as well as offering the author new insights into their research methods and the results that they have compiled. Peer review gives authors access to the opinions of experts in the field who can provide support and insight.

TYPE OF PEER REVIEW OF JOURNAL

Double blind peer review - names are hidden from both reviewers and the authors.

HOW TO REVIEW ARTICLES

Referees are sent invitations to review papers by journal editors. These requests are made via email. If you are asked to provide a review, in order to avoid delays, we would be grateful if you could let us know as soon as possible if you are unable to complete it at the time or if a problem arises after the invitation has been accepted. Suggestions for alternative reviewers are always gratefully received.

Below we present some advice and guidance about how to conduct a review and put together a reviewer report that will be effective and beneficial to authors:

ETIQUETTE

Timeliness - We understand that our reviewers are busy so it won 't always be possible for invitations to be accepted. Please let us know as soon as possible if you need to refuse a review or if a problem arises after the invitation has been accepted. We as editors are grateful to receive suggestions about someone else that might be suitable to do the review if you have to decline the invitation.

Conflict of Interest - It is important to highlight to us any conflict of interest that you feel might occur. If you review the paper, please do so as discretely and as quickly as possible.

Discussion - It is important to discuss with us any concerns that you have about the paper or any specific requirements for review if you are being invited to review for the first time. As editors are we open to discuss your expectations and journal requirements.

INDIVIDUAL JOURNAL REVIEWER GUIDELINES

These guidelines include a list of questions and will usually offer the reviewer the chance to make general comments

- Read the paper very carefully.
- Relevance to the publication.
- Significance of the research within the field.
- Originality of the work conducted. It is also important to consider whether the author has ever published a substantially similar paper elsewhere (if you suspect the work may not be original, please view our ethics page for information about how to deal with a variety of situations).
- The methodology employed during the research.
- Technical accuracy.

STRUCTURE AND COMMUNICATION

- Accuracy of references
- Overall Structure of the paper, communication of main points and flow of argument
- Quality of written language and structure of the article
- Effectiveness of the article abstract and introduction (some journals will request
- Whether the argument is clear and logical and the conclusions presented are supported by the results or evidence presented
- Whether the title of the article is suitable or effective
- Whether the abstract is a good summary of the article
- Whether the work meets with the article types accepted by the journal

The accessibility of the paper to a broad readership

Whether the paper is internally consistent

FEEDBACK IN YOUR REVIEWER REPORT - GIVING ADVICE TO AUTHORS AND SUGGESTING REVISIONS

- Be as objective as possible in your comments and criticisms and avoid making negative comments about work referenced in the article

- Be specific and as constructive as possible in your criticism. Be clear about what needs to be added or revised.
- If relevant, make suggestions about additional literature that the author might read to enrich or improve their arguments
- You should ensure that you are clear which of your comments you are happy for the author to see and which are meant specifically for the journal editor in order to avoid confusion or bad feeling
- While peer reviewers should feel free to make general comments on written quality and make suggestions about how articles might be improved by broadening reading of other literature, it is not the job of the peer reviewer to rewrite articles or suggest detailed changes to wording

MAKING A DECISION

> Recommend whether a paper should be accepted, rejected or revised (major or minor revisions)

> Most importantly, keep all activity, content and comments relating to the paper confidential

Publication Ethics and Publication Malpractice Statement

Our publication ethics and publication malpractice statement is mainly based on the Code of Conduct and Best-Practice Guidelines for Journal Editors (Committee on Publication Ethics, 2011).

EDITORS' RESPONSIBILITIES

Publication Decisions

The editor is responsible for deciding which of the papers submitted to the journal will be published. The editor will evaluate manuscripts without regard to the authors' race, gender, sexual orientation, religious belief, ethnic origin, citizenship, or political philosophy. The decision will be based on the paper's importance, originality and clarity, and the study's validity and its relevance to the journal's scope. Current legal requirements regarding libel, copyright infringement, and plagiarism should also beconsidered.

Confidentiality

The editor and any editorial staff must not disclose any information about a submitted manuscript to anyone other than the corresponding author, reviewers, potential reviewers, other editorial advisers, and the publisher, as appropriate.

Disclosure and Conflicts of Interest

Unpublished materials disclosed in a submitted paper will not be used by the editor or the members of the editorial board for their own research purposes without the author's explicit written consent.

REVIEWERS' RESPONSIBILITIES

Contribution to Editorial Decisions

The peer-reviewing process assists the editor and the editorial board in making editorial decisions and may also serve the author in improving the paper.

Promptness

Any selected referee who feels unqualified to review the research reported in manuscript or knows that its prompt review will be impossible should notify the editor and withdraw from the review process.

Confidentiality

Any manuscripts received for review must be treated as confidential documents. They must not be disclosed to or discussed with others except as authorized by the editor.

Standards of Objectivity

Reviews should be conducted objectively. Personal criticism of the author is inappropriate. Referees should express their views clearly with supporting arguments.

Disclosure and Conflict of Interest

Privileged information or ideas obtained through peer review must be kept confidential and not used for personal advantage. Reviewers should not consider manuscripts in which they have conflicts of interest resulting from competitive, collaborative, or other relationships or connections with any of the authors, companies, or institutions associated with the papers.

AUTHORS' DUTIES

Reporting Standards

Authors of original research reports should present an accurate account of the work performed as well as an objective discussion of its significance. Underlying data should be represented accurately in the paper. A paper should contain sufficient detail and references to permit others to replicate the work. Fraudulent or knowingly inaccurate statements constitute unethical behavior and are unacceptable.

Originality, Plagiarism and Acknowledgement of Sources

Authors will submit only entirely original works, and will appropriately cite or quote the work and/or words of others. Publications that have been influential in determining the nature of the reported work should also be cited.

Multiple, Redundant or Concurrent Publication

In general, papers describing essentially the same research should not be published in more than one journal. Submitting the same paper to more than one journal constitutes unethical publishing behavior and is unacceptable. Manuscripts which have been published as copyrighted material elsewhere cannot be submitted. In addition, manuscripts under review by the journal should not be resubmitted to copyrighted publications. However, by submitting a manuscript, the author(s) retain the rights to the published material.

Authorship of the Paper

Authorship should be limited to those who have made a significant contribution to the conception, design, execution, or interpretation of the reported study. All those who have made significant contributions should be listed as co-authors. The corresponding author ensures that all contributing co-authors and no uninvolved persons are included in the author list. The corresponding author will also verify that all co-authors have approved the final version of the paper and have agreed to its submission for publication. Disclosure and conflicts of interest

All authors should include a statement disclosing any financial or other substantive conflicts of interest that may be construed to influence the results or interpretation of their manuscript. All sources of financial support for the project should be disclosed.

Fundamental errors in published works

When an author discovers a significant error or inaccuracy in his/her own published work, it is the author's obligation to promptly notify the journal editor or publisher and to cooperate with the editor to retract or correct the paper in form of an erratum.

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DEPARTMENT OF ONCOLOGY

SCALP COOLING MACHINE

Rajasthan's First Scalp Cooling Machine has been established in Pacific Medical College and Hospital, Udaipur for providing US FDA Approved Scalp Cooling Therapy to Cancer Patients to prevent hair-loss due to Chemotherapy.

PACIFIC IVF CENTER

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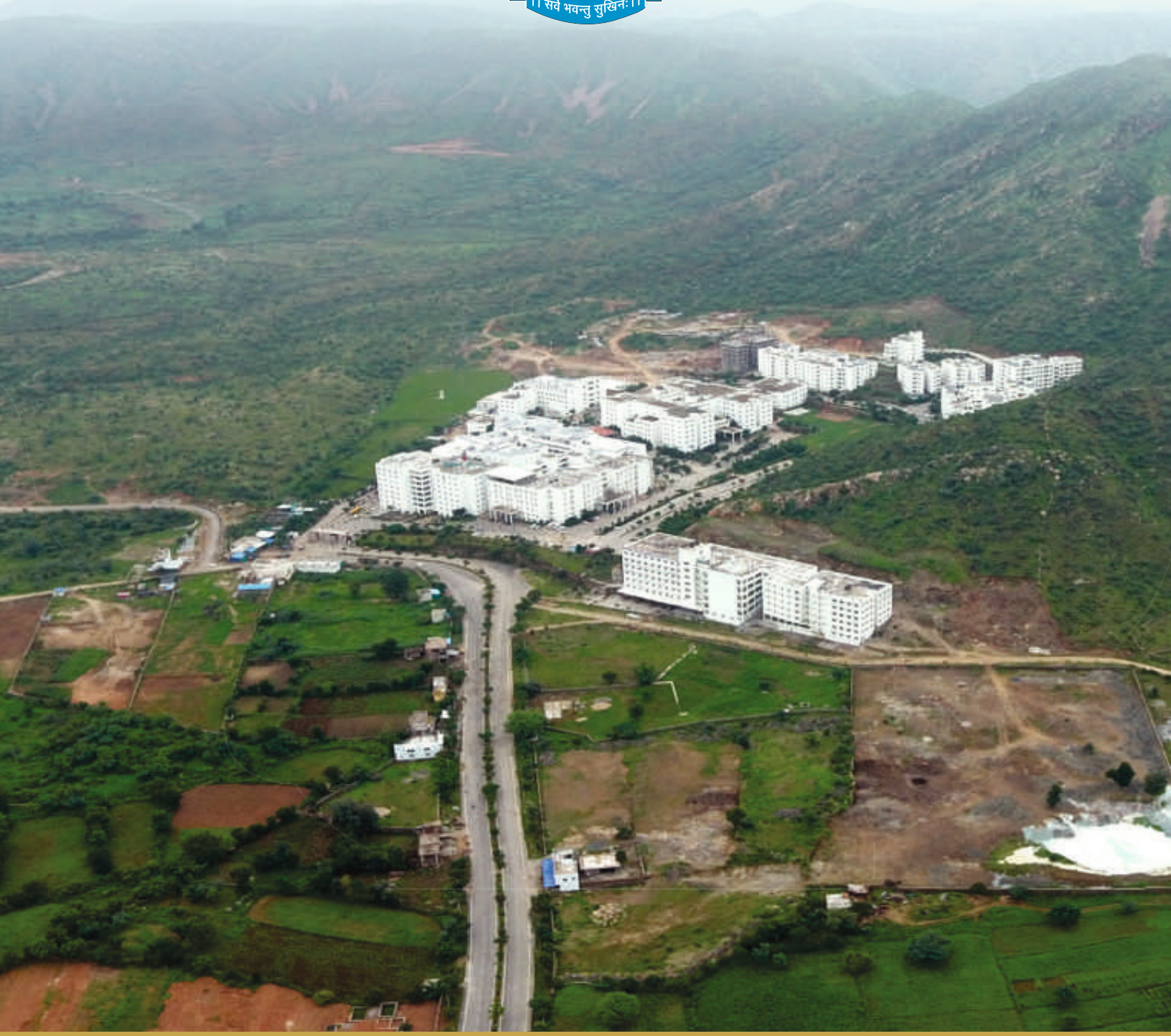

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