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In this issue

- Review Article
- Clinical Study
- Case Report
- Viewpoint
- Brief Communication
- Medicolegal
- Medical Voice for Policy Change
- Conference Proceedings
- Around the Globe
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Indian JOURNAL of CLINICAL PRACTICE

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EDITORIAL

5 Medicine Update

Veena Aggarwal

GUEST EDITORIAL

8 Obesity and the Banyan Tree

Sanjay Kalra, Suneet Verma, Nitin Kapoor

REVIEW ARTICLE

10 Role of Sodium Alginate in Gastroesophageal Reflux Disease: An Overview

Jyoti Yadav, Shubhricha

CLINICAL STUDY

16 The Effect of Phototherapy on Various Biochemical Parameters in Neonatal Hyperbilirubinemia

Shashi Kant Meena, Jagdish Singh, Dhan Raj Bagri, Neha Agrawal

CASE REPORT

26 An Interesting Case of Pulmonary Tuberculosis with Hypoxemic Respiratory Failure Mimicking Interstitial Lung Disease

Shrinath V, Siddhartha Chakraborty, Rahul Tyagi, Ashok Narayanan

VIEWPOINT

29 Doctors' Pride and Ethics: Time to Introspect

Aleya Anitha

BRIEF COMMUNICATION

38 Status of Urinalysis in Nigeria: Way Forward

Adeyemo AW, Olanrewaju TO, Aderibigbe A, Sourabh Sharma, Soje MO, Busari KA, Faponle AE, Oyedepo DS

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MEDICOLEGAL

- 41 Not Practising Accepted Protocols While Examining a Patient**

MEDICAL VOICE FOR POLICY CHANGE

- 44 HCFI Dr KK Aggarwal Research Fund**

CONFERENCE PROCEEDINGS

- 47 CSI NIC Mid Term Meet 2023**

AROUND THE GLOBE

- 49 News and Views**

SPIRITUAL UPDATE

- 52 What is the Importance of Life Force?**

LIGHTER READING

- 54 Lighter Side of Medicine**

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Medicine Update

THE CARDIOVASCULAR-KIDNEY-METABOLIC (CKM) SYNDROME: A NEW DISORDER INCREASING RISK OF HEART DISEASE

In a scientific statement published October 9, 2023, the American Heart Association (AHA) has coined a new term “cardiovascular-kidney-metabolic (CKM) syndrome” to highlight the interrelationship between various metabolic and kidney-related factors for cardiovascular disease (CVD). It has defined stages with increasing risk with treatment approach for each. Stage 0 (no risk factors), Stage 1 (overweight/obesity, impaired glucose tolerance), Stage 2 (hypertension, metabolic syndrome), Stage 3 (subclinical atherosclerotic cardiovascular disease [ASCVD] or heart failure [HF]) and Stage 4 (clinical CVD)... (Source: *Circulation*. Oct. 9, 2023).

PIONEERS OF GROUNDBREAKING MRNA TECHNOLOGY AWARDED NOBEL PRIZE IN MEDICINE

Katalin Karikó and Drew Weissman have jointly won the 2023 Nobel Prize in Physiology or Medicine for their “discoveries concerning nucleoside base modifications that enabled the development of effective mRNA vaccines against coronavirus disease 2019 (COVID-19)”... (Source: *Nobel Prize.org*. Oct. 2, 2023).

LOWER MICROBIOME DIVERSITY MAY BE A BIOMARKER OF SEVERE COVID-19

Significantly higher prevalence of *Parasutterella*, *Odoribacter*, *Staphylococcus* and *Sellimonas* were found in the stool samples of patients with severe COVID-19 receiving intensive care. These bacteria are implicated in gut dysbiosis. Oral samples of patients who required mechanical ventilation, *Staphylococcus* and *Enterococcus* were the abundant organisms. Patients receiving

supplemental oxygen showed lower community biodiversity in the oral cavity as well as the intestinal tract... (Source: *Chest*. Oct. 10, 2023).

HIGH HDL CHOLESTEROL LEVELS LINKED TO RISK OF DEMENTIA

Not just low high-density lipoprotein (HDL) “good” cholesterol levels, high levels of HDL cholesterol are also associated with increased risk of dementia, says a study in *Neurology* journal. After adjusting for confounding variables, patients with highest HDL levels had 15% higher risk, while the risk increased by 7% among those with lowest levels versus those with intermediate levels... (Source: *Neurology*. Oct. 4, 2023).

PHASE 1 TRIAL OF A NEW HIV VACCINE BEGINS

The phase 1 trial to investigate the efficacy and safety of an investigational preventive human immunodeficiency virus (HIV) vaccine “VIR-1388” has begun at 6 centers in the United States and 4 in South Africa. A total of 95 participants with asymptomatic cytomegalovirus but who are HIV-negative will be enrolled. Three out of four study groups will receive the vaccine in different doses, while the fourth will be given a placebo... (Source: *NIH*. Sept. 20, 2023).

FDA APPROVES THE FIRST IV SECUKINUMAB FORMULATION

Secukinumab is now also available as an intravenous (IV) formulation following FDA (Food and Drug Administration) approval of IV secukinumab for the treatment of adult patients with psoriatic arthritis, ankylosing spondylitis and nonradiographic axial spondyloarthritis (nr-axSpA). It is a monoclonal

antibody, which binds to interleukin-17A. It is also available as a subcutaneous injection... (Source: *Medscape*. Oct. 9, 2023).

THE FOURTH WHO ESSENTIAL DIAGNOSTICS LIST PUBLISHED

The World Health Organization (WHO) has published its latest list of essential diagnostic tests. Tests for hepatitis E virus (HEV nucleic acid test, IgM antibodies to HEV and IgM antibodies to HEV rapid diagnostic test) and the use of glucose monitoring devices for personal use have been included for the first time in the fourth edition of the list. Parathyroid hormone and 17-hydroxyprogesterone tests have been included for endocrine diseases. A point-of-care test to determine blood group and Rhesus factor, high-sensitivity troponin I and T to diagnose acute myocardial infarction, Kleihauer-Betke acid-elution test for fetomaternal hemorrhage are the other new tests included in the list... (Source: *WHO*. Oct. 19, 2023).

ANTIGEN RAPID DIAGNOSTIC TESTS MAY BE NEGATIVE AT THE TIME OF ONSET OF SYMPTOMS IN COVID-19

A study of symptomatic adult patients with COVID-19 (Omicron) found that the median severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) viral load reached its peak around the fourth or fifth day from the day of onset of symptoms. The sensitivity of the antigen rapid diagnostic test ranged from 30% to 60% on the day 1; it increased to 59.2%-74.8% on day 3 and reached 80%-93.3% on day 4... (Source: *Clin Infect Dis*. Sept. 28, 2023).

PEMBROLIZUMAB FDA APPROVED FOR RESECTABLE NON-SMALL CELL LUNG CANCER

Pembrolizumab, a monoclonal antibody, has been approved for use as neoadjuvant treatment with platinum-containing chemotherapy for resectable non-small cell lung cancer, either node-positive or tumor size ≥ 4 cm. It has also been approved for use as a single agent as post-surgical adjuvant treatment in these patients... (Source: *US FDA*. Oct. 16, 2023).

THE FIRST COMPLETE SEQUENCE OF A HUMAN Y CHROMOSOME

The complete sequence covering all 62.5 million DNA bases on the human Y chromosome has been constructed by scientists in a study supported by the National Institutes of Health (NIH) and is named T2T-Y. It is

the final human chromosome to be fully sequenced. The new sequence reveals important features such as the azoospermia factor region involved in sperm production. Gene array i.e., genes with many copies was identified as another feature of the chromosome. The study led by the Telomere-to-Telomere (T2T) Consortium is reported in the journal *Nature*... (Source: *NIH*. Aug. 23, 2023).

IMPACT OF ISOLATED DIASTOLIC HYPERTENSION IN CKD PATIENTS

In chronic kidney disease (CKD) patients, who were a part of the Chronic Renal Insufficiency Cohort (CRIC) study, isolated diastolic hypertension but controlled systolic hypertension (SBP ≤ 130 mmHg and DBP > 80 mmHg), was not associated with an increased risk of adverse kidney or cardiovascular events or all-cause mortality... (Source: *Kidney Medicine*. Sept. 22, 2023).

NIVOLUMAB GETS FDA NOD FOR RESECTED STAGE IIB/C MELANOMA

Patients, aged ≥ 12 years, with completely resected stage IIB/C melanoma can now be treated with nivolumab following FDA approval for this indication. Nivolumab is a programmed death receptor-1 (PD-1) blocking antibody... (Source: *Medscape*. Oct. 16, 2023).

THE GENETIC BASIS OF RAYNAUD'S DISEASE

New research published in *Nature Communications* has suggested a genetic predisposition to Raynaud's disease. Two new genes, ADRA2A and IRX1, have been identified as contributing to the risk of the vasospastic attacks or Raynaud phenomenon, which till now has been thought to occur in response to cold... (Source: *Nature Communications*. Oct. 12, 2023).

COVID VIRUS INFECTS ATHEROSCLEROTIC PLAQUES IN CORONARY ARTERIES, FINDS STUDY

Analysis of human autopsy tissue has detected SARS-CoV-2 in atherosclerotic plaques in the coronary arteries in cases with severe COVID-19. The virus particularly targets the plaque macrophages. The ongoing inflammation may trigger acute cardiovascular events and increase long-term risk of cardiac complications... (Source: *Nat Cardiovasc Res*. Sept. 23, 2023).

A TRIPLE COMBINATION TOPICAL GEL FOR ACNE VULGARIS

A fixed-dose combination of 1.2% clindamycin phosphate, 0.15% adapalene and 3.1% benzoyl peroxide has

been approved by the US FDA as treatment of acne vulgaris in patients aged ≥ 12 years. It will be marketed under the brand name of Cabtreo... (Source: *Medscape*. Oct. 25, 2023).

STUDY LINKS POSTMENOPAUSAL STRESS TO DEPRESSION

New research presented at the annual meeting of the Menopause Society has linked acute stress in perimenopausal or early postmenopausal women to higher incidence of more severe depressive symptoms. Women with chronic stress were more likely to experience problems with memory and concentration... (Source: *Medscape*. Oct. 25, 2023).

TRAUMATIC EVENTS IN CHILDHOOD: A RISK FACTOR FOR HEADACHE DISORDERS?

Traumatic or adverse experiences during childhood are associated with more frequent headaches in adulthood,

according to a meta-analysis of trials spanning 19 countries. Risk of headache disorders increased by 48% among those who had suffered one or more traumatic events as children. The risk of headaches increased by 46% with threat traumas and 35% with deprivation traumas. More the number of traumatic events, greater was the risk... (Source: *Neurology*. Oct. 25, 2023).

FDA APPROVES THE “FIRST & ONLY” SUBCUTANEOUS INFlixIMAB FOR INFLAMMATORY BOWEL DISEASE

Patients with moderately to severely active ulcerative colitis and Crohn’s disease can now be treated with subcutaneous infliximab-dyyb as maintenance therapy following treatment with an IV infliximab product. This is the only subcutaneous formulation of infliximab, tumor necrosis factor- α inhibitor, that has been approved by the US FDA... (Source: *Medscape*. Oct. 23, 2023).

■ ■ ■ ■

Covishield Booster Elevates COVID Antibodies: Research

A study carried out by the physicians at Veer Surendra Sai Institute of Medical Sciences and Research (VIMSAR) in Burla and published in the Springer Nature Group’s worldwide journal *Cureus* and western Odisha observed a substantial rise in COVID antibody levels following the administration of the Covishield booster shot, suggesting improved defense against the virus.

According to Dr Sanjeeb Mishra, the study’s co-corresponding author, there were 132 health care professionals involved, the majority of whom were female and had a mean age of 35. At least 9 months after the second dosage was administered, they received the booster injection. The findings demonstrated a considerable rise in antibody levels following the booster dose, with a mean-fold increase of more than 30%.

Mishra further revealed that the study unveiled a positive correlation between an extended interval between the second dose and the booster shot and higher antibody levels. It was observed that 38 individuals had alarmingly low antibody levels before the booster, emphasizing the critical importance of timely intervention.

The study’s findings underscore the substantial enhancement of viral immunity achievable through a third booster injection, which is particularly advantageous for health care professionals who face heightened exposure risks.

The study also emphasizes how crucial it is to monitor the antibody levels following the booster dose to provide the best possible defense against the infection.

(Source: <https://www.msn.com/en-in/health/nutrition/covishield-booster-shot-significantly-enhances-antibody-levels-against-covid-study/ar-AA1iikdj?ocid=msedgntp&pc=NMTS&covid=03c76fa02e3f47f3ada2b987d5bab201&ei=9>)



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Obesity and the Banyan Tree

ABSTRACT

Health is a multifaceted construct, with social, religious and spiritual dimensions. In this editorial, we use an important socio-religious icon, the banyan tree (*Ficus benghalensis*) as a metaphor for the etiopathogenesis, clinical evaluation and management of obesity. We utilize this as a motivational tool, to encourage self-discipline and self-care while living with obesity.

Keywords: Motivation, obesity, overweight, person-centered care, psychosocial aspects

The banyan tree enjoys place of pride in Oriental history and philosophy. The national tree of India, *Ficus benghalensis* figures prominently in Hindu, Buddhist and Pacific Island religio-cultural discourse.¹

Obesity is the banyan tree of metabolic medicine. As the Srimad Bhagavad Gita says, “There is a banyan tree which has its roots upward and its branches down, and the Vedic hymns are its leaves. One who knows this tree is the knower of the Vedas.” (15:1).² The banyan tree develops accessory trunks from its roots, which grow alongside the index trunk. These accessory trunks allow the tree to spread indefinitely, across hectares at times.

EPIDEMIOLOGY

Obesity is a growing pandemic that seems to have no end. Data indicate that the number of persons living with overweight and obesity will increase to 4 billion by 2035, from the estimated 2.6 billion in 2020. This is an increase from 38% of global population to over 50% by 2035 (excluding children aged <5 years old). Obesity (body mass index [BMI] ≥ 30 kg/m²) alone is anticipated to rise from 14% to 24% of the population, affecting 2 billion adults, children and adolescents by 2035. The rise will be steepest among children and adolescents, rising from 10% to 20% in boys, and from 8% to 18% girls, over the same period.³ Based on these figures, obesity is veritably the banyan tree of modern maladies.

CLINICAL PRESENTATION AND CAUSALITY

Obesity affects virtually every aspect of health as well. Not just an individual illness, it is also a syndrome of the society, and a health condition of the country at large. Obesity impacts both biophysical and psychosocial health, and can have deleterious effects on virtually every organ-systems of the body.⁴ Normal weight obesity is a type of “hidden obesity” which needs to be identified and addressed as well.⁵ Thus, the clinical presentation of obesity resembles the banyan tree in depth and breadth.

The etiology of obesity is multifactorial, too. Various reasons can cause, and contribute to, the development of obesity. The Ominous Octet of obesity lists four central and four peripheral endocrine players in the pathogenesis of obesity.⁶ The vast number of etiopathologic factors involved in obesity make it similar to the banyan tree.

Just like the banyan tree, obesity’s roots are entrenched in lifestyle. As the Bhagavad Gita says, one who understands this knows the Vedas (what knowledge is).² The roots of obesity, or the “bariatric personality”⁷ lie in genetic, dietary, exercise-related and psychological factors. These roots can make obesity management challenging, just as the aerial roots of a banyan tree prevent other plants from growing in its shadow.

MANAGEMENT AND MITIGATION

However, the banyan tree is a place of refuge for travelers, to whom it provides shade and shelter. If pruned and tended by a good gardener, the banyan tree can survive for centuries. Obesity management, too, needs “tender, loving care” (Abraham Verghese: Cutting for Stone) along with scientific intervention. Behavioral and lifestyle therapy, with pharmacological and invasive treatment, if needed, can help manage obesity in a sustainable and durable manner.

A comprehensive approach is needed for weight optimization. It is not enough to focus only on BMI.⁶ The other “roots” of the obesity tree—its comorbid conditions and complications can act as confounding factors in management and can create impediments to appropriate interventions self-care. All these are interconnected, like banyan roots, and must be handled in a holistic manner.

THE TREE OF HEALTH

The Bhagavad Gita describes the banyan tree as the “Tree of Life”. The roots of this tree represent our attachment to worldly possessions thoughts and desires, which can prevent us from achieving our full potential. From an obesity perspective, unhealthy behaviors are a barrier against good health. As the banyan keeps growing new roots, weight gain, too, tends to self-propagate a vicious cycle: unhealthy habits leading to weight gain, which amplifies these habits and worsens obesity.

Breaking free from the cycle of weight gain is difficult, but is not impossible. The Tree of Life, as described in Gita, shows the way out. This path is knowledge (the Vedas).² Understanding what obesity is, how it is caused and how it can be managed, will help us plan effective, and efficient preventive and therapeutic strategies.

Thus, banyan tree serves not only as a metaphor, but also as a source of inspiration for persons living with obesity, and their caregivers.

This is what the Indian Journal of Clinical Practice, and its sister publication, the Asian Journal of Diabetology, strive to do. Showcasing the wide spectrum of obesity epidemiology and medicine, the journals bring obesity discourse to the center stage of global public health. Through these publications, we hope to plant a Tree of Life, Healthy Life and convert the vicious cycle of obesity, into a virtuous cycle of obesity management.

Acknowledgments

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REFERENCES

1. Noehden GH. VIII. Account of the Banyan-Tree, or Ficus Indica, as found in the ancient Greek and Roman Authors. Transactions of the Royal Asiatic Society of Great Britain and Ireland. 1827;1:119-32.
2. Srimad Bhagavad Gita. Gorakhpur: Gita Press, 2009.
3. World Obesity Atlas 2023. Available at: <https://data.worldobesity.org/publications/WOF-Obesity-Atlas-V5.pdf>. Last accessed May 7, 2023.
4. Kalra S, Arora S, Kapoor N. The Ominous Octet of obesity: a framework for obesity pathophysiology. J Pak Med Assoc. 2021;71(10):2475-6.
5. Kalra S, Kapoor N, Jacob JJ. Management of obesity: finding the metabolic magic wand. Indian J Endocrinol Metab. 2022;26(6):499-500.
6. Kalra S, Arora S, Kapoor N. Hidden obesity. J Pak Med Assoc. 2023;73(4):937-8.
7. Kalra S, Das S, Kota S, Anne B, Kumar A, Punyani H, et al. Barophenotypic characterization – The key to person centric management of obesity. Indian J Endocrinol Metab. 2021;25(4):295.

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Role of Sodium Alginate in Gastroesophageal Reflux Disease: An Overview

JYOTI YADAV*, SHUBHRICA†

ABSTRACT

Sodium alginate helps manage and treat heartburn and gastroesophageal reflux disease (GERD). This article discusses the structure, mechanism of action and clinical application. A brief review of the literature is carried out.

Keywords: Gastroesophageal reflux disease, sodium alginate

Gastroesophageal reflux disease (GERD) is a digestive disorder that occurs when gastric contents, which are acidic stomach juices or food and fluids, reflux from the stomach into the esophagus. This irritates the stomach lining, leading to heartburn and regurgitation occurring two or more times a week.¹ The symptoms can occur in the daytime but have a higher impact at night due to loss of usual physiological function associated with sleep and supine position.² In India, 22.2% of people suffer from heartburn.³ The prevalence of GERD ranges from 7.6% to 30%, and less than 10% of GERD patients in India have erosive esophagitis.⁴

The typical symptoms of GERD are heartburn, regurgitation and water brash/hypersalivation, while the atypical symptoms are nausea, eructation/belching, bloating, slow digestion, early satiety, vomiting, epigastric pain, precordial chest pain, early and nocturnal awakening and nightmares, hoarseness, pharyngeal pain, cough, wheeze and chronic rhinosinusitis. The alarming symptoms of GERD include dysphagia, odynophagia, epigastric mass, gastrointestinal tract bleeding and lymphadenopathy.⁵ Patients with GERD have significantly poor health-related quality of life (HRQoL). The rate and intensity of acid complaints or

gastrointestinal symptoms significantly influence the quality of life. The presence of gastrointestinal symptoms is associated with reduced work productivity.⁶

Treatment goals and strategies of GERD are based on (a) effective and rapid relief of symptoms and improvement in HRQoL for patients; (b) healing of esophageal mucosal damage, preventing the relapse of erosive esophagitis and reducing the development of other serious complications; (c) preventing the repeated reflux of gastric contents into the esophagus and reduce the damaging effect of gastric acid.^{6,7}

MECHANISMS OF ACTION OF VARIOUS DRUGS FOR TREATMENT OF GERD

Antacids

Antacids reduce the acid reaching the duodenum by neutralizing the acid present in the stomach.⁸ They also offer rapid and short-term relief.⁹ The easily available antacids and serotonergic or dopaminergic receptor activators offer only short-term relief of symptoms.⁹

Proton Pump Inhibitors

Proton pump inhibitors (PPIs) bind and inactivate the hydrogen potassium ATPase in the parietal cells of gastric mucosa. They are rapid-acting and produce a considerable but dose-dependent elevation of gastric pH.⁴ PPIs do not significantly change the size and position of acid pockets, nor do they displace them to a more distal location. Acid pockets persist even after treatment with PPIs.¹⁰ The long-term continuous use of PPIs and prokinetics is associated with chronic side effects, which limit their use. Safety implications with PPIs include increased risk of diseases, such

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as hospital- and community-acquired pneumonia, *Campylobacter enteritis*, *Clostridium difficile*-associated disease and fractures.¹¹ Despite high efficacy, failure to respond to PPIs has now become the most common presentation in gastrointestinal practice.¹²

Prokinetics

Since it is a known fact that the pathogenesis of GERD is a disordered function of the lower esophageal sphincter, the use of a prokinetic agent in such patients seems logical.¹³ Prokinetics activate serotonergic or dopaminergic receptors to increase esophageal and gastric peristalsis, which aids in esophageal clearance.^{9,14} This is particularly crucial for individuals with GERD characterized by transient lower esophageal sphincter relaxation (TLESR), which refers to spontaneous lower esophageal sphincter relaxation unrelated to swallowing and plays a pivotal role in GERD patients.

In GERD patients, symptom relief through acid-suppressive therapy usually obviates the need for additional treatments or diagnostic procedures. Acid-suppressive therapy, such as proton pump inhibitors (PPIs), alleviates symptoms, fosters esophageal healing and mitigates potential complications. However, addressing the underlying cause of TLESR may become necessary to sustain remission and deter relapses. In situations where acid-suppressive therapy falls short of yielding a complete response, including a prokinetic agent may be advantageous.¹⁵

Additionally, prokinetics alone may not be sufficient for significant relief in GERD patients. When used in conjunction with PPIs, prokinetics reduce the frequency of reflux episodes, resulting in more substantial improvements in symptom scores.¹⁶

Histamine Receptor Antagonists

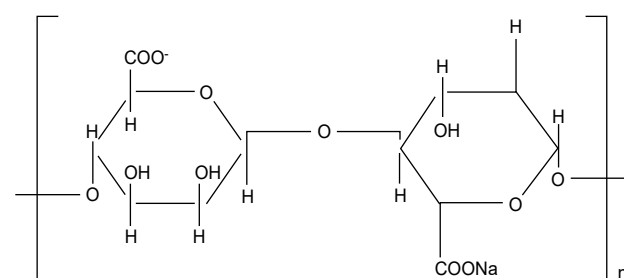
The histamine receptor antagonists competitively and reversibly block histamine type 2 (H₂) receptors, thereby decreasing gastric acid secretion. They are safe and significantly more effective than antacids. Acid suppression therapy with histamine receptor antagonists, though effective, has slower onset of action and is relatively ineffective in most patients.⁶ Patients continue to use acid-reducing medications regularly and have no significant differences in grade of esophagitis and impact on quality of life.^{9,13}

Alginates

Alginates precipitate to form a gel, which then floats in the stomach and displaces postprandial gastric acid pocket, thus physically blocking the refluxate from

entering the esophagus. It may also coat and protect the esophageal mucosa.⁹ The acid pocket is a phenomenon that occurs in both healthy individuals and in patients suffering from esophageal hypersensitivity after a meal. Acid pockets are unbuffered acidic regions formed near the gastroesophageal squamocolumnar junction during postprandial period. This region escapes the buffering effect of meals, remaining highly acidic (median pH 1.6) compared with the body of stomach (pH 4.7) and thus is termed acid pocket. It plays an important role in causing acid reflux by shortening the lower esophageal sphincter after a meal or during transient hiatus herniation.¹⁷

Structure of sodium alginate



Sodium alginate is a basic polysaccharide derived from alginic acid. It is composed of 1,4-β-D-mannuronic and L-guluronic acid. It is obtained from brown algae and contains 30% to 60% alginic acid. The conversion of alginic acid to sodium alginate allows its solubility in water, which assists in its extraction.¹⁸ The floating ability of alginate depends on the amount of carbon dioxide generated, amount of carbon dioxide entrapped in gel and the molecular properties of alginate, i.e., molecular weight and the ratio of D-mannuronic and L-guluronic acid. The addition of calcium to the alginate crosslinks with an alginate-containing acid polymer, that aids in floating with greater viscoelastic strength. On the other hand, the combination of aluminum and alginate reduces floating ability. The magnesium-alginate antacid formulation also remains floating in the stomach for only 1 hour.¹⁹

Modes of action

Alginates act by the following modes.

Prevention of gastric reflux: Alginates prevent gastric reflux by suppressing gastric reflux, and preventing postprandial reflux. The G-block structure of sodium alginate reacts with the acid in the stomach, thus producing a low-density gel that floats on top of stomach contents. This forms a physical barrier that suppresses gastric reflux. The physical barrier formed by alginate eliminates or displaces the acid pocket, preventing postprandial acid reflux.²⁰

Inhibition of pepsin and bile acids: Alginates inhibit pepsin and bile acids by reflux of pepsin and bile acids and by relieving symptoms, such as regurgitation and heartburn. Pepsin and bile acids are believed to be a major etiological factors associated with the development of gastroesophageal complications, i.e., Barrett's esophagus and esophageal adenocarcinoma. Alginate relieves symptoms by removing both pepsin and bile acids from gastric refluxate, thus limiting their diffusion and aiding relief.^{18,20}

Mucosal protection: Alginates protect the mucosa firstly by reflux prevention and secondly by their bioadhesive potential. They play a major role in protecting esophageal mucosa by reducing risk of inflammation via prevention of reflux of gastric contents. Alginates form an adherent viscous layer when it comes in contact with the esophageal mucosa and demonstrate bioadhesive potential.²⁰

Sodium alginate has a rapid onset of action, within 1 hour of administration, when compared to other antacids.²¹ The mode of action of alginate is physical and does not depend on absorption into the systemic circulation. On ingestion, alginate reacts rapidly with gastric acid to form an alginic acid gel, which has a near neutral pH and floats on the stomach contents and thus quickly and effectively prevents the impending gastroesophageal reflux. Alginate formulations require three chemical reactions to take place simultaneously: transformation to alginic acid, sodium bicarbonate reacting to form carbon dioxide and calcium carbonate releasing free calcium ions to bind with alginic acid providing strength to float. In severe cases, the float itself may be refluxed into the esophagus, in preference to the stomach contents, and exert a demulcent effect. The sodium alginate was found to be retained in the stomach for up to 4 hours, thus preventing acid reflux for a longer duration.²²

Alginate-containing formulations are safe, well-tolerated and comparable to the other antireflux medications such as omeprazole, ranitidine and other nonalginate antacids. Additionally, there have been no reports of any significant adverse events associated with alginate antacids. Alginate very rarely causes immune system disorders in the form of anaphylactic and anaphylactoid reactions and hypersensitivity reactions such as urticaria and respiratory effects like bronchospasm.²³⁻²⁶

Uses of alginate

The floating ability of sodium alginate above the acid pocket aids in preventing acid reflux. Alginate therapy successfully led to a reduction in regurgitation compared

to patients in the placebo group.²³ A randomized, double-blind placebo control trial suggested that the alginate-antacid combination (n = 212) compared to placebo (n = 212), is an effective treatment option in patients with reflux symptoms.⁷

In obese patients, the alginate-antacid combination was more effective than control in suppressing gastric reflux after a late-night supper.²³ Sodium alginate was effective in patients suffering from heartburn and epigastric pain due to its faster onset of action, thus providing long-term relief of symptoms.²⁷ Sodium alginate, compared with anhydrous magaldrate was found to be quick in relieving heartburn symptoms and/or acid regurgitation.²⁸

Due to its localizing and acid neutralizing effect, the alginate-antacid combination was significantly more effective in reducing gastric reflux events.²⁹ The alginate-antacid combination is also effective in reducing postprandial esophageal acid exposure.³⁰

Adding sodium alginate to PPI therapy was significantly more effective in attaining a complete resolution of heartburn and heartburn-free days compared to PPI therapy alone.³¹ Alginates were also effective in step-down or cessation of PPI therapy.^{11,20}

In patients, the addition of alginate with H₂ receptor antagonists was observed to be more effective in alleviating gastric acid reflux. Gastric reflux events were significantly reduced with sodium alginates compared to cimetidine.³²

Need of Alginate-antacid Combination

PPIs are considered the first-line approach for endoscopic healing and symptomatic relief in patients with GERD. Still, a substantial subgroup of patients, around 30%, continue to experience reflux symptoms despite adequate dosing.^{12,20} Either because of general unease with open-ended pharmacotherapy or because of the intermittent nature of reflux symptoms, prefer to address reflux symptoms with PRN medication. The problem has been the limited efficacy of this approach; antacids neutralize gastric acid in a short time frame after ingestion, but the effect is soon overcome by meal-stimulated acid secretion.³⁰

On the other hand, treatment with the combination of alginate and antacid decreases the severity and frequency of heartburn, leading to complete resolution of symptoms.²⁰ The combination potentially targets postprandial symptoms because of its localized acid-neutralizing action in the proximal stomach, while maintaining effective alginate float.⁷ The alginate-antacid

combination decreases burden of reflux symptoms, especially in PPI-unresponsive patients. The oral suspension of alginate that contains antacids, such as calcium carbonate, sodium bicarbonate and magnesium hydroxide, is used.²⁰

It should be given only on medical advice in children under 12 years of age. In adults and children over 12 years, 10-20 mL after meals and at bedtime is given. No dosage modification is required in elderly persons and patients with hepatic impairment, and can be safely administered. Alginate should be cautiously administered in renal insufficiency patients if a highly restricted salt diet is necessary. In patients with diabetes, sugar-free formula can be administered. Alginate is considered a safe treatment of choice for GERD during pregnancy.^{12,20}

CONCLUSION

Sodium alginate is useful in treating GERD, more so when combined with antacids and PPIs.

REFERENCES

- Okimoto E, Ishimura N, Morito Y, Mikami H, Shimura S, Uno G, et al. Prevalence of gastroesophageal reflux disease in children, adults, and elderly in the same community. *J Gastroenterol Hepatol*. 2015;30(7):1140-6.
- Deraman MA, Abdul Hafidz MI, Lawenko RM, Ma ZF, Wong MS, Coyle C, et al. Randomised clinical trial: the effectiveness of Gaviscon Advance vs non-alginate antacid in suppression of acid pocket and post-prandial reflux in obese individuals after late-night supper. *Aliment Pharmacol Ther*. 2020;51(11):1014-21.
- Wang HY, Leena KB, Plymoth A, Hergens MP, Yin L, Shenoy KT, et al. Prevalence of gastro-esophageal reflux disease and its risk factors in a community-based population in southern India. *BMC Gastroenterol*. 2016;16:36.
- Bhatia SJ, Makharia GK, Abraham P, Bhat N, Kumar A, Reddy DN, et al. Indian consensus on gastroesophageal reflux disease in adults: a position statement of the Indian Society of Gastroenterology. *Indian J Gastroenterol*. 2019;38(5):411-40.
- Hunt R, Armstrong D, Katerlaris P, Afihene M, Bane A, Bhatia S, et al; Review Team. World Gastroenterology Organization Global Guidelines: GERD global perspectives on gastroesophageal reflux disease. *J Clin Gastroenterol*. 2017;51(6):467-78.
- Scholten T. Long-term management of gastroesophageal reflux disease with pantoprazole. *Ther Clin Risk Manag*. 2007;3(2):231-43.
- Wilkinson J, Wade A, Thomas SJ, Jenner B, Hodgkinson V, Coyle C. Randomized clinical trial: a double-blind, placebo-controlled study to assess the clinical efficacy and safety of alginate-antacid (Gaviscon Double Action) chewable tablets in patients with gastro-oesophageal reflux disease. *Eur J Gastroenterol Hepatol*. 2019;31(1):86-93.
- Salisbury BH, Terrell JM. Antacids. [Updated 2023 Aug 8]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK526049/>
- Patrick L. Gastroesophageal reflux disease (GERD): a review of conventional and alternative treatments. *Altern Med Rev*. 2011;16(2):116-33.
- Kahrilas PJ, McColl K, Fox M, O'Rourke L, Sifrim D, Smout AJ, et al. The acid pocket: a target for treatment in reflux disease? *Am J Gastroenterol*. 2013;108(7):1058-64.
- Murie J, Allen J, Simmonds R, de Wet C. Glad you brought it up: a patient-centred programme to reduce proton-pump inhibitor prescribing in general medical practice. *Qual Prim Care*. 2012;20(2):141-8.
- Subramanian CR, Triadafilopoulos G. Refractory gastro-esophageal reflux disease. *Gastroenterol Rep (Oxf)*. 2015;3(1):41-53.
- Champion MC. Prokinetic therapy in gastroesophageal reflux disease. *Can J Gastroenterol*. 1997;11 Suppl B:55B-65B.
- Savarino V, Marabotto E, Zentilin P, Demarzo MG, de Bortoli N, Savarino E. Pharmacological management of gastro-esophageal reflux disease: an update of the state-of-the-art. *Drug Des Devel Ther*. 2021;15:1609-21.
- Rai RR, Prasad VGM. Prokinetics in the management of upper gastrointestinal motility disorders: an Indian expert opinion review. *Int J Adv Med*. 2021;8(9):1442.
- Ren LH, Chen WX, Qian LJ, Li S, Gu M, Shi RH. Addition of prokinetics to PPI therapy in gastroesophageal reflux disease: a meta-analysis. *World J Gastroenterol*. 2014;20:2412-9.
- Goh KL, Lee YY, Leelakusolvong S, Makmun D, Maneerattanaporn M, Quach DT, et al. Consensus statements and recommendations on the management of mild to moderate gastroesophageal reflux disease in the southeast Asian region. *JGH Open*. 2021;5(8):855-63.
- Dos Santos LAL. Natural polymeric biomaterials: Processing and properties. Elsevier; 2017.
- Mandel KG, Daggy BP, Brodie DA, Jacoby HI. Review article: alginate raft formulations in the treatment of heartburn and acid reflux. *Aliment Pharmacol Ther*. 2000;14(6):669-90.
- Bor S, Kalkan İH, Çelebi A, Dinçer D, Akyüz F, Dettmar P, et al. Alginates: from the ocean to gastroesophageal reflux disease treatment. *Turk J Gastroenterol*. 2019;30(Suppl 2): 109-36.
- Strugala V, Avis J, Jolliffe IG, Johnstone LM, Dettmar PW. The role of an alginate suspension on pepsin and bile acids - key aggressors in the gastric refluxate. Does this have implications for the treatment of gastro-oesophageal reflux disease? *J Pharm Pharmacol*. 2009;61(8):1021-8.

22. Dettmar PW, Sykes J, Little S, Bryan J. Rapid onset of effect of sodium alginate on gastro-oesophageal reflux compared with ranitidine and omeprazole, and relationship between symptoms and reflux episodes. *Int J Clin Pract.* 2006;60(3):275-83.
23. Leiman DA, Riff BP, Morgan S, Metz DC, Falk GW, French B, et al. Alginate therapy is effective treatment for GERD symptoms: a systematic review and meta-analysis. *Dis Esophagus.* 2017;30(5):1-9.
24. Thomas E, Wade A, Crawford G, Jenner B, Levinson N, Wilkinson J. Randomised clinical trial: relief of upper gastrointestinal symptoms by an acid pocket-targeting alginate-antacid (Gaviscon Double Action) - a double-blind, placebo-controlled, pilot study in gastro-oesophageal reflux disease. *Aliment Pharmacol Ther.* 2014;39(6):595-602.
25. Pouchain D, Bigard MA, Liard F, Childs M, Decaudin A, McVey D. Gaviscon vs. omeprazole in symptomatic treatment of moderate gastroesophageal reflux, a direct comparative randomized trial. *BMC Gastroenterol.* 2012;12:18.
26. Chatfield S. A comparison of the efficacy of the alginate preparation, Gaviscon Advance, with placebo in the treatment of gastro-oesophageal reflux disease. *Curr Med Res Opin.* 1999;15(3):152-9.
27. Chevrel B. A comparative crossover study on the treatment of heartburn and epigastric pain: liquid Gaviscon and magnesium- aluminium antacid gel. *J Int Med Res.* 1980;8(4):300-2.
28. Giannini EG, Zentilin P, Dulbecco P, Iiritano E, Bilardi C, Savarino E, et al. A comparison between sodium alginate and magaldrate anhydrous in the treatment of patients with gastroesophageal reflux symptoms. *Dig Dis Sci.* 2006;51(11):1904-9.
29. Sweis R, Kaufman E, Anggiansah A, Wong T, Dettmar P, Fried M, et al. Post-prandial reflux suppression by a raft-forming alginate (Gaviscon Advance) compared to a simple antacid documented by magnetic resonance imaging and pH-impedance monitoring: mechanistic assessment in healthy volunteers and randomized, controlled, double-blind study in reflux patients. *Aliment Pharmacol Ther.* 2013;37(11):1093-102.
30. De Ruigh A, Roman S, Chen J, Pandolfino JE, Kahrilas PJ. Gaviscon Double Action Liquid (antacid & alginate) is more effective than antacid in controlling post-prandial oesophageal acid exposure in GERD patients: a double-blind crossover study. *Aliment Pharmacol Ther.* 2014;40(5):531-7.
31. Manabe N, Haruma K, Ito M, Takahashi N, Takasugi H, Wada Y, et al. Efficacy of adding sodium alginate to omeprazole in patients with nonerosive reflux disease: a randomized clinical trial. *Dis Esophagus.* 2012;25(5):373-80.
32. Washington N, Denton G. Effect of alginate and alginate-cimetidine combination therapy on stimulated postprandial gastro-oesophageal reflux. *J Pharm Pharmacol.* 1995;47(11):879-82.

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Soft Drink Consumption and Sedentary Lifestyle Leads to Osteoporosis

Orthopedic specialists are sounding the alarm, asserting that the combination of regular soft drink consumption and a sedentary lifestyle renders bones more fragile, potentially resulting in a decline in bone mineral density (BMD) among individuals aged 40 to 50, ultimately leading to osteoporosis.

Professor Shah Waliullah of King George's Medical University (KGMU) cited a comprehensive study involving 17,000 participants conducted over 7 years in China, emphasizing that daily soft drink consumption is strongly linked to a heightened risk of fractures in adults. The study findings indicated that an increased consumption of soft drinks is associated with a higher fracture risk, irrespective of socio-demographic factors and overall dietary patterns.

A similar trend is now emerging in the local context, with orthopedic specialists reporting a worrisome increase in patients between the ages of 40 and 50 presenting with decreased BMD. Professor Waliullah noted that this trend was not prevalent a decade ago when soft drink consumption was significantly lower in the adult population.

Orthopedic surgeon and former Chief Medical Superintendent of the railway hospital, Dr Sanjay Srivastava, provided insight into the detrimental effects of soft drinks on bone health. He pointed out that these beverages' sugar, sodium, and caffeine content contribute to heightened calcium loss and an elevated risk of fractures.

Furthermore, Dr Srivastava mentioned the potential impact of phthalates, a chemical found in plastics used in soft drink bottle production, which could disrupt essential bone processes, leading to skeletal malformations and, ultimately, osteoporosis.

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The Effect of Phototherapy on Various Biochemical Parameters in Neonatal Hyperbilirubinemia

SHASHI KANT MEENA*, JAGDISH SINGH†, DHAN RAJ BAGRI‡, NEHA AGRAWAL#

ABSTRACT

Phototherapy (PT) is the current modality of choice for treatment of unconjugated hyperbilirubinemia. The effects of PT on various biochemical parameters including serum calcium, bilirubin profile, serum total protein, albumin, urea, creatinine, serum electrolytes in neonates are a concern in current times. Like any other treatment, PT also has its own side effects. This hospital-based, prospective, comparative observational study was conducted with the objective to assess the level of various biochemical parameters like serum calcium, serum sodium, serum potassium, serum chloride, serum urea and serum creatinine, serum total protein and serum albumin in addition to serum bilirubin before PT and after completion of 48 hours of PT in full-term neonates with unconjugated hyperbilirubinemia at a tertiary care center. On comparing biochemical parameters, a statistically significant difference in parameters such as bilirubin, urea, creatinine, sodium, potassium, chloride, calcium, total protein and albumin was observed after PT. On the other hand, there was a statistically nonsignificant difference in corrected calcium ($p = 0.945$).

Keywords: Phototherapy, neonatal hyperbilirubinemia, neonatal hypocalcemia, biochemical parameters in neonates

Neonatal hyperbilirubinemia affects nearly 80% preterm and 60% term babies during initial weeks of life.¹ About 6.1% term babies have a serum bilirubin over 12.9 mg/dL and 3% of them have levels over 15 mg/dL at the time of admission. Untreated severe unconjugated hyperbilirubinemia is potentially neurotoxic.² Premature infants when compared to term neonates have higher frequency of hyperbilirubinemia necessitating intervention.³ Phototherapy (PT) prevents rise of bilirubin to dangerous levels, which may cause neurological damage.⁴ Phototherapy can produce adverse effects such as dehydration, temperature instability, skin rashes, loose stools, retinal damage, hypocalcemia, bronze baby syndrome, redistribution of blood flow and genitotoxicity. In addition, limited evidences are available

that depict the effect of PT on various biochemical parameters including serum calcium, bilirubin profile, serum total protein, albumin, urea, creatinine, serum electrolytes in neonates. Bilirubin encephalopathy is the most serious complication of jaundice and PT is the current modality of choice for treatment of unconjugated hyperbilirubinemia. Like any other treatment PT also has its own side effects but they are not fatal and have no known long-term effects. One of its possible side effects is electrolyte imbalance. Hence, the present study was conducted with the objective to assess the level of various biochemical parameters like serum calcium, serum sodium, serum potassium, serum chloride, serum urea and serum creatinine, serum total protein and serum albumin in addition to serum bilirubin before PT and after completion of ≥ 48 hours of PT in full-term neonates with unconjugated hyperbilirubinemia.

MATERIAL AND METHODS

This hospital-based prospective comparative observational study was conducted in the Department of Pediatrics, SMS Medical College, Jaipur, from June 2019 to July 2020, after taking requisite clearance from the research board of the institute. Full-term neonates with unconjugated hyperbilirubinemia requiring PT for ≥ 48 hours were included in the study after getting written informed consent from the parents. Babies born

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to mothers with diabetes, with onset of jaundice within 24 hours of age, with perinatal asphyxia (Apgar <4 at 1 min of birth), who had exchange transfusion, with jaundice having hypocalcemia and other biochemical parameter abnormalities prior to start of PT or babies born with apparent major congenital anomalies, small for gestational age (SGA) and large for gestational age (LGA), PT duration <48 hours and those having pathological jaundice were excluded.

Sample size was calculated at 95% confidence level, alpha error of 0.05, assuming standard deviation (SD) of 22.7 mEq/L in sodium in neonates with hyperbilirubinemia with pre- and post-PT; to get a minimum difference of at least 5 mEq/L in serum sodium level, pre- and post-PT, at study power of 80%, the required sample size was at least 154 term neonates with unconjugated hyperbilirubinemia receiving PT $\geq$ 48 hours. Data were recorded on a proforma. The data analysis was computer based; SPSS-22 was used for analysis. For categoric variables, Chi-square test was used. For continuous variables, independent samples *t*-test was used. $P < 0.05$ was considered significant.

A total of 154 babies were enrolled in the study. Two venous blood samples were collected with all aseptic precautions; first before start of PT and second after $\geq$ 48 hours of continuous PT. These blood samples were immediately sent to the laboratory for estimation of serum bilirubin, urea, creatinine, electrolytes (sodium, potassium and chloride), calcium, total protein and albumin.

The patients were divided into two groups; one group included neonates receiving PT for 48 hours and the second group had neonates who received PT for 48 to 72 hours. The comparative effect of PT was assessed on the various biochemical parameters in both groups. Blue light LED (light-emitting diode) PT was used and distance between LED bulb and baby was kept 30 cm. Eyes and genitalia of baby were covered with eye shield and diaper, respectively. The baby was taken out only for feeding.

Total and direct serum bilirubin were measured by Diazo method in Randox Rx Imola chemistry analyzer. Serum calcium was measured by Arsenazo III method in Randox Rx Imola chemistry analyzer. Standard reference value was taken as 8-11 mg/dL. Serum electrolytes (sodium, potassium and chloride) were measured by Ion selective electrodes analyzer in EasyLyte® Plus REF 2121 machine. Standard reference values were taken as sodium 135-145 mEq/L, potassium 3.5-4.5 mEq/L and chloride 92-114 mg/dL. Serum urea was measured by

urease GLDH method in Randox Rx Imola chemistry analyzer. Standard reference value was taken as 10-45 mg/dL. Serum creatinine was measured by Jaffe method in Randox Rx Imola chemistry analyzer. The standard reference value was taken as 0.42-1.2 mg/dL. Serum total protein was measured by colorimetric biuret test by Randox Rx Imola chemistry analyzer. Standard reference value was taken as 4.6-7.4 g/dL. Serum albumin was measured by Bromocresol Green (BCG) end point method in Randox Rx Imola chemistry analyzer. Standard reference value was taken as 3.5-5.5 g/dL.

RESULTS

The baseline characteristics of study participants are depicted in Table 1.

The baseline demographic and biochemical profile of subjects is depicted in Table 2.

Comparative analysis of various biochemical parameters like bilirubin, urea, creatinine, sodium, potassium, chloride, calcium, total protein and albumin revealed that all these parameters were significantly reduced after PT. This difference in parameters was statistically significant. On the other hand, there was statistically nonsignificant difference in corrected calcium ($p = 0.945$) (Tables 3 and 4).

Out of 114 patients (PT till 48 hours), 27 patients (23.68%) developed hypocalcemia ($p < 0.0001$), while out of 40 patients (PT till 48-72 hours) 9 patients (22.50%) developed hypocalcemia ($p = 0.002$). Difference in both groups were statistically significant. Hypocalcemia was observed in 20 patients (28.99%) 3 days old as compared to 7 patients (15.56%) aged >3 days receiving PT till 48 hours. The difference was not statistically significant ($p = 0.118$). Similar findings were observed in patients receiving PT till 48 to 72 hours in 5 patients (31.25%) 3 days old as compared to 4 patients (16.67%) >3 days age. The difference was not statistically significant ($p = 0.441$) (Scatter diagram 1).

There was a significant positive correlation observed between serum calcium before and after PT till 48 hours (Coefficient of correlation = 0.043, $p = 0.025$) (Scatter diagram 2).

It suggests a positive correlation but p value was nonsignificant ($p = 0.140$) and coefficient of determination $R^2 = 0.056$.

Change in mean values of serum total bilirubin level, serum urea, serum creatinine, serum protein, serum albumin, serum calcium before and after PT (PT till 48 hours) and (PT till 48-72 hours) were found to be

CLINICAL STUDY

Table 1. Baseline Characteristics of Study Participants (n = 154)

Residential status	Urban-85 (55.19%)		Rural-69 (44.81%)
Male:Female (ratio)	Males-103 (66.88%)	Females-51 (33.12%)	Ratio (M:F) = 2.019
Age- and gender-wise distribution	Male (103)	Female (51)	100%
1-2 days	40 (38.83%)	10 (19.51%)	50 (32.47)
3-4 days	43 (41.75%)	28 (54.90%)	71 (46.10)
5-6 days	16 (15.53%)	12 (23.53%)	28 (18.18)
>6 days	04 (3.88%)	01 (1.96%)	5 (3.25)
Onset of jaundice	Male (103)	Female (51)	Total frequency (100%)
2-3 days	23 (21.90%)	13 (25.49%)	36 (23.38)
4-5 days	61 (58.10%)	27 (52.94%)	88 (57.14)
6-7 days	19 (18.10%)	11 (21.57%)	30 (19.48)
Place of delivery	Inborn-103 (66.88%)	Outborn-51 (33.12%)	Total (154)
Mode of delivery	Vaginal delivery-65 (42.21%)	Cesarean section-89 (57.79%)	Total (154)

Table 2. Biochemical Parameters of Study Population (n = 154) at Admission

Parameters	Mean	SD	Median	Range
Age (days)	3.30	1.68	3.00	1.00-10.00
Day of onset of jaundice	4.51	1.28	4.00	2.00-10.00
Duration of PT (hours)	52.22	8.27	48.00	48.00-72.00
Total serum bilirubin (mg/dL)	18.55	2.62	17.84	14.10-24.30
Serum urea (mg/dL)	27.65	6.76	28.00	10.00-45.00
Serum creatinine (mg/dL)	0.77	0.18	0.77	0.42-1.20
Serum sodium (mEq/L)	139.77	3.15	139.50	135.0-145.00
Serum potassium (mEq/L)	4.42	0.50	4.45	3.50-5.50
Serum chloride (mg/dL)	106.46	4.54	107.00	92.00-114.00
Serum calcium (mg/dL)	9.07	0.65	8.90	8.00-10.80
Corrected calcium (mg/dL)	9.28	0.68	9.20	8.00-11.00
Total protein (g/dL)	5.60	0.63	5.50	4.60-7.40
Albumin (g/dL)	3.73	0.21	3.70	3.5-5.5

statistically significant. Out of 154 patients, 114 patients received PT till 48 hours and 40 patients received PT till 48 to 72 hours. There was a significant decline in serum urea levels after PT in both groups, but the decline was within defined range.

Out of 114 patients (PT till 48 hours), 10 patients (8.77%) developed hypoproteinemia ($p = 0.001$); this difference

was statistically significant, while out of 40 patients (PT till 48-72 hours), only 1 patient (2.50%) developed hypoproteinemia ($p = 0.314$); this difference was nonsignificant statistically.

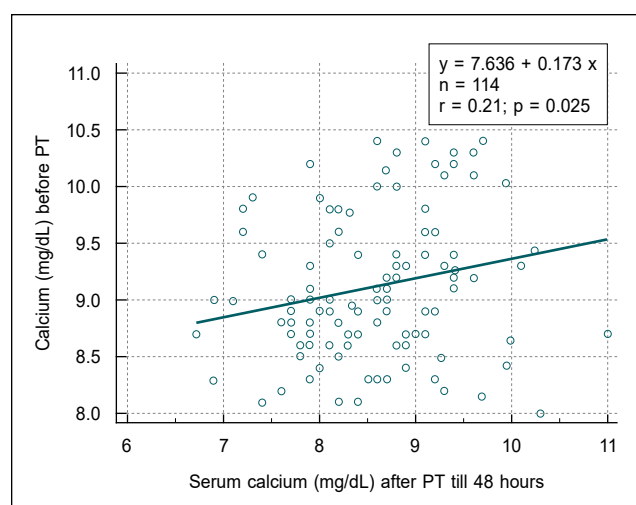
Out of 114 patients (PT till 48 hours), 38 patients (33.33%) developed hyponatremia ($p < 0.0001$). Similarly, out of 40 patients (PT till 48-72 hours),

Table 3. Biochemical Parameters Before and After PT (n = 154)

Biomarker	Before	After	t value	P value
Serum bilirubin (Total)	18.55 ± 2.62	9.38 ± 2.75	43.14	<0.0001
Serum urea	27.65 ± 6.76	21.66 ± 7.17	8.65	<0.0001
Serum creatinine	0.77 ± 0.18	0.65 ± 0.20	6.63	<0.0001
Serum sodium	139.77 ± 3.15	137.69 ± 5.24	4.59	<0.0001
Serum potassium	4.42 ± 0.50	4.17 ± 0.52	5.75	<0.0001
Serum chloride	106.46 ± 4.54	105.13 ± 5.68	2.23	0.026
Serum calcium	9.07 ± 0.65	8.58 ± 0.81	6.58	<0.0001
Corrected calcium	9.28 ± 0.68	9.29 ± 0.77	0.06	0.945
Total protein	5.60 ± 0.63	5.23 ± 0.61	8.20	<0.0001
Albumin	3.73 ± 0.21	3.10 ± 0.43	16.90	<0.0001

Table 4. Correlation of Parameters with Duration of PT

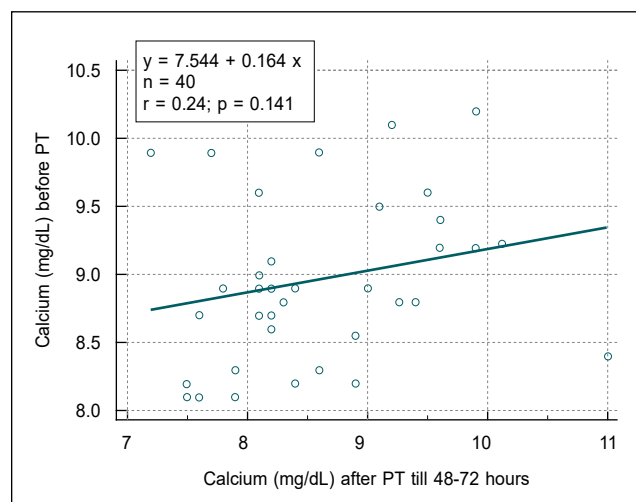
Parameters	PT till 48 hours (n = 114)		P value	PT till 48-72 hours (n = 40)		P value
	Before PT	After PT		Before PT	After PT	
Serum urea (mg/dL)						
10-45 mg/dL	114 (100%)	114 (100%)	NA	40 (100%)	40 (100%)	NA
<10 or >45 mg/dL	—	—		00	00	
Serum creatinine (mg/dL)						
0.42-1.2 mg/dL	114 (100%)	104 (91.23%)	0.001	40 (100%)	39 (97.50%)	0.314
<1.2 mg/dL		10 (8.77%)		00	01 (2.50%)	
Serum sodium						
135-145 mEq/L	114 (100%)	76 (66.67%)	<0.0001	40 (100%)	30 (75.00%)	0.001
<135 mEq/L		38 (33.33%)		—	10 (25.00%)	
Serum potassium						
3.5-5.5 mEq/L	114 (100%)	105 (92.11%)	<0.0001	40 (100%)	37 (92.50%)	0.0002
<3.5 mEq/L		09 (7.89%)		—	03 (7.50%)	
Serum chloride (mg/dL)						
92-114	114 (100%)	109 (95.61%)	<0.0001	40 (100%)	36 (90.00%)	0.115
>114		05 (4.39%)		—	04 (10.00%)	
Serum calcium (mg/dL)						
8.0-11 (mg/dL)	114 (100%)	87 (76.32%)	<0.0001	40 (100%)	31 (77.50%)	0.002
<8.0 (mg/dL)	—	27 (23.68%)		—	09 (22.50%)	
Total protein						
4.6-7.4 g/dL (Normal)	114 (100%)	100 (87.72%)	<0.0001	40 (100%)	35 (87.50%)	0.054
<4.6 g/dL	—	14 (12.28%)		00	05 (12.50%)	
Albumin						
3.5-5.5 g/dL (Normal)	114 (100%)	20 (17.54%)	<0.0001	40 (100%)	13 (32.50%)	<0.0001
<3.5 g/dL	—	94 (82.46%)		00	27 (67.50%)	



Scatter diagram 1. Serum calcium before and after PT till 48 hours (n = 114).

Regression Equation (n = 114). Coefficient of determination $R^2 = 0.04387$

$y = 7.6358 + 0.1729 x$					
Parameter	Coefficient	SE	95% CI	t value	P value
Intercept	7.6358	0.6581	6.3319 to 8.9396	11.6033	<0.0001
Slope	0.1729	0.07626	0.02177 to 0.3240	2.2668	0.0253

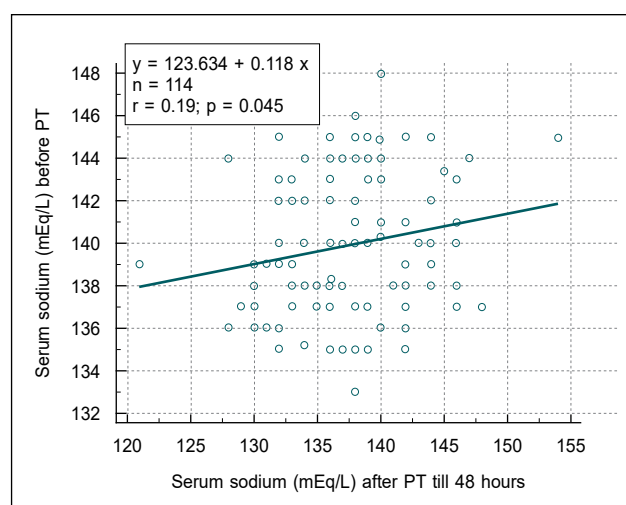


Scatter diagram 2. Serum calcium before and after PT till 48-72 hours (n = 40).

Regression Equation

$y = 7.5444 + 0.1642 x$					
Parameter	Coefficient	SE	95% CI	t value	P value
Intercept	7.5444	0.9388	5.6440 to 9.4449	8.0365	<0.0001
Slope	0.1642	0.1092	-0.05684 to 0.3851	1.5037	0.1409

10 patients (25%) developed hyponatremia ($p = 0.001$). In both groups, the difference was statistically significant (Scatter diagram 3).



Scatter diagram 3. Serum sodium before and after PT till 48 hours (n = 114).

Regression Equation

$y = 123.6336 + 0.1184 x$					
Parameter	Coefficient	SE	95% CI	t value	P value
Intercept	123.6336	8.0217	107.7397 to 139.5275	15.4125	<0.0001
Slope	0.1184	0.05837	0.002717 to 0.2340	2.0279	0.0449

A significant positive correlation was observed between serum sodium before and after PT till 48 hours (Coefficient of correlation = 0.035, $p = 0.04$).

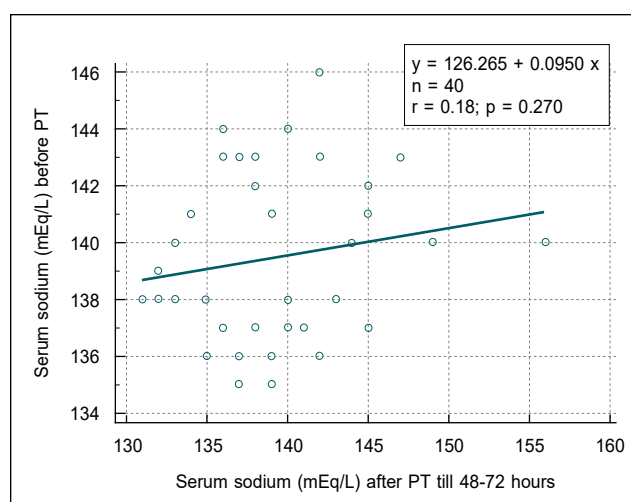
Scatter diagram 4 shows the correlation between serum sodium before and after PT till 48 to 72 hours. It depicts a positive correlation but p value was nonsignificant ($p = 0.27$) and coefficient of determination $R^2 = 0.031$.

Out of 114 patients (PT till 48 hours), 9 patients (7.89%) developed hypokalemia ($p < 0.0001$) and out of 40 patients (PT till 48-72 hours), 12 patients (30%) developed hypokalemia ($p = 0.0002$). This difference was statistically significant in both groups (Scatter diagram 5).

Scatter diagram 5 shows the significant positive correlation between serum potassium before and after PT till 48 hours with significant p value ($p < 0.0001$) and coefficient of determination $R^2 = 0.18$.

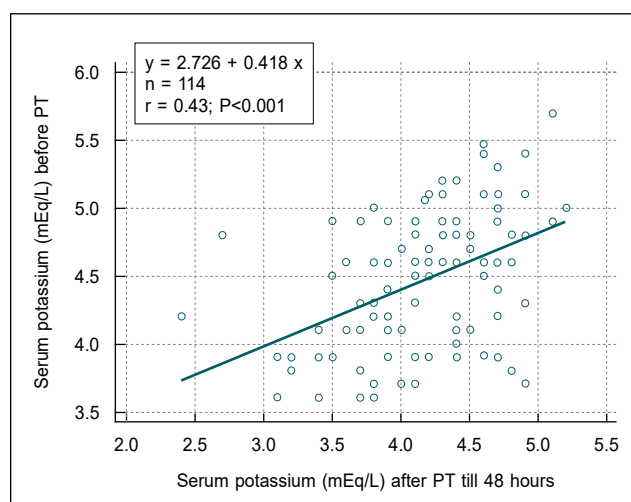
Scatter diagram 6 shows the significant positive correlation between serum potassium before and after PT till 48 to 72 hours with significant p value ($p < 0.0001$) and coefficient of determination $R^2 = 0.38$.

Out of 114 patients (PT till 48 hours), 5 patients (4.3%) developed hyperchloremia ($p < 0.0001$), the difference was statistically significant, while out of 40 patients, 4 patients (10%) developed hyperchloremia ($p = 0.115$), the difference was insignificant statistically.



Scatter diagram 4. Serum sodium before and after PT till 48-72 hours (n = 40).

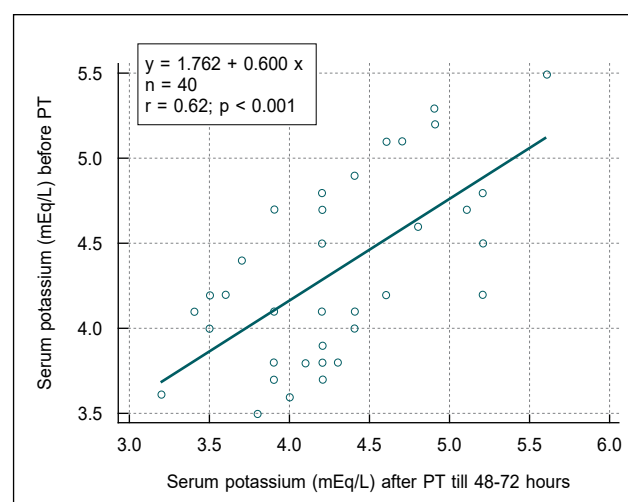
Regression Equation					
$y = 126.2652 + 0.09503 x$					
Parameter	Coefficient	SE	95% CI	t value	P value
Intercept	126.2652	11.7954	102.3867 to 150.1438	10.7046	<0.0001
Slope	0.09503	0.08495	-0.07695 to 0.2670	1.1186	0.2703



Scatter diagram 5. Potassium before and after PT till 48 hours (n = 114).

Regression Equation					
$y = 2.7263 + 0.4184 x$					
Parameter	Coefficient	SE	95% CI	t value	P value
Intercept	2.7263	0.3479	2.0370 to 3.4157	7.8360	<0.0001
Slope	0.4184	0.08335	0.2532 to 0.5835	5.0198	<0.0001

Out of 114 patients (PT till 48 hours), 14 patients (12.28%) developed hypoproteinemia. This difference was statistically significant ($p < 0.0001$). Out of 40 patients (PT till



Scatter diagram 6. Serum potassium before and after PT till 48-72 hours (n = 40).

Regression Equation					
$y = 1.7620 + 0.6001 x$					
Parameter	Coefficient	SE	95% CI	t value	P value
Intercept	1.7620	0.5302	0.6886 to 2.8353	3.3232	0.0020
Slope	0.6001	0.1229	0.3513 to 0.8488	4.8836	<0.0001

48-72 hours), 5 patients developed hypoproteinemia, this difference was statistically insignificant ($p = 0.054$). Out of 114 patients (PT till 48 hours), 94 patients (82.46%) developed hypoalbuminemia ($p < 0.0001$) and out of 40 patients (PT till 48-72 hours), 27 patients (67.50%) developed hypoalbuminemia ($p < 0.0001$). The difference in both groups were statistically significant.

DISCUSSION

Out of 154 patients, 103 patients (66.68%) were inborn and 51 patients (32.12%) were outborn. Most of the neonates (46.10%) enrolled in this study were in the age group 3 to 4 days of life. Males were (66.88%) with male:female ratio being 2.01:1. The study population consisted of 85 urban infants (55.19%) and 69 rural infants (44.81%). About 89 (57.79%) neonates were lower-segment cesarean section (LSCS) delivered. Khan et al (2016) observed that the mean age of the neonates presenting with neonatal hyperbilirubinemia was 8.35 ± 6.74 days.⁵ Karan et al also observed preponderance to male baby with male and female ratio being 1.45:1.12; out of 74 subjects.⁶ In Kale et al (2020) study, out of 100; 35% neonates had normal vaginal delivery and 65% were delivered by cesarean section and the mean age on the onset of hyperbilirubinemia was 4.73 ± 1.56 days.⁷

In present study, 50 patients were admitted in first 2 days of life. Of these, 40 patients (80%) were male and

10 were female (20%). On the other hand, 71 patients were admitted between 3rd and 4th days of life, out of which 43 were male (60.56%) and 28 were female (39.43%). This male preponderance was probably due to the prejudiced care of male baby.

All biochemical parameters viz. bilirubin, urea, creatinine, sodium, potassium, chloride, calcium, albumin, total protein were significantly reduced after PT. But, there was a statistically nonsignificant decline in corrected calcium post-PT.

The mean serum total bilirubin levels before and after PT (PT till 48 hours) were 17.33 ± 1.69 and 8.70 ± 2.53 mg/dL, respectively; this change was found to be statistically significant ($p < 0.0001$). Similarly, mean serum total bilirubin levels before and after PT (PT till 48-72 hours) were 22.02 ± 1.40 and 11.32 ± 2.46 mg/dL, respectively. This difference was also found to be significant statistically ($p < 0.0001$).

Suneja et al (2018) found that the levels of bilirubin profile were elevated significantly in patients prior to PT and returned to normal generally after 48 hours to 96 hours of PT.⁸ Shahsavari et al (2017) also reported that in patients who underwent PT for hyperbilirubinemia, bilirubin levels were significantly declined after PT.⁹

In present study, the mean serum urea serum levels pre- and post-PT for 48 hours were 27.01 ± 6.49 and 21.38 ± 6.99 mg/dL, respectively, this difference was statistically significant ($p < 0.0001$). Similarly, mean serum urea levels pre- and post-PT for 48 to 72 hours were 29.47 ± 7.26 and 22.47 ± 7.69 mg/dL, respectively, this difference was also statistically significant ($p < 0.0001$). In the present study, out of 154 patients, 114 patients receiving PT for 48 hours and 40 patients receiving PT for 48 to 72 hours, there was significant decline in urea levels but the levels were within normal defined range.

Mean serum creatinine level pre- and post-PT (PT till 48 hours) were 0.75 ± 0.18 and 0.61 ± 0.20 mg/dL, respectively, this difference was statistically significant ($p < 0.0001$). Similarly, mean serum creatinine level before and after PT (PT till 48-72 hours) were 0.83 ± 0.17 mg/dL and 0.74 ± 0.19 mg/dL, respectively, this difference was also statistically significant ($p = 0.013$). Out of 114 patients (PT till 48 hours) 10 patients (8.77%) developed hypocreatinemia ($p = 0.001$), this difference was statistically significant while out of 40 patients (PT till 48-72 hours), 1 patient (2.50%) developed hypocreatinemia ($p = 0.314$), this difference was nonsignificant statistically. Serum creatinine concentration is usually the sole available marker of glomerular filtration rate (GFR) in clinical practice.¹⁰⁻¹⁴

Our results are consistent with the study done in recent past, depicting positive association between serum total bilirubin and serum creatinine.

In present study, the mean sodium levels declined from 139.88 ± 3.25 mEq/L to 137.32 ± 5.17 mEq/L after 48 hours of PT; the changes were statistically significant ($p < 0.001$). In contrast after 48 to 72 hours PT, the mean sodium levels declined from 139.45 ± 2.85 mEq/L to 138.74 ± 5.36 mEq/L; the changes were found to be statistically nonsignificant ($p = 0.433$). Hyponatremia had been postulated to emerged as side effect of PT due to impaired absorption or due to insufficient fluid replacements.¹⁰⁻¹⁴

Out of 114 patients (PT till 48 hours), 38 patients (33.33%) developed hyponatremia; this change was statistically significant ($p < 0.0001$). Similarly, out of 40 patients (PT till 48-72 hours), 10 patients (25%) developed hyponatremia. This difference was also statistically significant. In our study, any patient did not developed symptoms of hyponatremia. Purohit et al (2020) found that the mean sodium decreased from 146.6 ± 6.2 mEq/L to 141.3 ± 6.1 mEq/L.¹⁰ Rangaswamy et al (2019)¹¹ observed that the incidence of sodium changes was found to be statistically significant after PT ($p < 0.01$), but any neonate didn't develop any signs or symptoms of hyponatremia. Reddy et al (2015) found that the incidence of hyponatremia following PT was higher when the duration of PT was >48 hours when compared to <48 hours.¹³

In present study, the mean potassium level declined from 4.46 ± 0.49 mEq/L to 4.14 ± 0.50 mEq/L after 48 hours of PT; these changes were significant statistically ($p < 0.001$). In contrast after 48 to 72 hours PT, the mean potassium levels declined from 4.33 ± 0.53 mEq/L to 4.28 ± 0.55 mEq/L; these changes were statistically insignificant ($p < 0.507$). Hypokalemia was observed as a side effect of PT due to impaired absorption or due to insufficient fluid replacements. Past studies have stated that absorption of water, sodium chloride and potassium was significantly impaired in the patients receiving PT.^{12,13}

Out of 114 patients (PT till 48 hours), 9 patients (7.89%) developed hypokalemia ($p < 0.0001$) and out of 40 patients (PT till 48-72 hours), 12 patients (30%) developed hypokalemia ($p = 0.0002$). In our study, no patient developed symptomatic hypokalemia. Purohit et al (2020) found that the mean potassium declined from 4.7 ± 0.47 mEq/L to 4.2 ± 0.51 mEq/L.¹⁰ Rangaswamy et al (2019) observed that the incidence of potassium changes was found to be statistically significant after

PT ($p < 0.01$) but none of the neonates developed any signs of hypokalemia.¹¹ In yet another study, Reddy et al (2015) found no significant changes in potassium level following PT probably because of difference in study settings.¹³

Mean serum chloride levels before and after PT (PT till 48 hours) were 106.12 ± 4.54 and 104.51 ± 5.64 mg/dL, respectively; this change was found to be statistically significant ($p = 0.023$). While the mean serum chloride levels before and after PT (PT till 48-72 hours) were 107.42 ± 4.46 and 106.89 ± 5.48 mg/dL, respectively; the difference was statistically nonsignificant ($p = 0.638$). Similar to this finding, Reddy et al (2015) also reported no significant changes in chloride levels following PT in neonates with hyperbilirubinemia. Currently, there is lack of adequate literature regarding effects of PT on electrolytes.¹³

In present study, the mean calcium levels reduced from 9.12 ± 0.67 mEq/L to 8.59 ± 0.81 mEq/L after 48 hours of PT ($p < 0.001$). Similarly after 48 to 72 hours PT, the mean calcium levels were declined from 8.94 ± 0.58 mEq/L to 8.55 ± 0.84 mEq/L ($p = 0.009$), these changes were found to be statistically significant in both groups. This effect may be attributed to increased urinary calcium excretion. In addition, PT can also affect calcium homeostasis by inhibiting pineal secretion of melatonin, which blocks the effect of cortisol on bone calcium, consequently leading to hypocalcemia. Cortisol also exerts a direct hypocalcemic effect by increasing bone uptake of calcium as well.¹⁴

Out of 114 patients (PT till 48 hours), 27 patients (23.68%) developed hypocalcemia ($p < 0.0001$). Similarly, out of 40 patients (PT till 48-72 hours), 9 patients (22.50%) developed hypocalcemia ($p = 0.002$), the changes in both groups were statistically significant. Purohit et al (2020) found that the mean calcium decreased from 9.4 ± 0.73 mg/dL to 8.4 ± 0.68 mg/dL ($p < 0.05$).¹⁰ Khan et al (2016) found that serum calcium level before and after 24 hours of initiating PT was 8.73 ± 0.68 and 7.47 ± 0.82 mg/dL, respectively. Frequency of hypocalcemia, in term jaundiced neonates, receiving PT were observed in 22.76% of neonates.⁵

In the present study, among the patients receiving PT for 48 hours, majority were 3 days old (69/114) while 45/114 patients were >3 days old. Prevalence of hypocalcemia was observed in 20 of the of 3 days old patients (28.99%) and 7 patients (15.56%) >3 days old. Difference was statistically nonsignificant ($p = 0.118$). While on other hand, in patients receiving PT for 48 to 72 hours, in both groups 3 days (16/40 patients) and

>3 days old (24/40) the difference was nonsignificant ($p = 0.441$).

In the present study, mean serum calcium levels in 3 days old neonates before and after PT for 48 hours were 9.09 ± 0.66 and 8.55 ± 0.90 mg/dL, respectively ($p < 0.0001$). Similarly, in >3 days old neonates, the mean calcium levels before and after PT were 9.16 ± 0.68 and 8.65 ± 0.66 mg/dL, respectively ($p = 0.0002$). In both groups, decline in mean calcium was statistically significant.

While in patients receiving PT for 48 to 72 hours, mean calcium levels in 3 days old babies before and after PT were 8.87 ± 0.57 and 8.44 ± 0.69 , respectively. Difference was statistically significant ($p = 0.28$). In contrast, in >3 days old babies, the mean calcium levels before and after PT were 9.00 ± 0.59 and 8.63 ± 0.93 mg/dL, respectively. This difference was statistically insignificant ($p = 0.095$). Possible explanation being effective establishment of feeding in neonates during late phase of life.

The present study revealed that in male patients receiving PT for 48 hours, the mean serum calcium levels before and after PT were 9.03 ± 0.63 and 8.46 ± 0.71 mg/dL, respectively; the difference was statistically significant ($p < 0.0001$). In contrast in female babies receiving PT for 48 hours, the mean calcium levels before and after PT were 9.25 ± 0.70 and 8.97 ± 1.00 mg/dL, respectively; the difference was statistically insignificant ($p = 0.106$). In male patients receiving PT for 48 to 72 hours, the mean calcium levels before and after PT were 8.47 ± 0.44 and 7.82 ± 0.32 mg/dL, respectively ($p = 0.004$). Similarly, in female babies receiving PT for 48 to 72 hours, the mean calcium levels before and after were 9.01 ± 0.56 and 8.43 ± 0.46 mg/dL, respectively; ($p = 0.037$) significant statistically. In our study, all patients who developed hypocalcemia were asymptomatic.

Goyal et al (2018) found statistically significant difference between pre- and post-PT serum calcium levels.¹⁵ Rozario et al (2017) also found statistically significant decline in calcium level after 48-hour PT.¹⁶ Singh et al (2017) observed a significant fall in calcium level in 30% of term and 70% of preterm neonates after 48-hour PT.¹⁷ Reddy et al (2015) found that incidence of hypocalcemia following PT was higher when the duration of PT was >48 hours when compared to <48 hours.^{12,13} In contrast to these studies, Alizadeh-Taheri et al (2013) observed that the prevalence of PT associated hypocalcemia was not so high, probably because of the shorter duration of PT in their study.¹⁸

Out of 114 patients (PT till 48 hours), 14 patients (12.28%) developed hypoproteinemia, the change was

statistically significant ($p < 0.0001$). While out of 40 patients (PT till 48-72 hours), 5 patients (12.50%) developed hypoproteinemia, the change was statistically nonsignificant ($p = 0.054$). Mean serum protein before and after PT (PT till 48 hours) was 5.52 ± 0.60 and 5.16 ± 0.59 g/dL, respectively ($p < 0.0001$). Similarly, mean serum protein before and after PT (PT till 48-72 hours) was 5.81 ± 0.69 and 5.44 ± 0.66 g/dL, respectively ($p = 0.0001$). The difference in both groups was statistically significant.

Out of 114 patients (PT till 48 hours), 94 patients (82.46%) developed hypoalbuminemia ($p < 0.0001$) and out of 40 patients (PT till 48-72 hours), 27 patients (67.50%) developed hypoalbuminemia ($p < 0.0001$). This decline was statistically significant in both groups. The mean serum albumin before and after PT till 48 hours was 3.74 ± 0.21 g/dL and 3.05 ± 0.42 g/dL, respectively ($p < 0.0001$). Similarly, mean serum albumin before and after PT till 48 to 72 hours was 3.70 ± 0.18 and 3.27 ± 0.42 g/dL, respectively ($p < 0.0001$), this decline was statistically significant in both groups. Our study observed a significant decline in total proteins, albumin, which could be the result of photo-oxidation of various substances or structures that occurs as a result of PT.^{12,19-21} Serum calcium and sodium before PT showed weak positive correlation with levels after PT among both the groups (PT till 48 hours as well as PT 48-72 hours). Serum potassium before PT showed moderate positive correlation with levels after PT till 48 hours, and strong positive correlation with levels after PT 48 to 72 hours.

CONCLUSIONS

In the present study, we observed significant reduction in blood urea and serum creatinine levels as beneficial effects of PT along with serum bilirubin. On other hand, we observed other changes like dyselectrolytemia, especially hyponatremia, hypokalemia and hypocalcemia may prove to be alarming for future reference. In our study, none of the patient developed any adverse symptoms of dyselectrolytemia and hypocalcemia. Therefore, this warrants close and more meticulous monitoring of unwanted side effects so that they do not become life-threatening complications. Hence, PT must be used judiciously considering the risk-benefit ratio. In many studies, we found that PT had an effect on these biochemical parameters in preterm babies also, so we recommend much larger studies in preterm babies. We also recommend further studies to compare the parameters in preterm and full-term babies. We also recommend to measure flux of PT in further studies.

Hence, serum calcium, serum electrolyte, blood urea, serum creatinine, serum total protein and albumin must be monitored in each and every patient requiring PT as it was found that serum calcium and electrolyte imbalance is common after PT. Babies should be closely watched for sign and symptoms of hypocalcemia, hyper-/hyponatremia, hyper-/hypokalemia like seizure, tetany, lethargy, arrhythmia, constipation, diarrhea, etc. Parents should be sensitized towards early recognition of jaundice in neonates.

REFERENCES

1. Kliegman RM. Jaundice and hyperbilirubinemia in the New-born. In: Behrman R (Ed.). Nelson Textbook of Pediatrics. 20th Edition. Philadelphia: Elsevier; 2015. pp. 871-5.
2. Gregory ML, Martin CR, Cloherty JP. Neonatal hyperbilirubinemia. In: Cloherty JP, Eichenward EC, Stark AR (Eds.). Manual of Neonatal Care. 7th Edition. Philadelphia: Lippincott Williams and Wilkins; 2015. pp. 304-28.
3. Yadav RK, Sethi RS, Sethi AS, Kumar L, Chaurasia OS. The evaluation of effect of phototherapy on serum calcium level. People's J Sci Res. 2012;5(2):1-4.
4. Eghbalian F, Monsef A. Phototherapy-induced hypocalcemia in icteric newborns. Iran J Med Sci. 2002;27(4): 169-71.
5. Khan M, Malik KA, Bai R. Hypocalcemia in jaundiced neonates receiving phototherapy. Pak J Med Sci. 2016;32(6): 1449-52.
6. Karan S, Rajak P, Basu M. A comparative study of electrolyte changes in newborns delivered after 35 weeks of gestation before and after receiving phototherapy in a tertiary care hospital. IOSR-JDMS. 2020;19(10):27-34.
7. Kale AV, Jadhao PU, Valecha A, Kethepalli S. The effect of phototherapy on serum calcium level in neonates with hyperbilirubinemia: a cross-sectional study. Int J Contemp Pediatr. 2020;7(8):1772-6.
8. Suneja S, Kumawat R, Saxena R. Effect of phototherapy on various biochemical parameters in neonatal hyperbilirubinaemia: a clinical insight. Indian J Neonat Med Res. 2018;6(2):PO13-PO18.
9. Shahsavari G, Firouzi M, Mahdaviard S, Joudaki A, Birjandi M. Phototherapy motivates protein and lipid oxidation in jaundiced term and late term neonates. Caspian J Pediatr Sep. 2017;3(2):248-52.
10. Purohit A, Verma SK. Electrolyte changes in the neonates receiving phototherapy. Int J Contemp Pediatr. 2020;7(8): 1753-7.
11. Rangaswamy KB, Yeturi D, Gowda BL AN, Krishna C, Samyuktha. Study of sodium and potassium changes in term neonates receiving phototherapy. Int J Contemp Pediatr. 2019;6(3):1076-9.
12. Ezzeldin Z, Mansi Y, Abdelhamid TA, Sabry M. The effect of hat on phototherapy-induced hypocalcemia in jaundiced full-term neonates. Dovepress. 2015;5:73-8.

13. Reddy AT, Vani Bai K, Shankar SU. Electrolyte changes following phototherapy in neonatal hyperbilirubinemia. *Int J Sci Res.* 2015;4(7):752-8.
14. American Academy of Pediatrics Subcommittee on Hyperbilirubinemia. Management of hyperbilirubinemia in the newborn infant 35 or more weeks of gestation. *Pediatrics.* 2004;114(1):297-316.
15. Goyal S, Srivastava A, Bhattacharjee P, Goyal I, Malhotra K. Effect of phototherapy on serum calcium levels in neonates receiving phototherapy for neonatal jaundice. *Int J Res Med Sci.* 2018;6(6):1992-5.
16. Rozario CI, Pillai PS, Ranamol T. Effect of phototherapy on serum calcium level in term newborns. *Int J Contemp Pediatr.* 2017;4(6):1975-9.
17. Singh PK, Chaudhuri PK, Chaudhary AK. Phototherapy induced hypocalcemia in neonatal hyperbilirubinemia. *IOSR-JDMS.* 2017;16(4):35-8.
18. Alizadeh-Taheri P, Sajjadian N, Eivazzadeh B. Prevalence of phototherapy induced hypocalcemia in term neonate. *Iran J Pediatr.* 2013;23(6):710-1.
19. Kemper K, Horwitz RI, McCarthy P. Decreased neonatal serum bilirubin with plain agar: a meta-analysis. *Pediatrics.* 1988;82(4):631-8.
20. Bratlid D. Bilirubin toxicity: pathophysiology and assessment of risk factors. *N Y State J Med.* 1991;91:489-92.
21. Singh M, Singh M, Tiwari S. Effect of exchange transfusion in bilirubin and calcium level in neonatal hyperbilirubinemia. *Int J Med Res Rev.* 2015;3(7):733-7.



Rotavirus Hospitalization Linked to Risk of Childhood Autoimmune Diseases

The risk of subsequent childhood autoimmune diseases is elevated in children who have been hospitalized for rotavirus infection, according to a new study from South Korea published in *JAMA Network Open*.¹

This study enrolled 86,157 South Korean children and adolescents, born between 2002 and 2005, who had been hospitalized for rotavirus infection, during the first or second documented episode. An equal number of participants who had not been hospitalized were included as controls. Nearly 60% of the cohort was male. Data for the study from January 2002 to December 2017 was obtained from national register databases. Through this study, researchers aimed to investigate any association between rotavirus infection and the risk of subsequent childhood autoimmune disease, which was also the primary study end point. Those with other autoimmune diseases were not included in the study. The median age of first hospitalization due to rotavirus infection was 1.5 years.

During the follow-up period of 12 years (mean), children who had been admitted to hospitals for rotavirus infection were found to be at a higher risk of developing subsequent autoimmune disease with hazard ratio (HR) of 1.24. Autoimmune diseases were diagnosed in 8.8% children in the hospitalized group and in 7.0% of those not hospitalized. This elevated risk was found to be substantial even when more stringent definitions for exposure and outcomes were used in a multivariable stratified analysis with HR of 1.22.

The association was also found to be significant for the number of hospitalizations and duration of hospitalization; those who had been hospitalized more than once were at greater risk. The HR for a single hospitalization was 1.20, whereas it rose to 1.60 among those with multiple admissions. Those admitted for a duration of more than 5 days were at higher risk of developing autoimmune disease later on with HR of 1.31 and 1.17 for hospitalization ≤ 5 days. Furthermore, rotavirus hospitalization was found to be associated with more than one autoimmune disease on sensitivity analysis. The HR for ≥ 2 autoimmune diseases was 1.51 and it was 1.79 for ≥ 3 disease. A striking association was noted between rotavirus hospitalization and autoimmune diseases such as inflammatory arthritis (HR 1.36), connective tissue disease (HR 1.29), nervous system diseases (HR 1.29), endocrine diseases (HR 1.28) and vasculitis (HR 1.2).

This study illustrates a significant link between hospitalization for rotavirus infection and higher risk for childhood autoimmune disease, including specific autoimmune diseases, during childhood compared to the controls. Physicians should be aware of this interrelationship when managing children who had been hospitalized due to rotavirus infection, especially the very young children. However, since this was an observational study, causality cannot be established.

Reference

1. Ha EK, et al. Rotavirus-associated hospitalization in children with subsequent autoimmune disease. *JAMA Netw Open.* 2023;6(7):e2324532.

An Interesting Case of Pulmonary Tuberculosis with Hypoxemic Respiratory Failure Mimicking Interstitial Lung Disease

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ABSTRACT

Hypoxemic respiratory failure is a rare presentation of active pulmonary tuberculosis (TB). Though tuberculous acute respiratory distress syndrome (ARDS) is well documented in medical literature, non-ARDS respiratory failure is seldom reported in active pulmonary TB. We herein report a case, which posed a diagnostic dilemma as it clinically mimicked interstitial lung disease. Imaging showed unilateral localized smooth interlobular septal thickening along with consolidation without significant mediastinal lymphadenopathy. To the best of our knowledge, this rare radiological finding has not been reported in medical literature as being associated with hypoxemic respiratory failure in pulmonary TB patients.

Keywords: Pulmonary TB, TB, hypoxemic respiratory failure, interlobular septal thickening

Pulmonary tuberculosis (TB) has been recognized as a scourge of humanity since antiquity. The disease continues to ravage much of the developing world and is still the most common infection causing death. One-fourth of the world population is estimated to be infected with *Mycobacterium tuberculosis*, although the distribution is heterogeneous.¹ TB has a myriad of clinical presentations making its diagnosis challenging.

Here we present a rare case of a patient who presented with type 1 respiratory failure and was clinically suspected to have interstitial lung disease but got microbiologically diagnosed with pulmonary TB and improved with antitubercular medications. This case report emphasizes the importance of a high degree of clinical suspicion for pulmonary TB in endemic countries like India.

CASE REPORT

A 74-year-old male farmer with a history of working in a cotton mill for 12 years, never-smoker, presented with complaints of breathlessness on exertion for the last 4 months. The breathlessness was insidious in onset and progressed from Grade 0 on the Modified Medical Research Council (mMRC) dyspnea scale to Grade IV. He gave a history of dry cough for the past 10 years with no diurnal, seasonal or postural variation. There was no history of fever, hemoptysis, weight loss, wheezing, chest tightness, joint pains, rash or Raynaud's syndrome. He had no other medical comorbidities or history of previous TB or severe coronavirus disease 2019 (COVID-19) infection. On evaluation, he was found to have tachycardia (heart rate - 110/min), tachypnea (respiratory rate - 35/min), hypoxemia (oxygen saturation of 72% at room air); the blood pressure was 136/84 mmHg. The patient had pallor with no evidence of clubbing, icterus or peripheral lymphadenopathy.

On auscultation, there were fine end-inspiratory crackles in bilateral lower lung zones with a predominance in the left lower regions of the chest. Arterial blood gas evaluation revealed respiratory alkalosis along with moderate hypoxemia (pH - 7.479, pCO₂ - 26.9 mmHg, pO₂ - 52.9 mmHg, HCO₃⁻ - 24 mmol/L and lactate - 1.2 mmol/L). He was given supplemental oxygen through a face mask at 10 L/min.

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On further evaluation, he had a hemoglobin level of 9.9 g/dL, total leukocyte count of 10,500 cells/ μ L with a differential cell count showing 87% neutrophil, 7% lymphocytes, 3% eosinophils, 3% monocytes and platelets of 1.53 lakh/cu mm. Serum biochemistry revealed urea - 41 mg/dL, creatinine - 0.81 mg/dL, aspartate aminotransferase (AST) - 103 IU/L, alanine aminotransferase (ALT) - 85 IU/L, sodium - 130 mEq/L, potassium - 4.3 mEq/L, total protein - 6.4 g/dL and albumin - 2.1 g/dL.

Chest radiography demonstrated a hyperinflated lung field with reticular opacities in the right upper zone, left upper and middle zones with nonhomogenous air space opacities and features of volume loss in the form of rib crowding in the left upper and middle zone (Fig. 1).

Gram stain and Ziehl-Neelsen (ZN) stain done on induced sputum were negative. The viral markers for human immunodeficiency virus (HIV) and hepatitis B virus (HBV) were negative. High-resolution computed tomography (HRCT) of the chest taken for further evaluation of the patient revealed bilateral apical emphysematous changes with interlobular septal thickening in the left lingula and left lower lobe with consolidation in

in the left lower lobe with no significant mediastinal lymphadenopathy (Fig. 2).

He underwent videobronchoscopy and bronchoalveolar lavage (BAL) was taken from the left lower lobe superior segment. Cartridge-based nucleic acid amplification test (CB-NAAT) done on BAL revealed high levels of *M. tuberculosis* with no rifampicin resistance. BAL Gram stain and ZN stain were negative.

He was diagnosed with microbiologically-confirmed pulmonary TB and was put on first-line antitubercular drugs. He responded well to treatment and was weaned off supplemental oxygen after 6 weeks of starting antitubercular therapy.



Figure 1. Chest radiography (PA view) demonstrating a hyperinflated lung field with reticular opacities in the right upper zone, left upper and middle zone. Left upper and middle zone shows rib crowding along with nonhomogenous air space opacities.

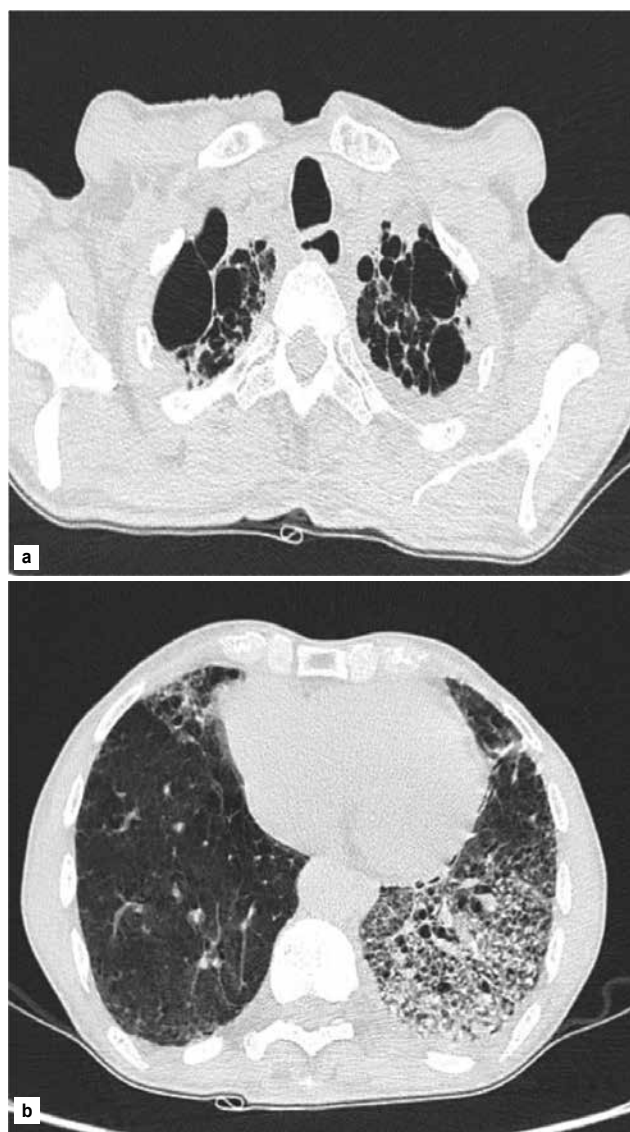


Figure 2. HRCT of the chest demonstrating (a) bilateral apical emphysematous changes (b) interlobular septal thickening in the left lingula and left lower lobe with consolidation in the left lower lobe.

DISCUSSION

India bears the highest burden of TB with an incidence of 210 per 1,00,000 population in 2021.² Acute hypoxemic respiratory failure is a rare presentation of pulmonary TB with an incidence of only 1.7% and mortality nearing 53%.^{3,4}

Our patient was clinically suspected to have acute exacerbation of interstitial lung disease as he had history of significant exposure to cotton dust, chronic dry cough with progressive dyspnea, fine crackles on auscultation and hypoxemia. He had no history of exposure to an active pulmonary TB case, no fever or significant weight loss. Chest radiography prompted us to further evaluate the patient for infective etiology of hypoxemic respiratory failure but the HRCT of the patient added to the existing diagnostic dilemma. CB-NAAT performed on the patient's BAL was crucial in diagnosing the patient.

Even though TB ARDS has been documented in medical literature,⁵ our patient with unilateral localized radiological lesions did not satisfy Berlin's criteria for ARDS. Bronchogenic pulmonary TB, extensive parenchymal consolidation, bilateral smooth interlobular septal thickening and miliary TB have been reported as causes of acute respiratory failure.^{6,7} Our patient had unilateral localized interstitial involvement in the form of interlobular septal thickening along with consolidation, which to the best of our knowledge has not been reported in medical literature as a cause of hypoxemic respiratory failure in pulmonary TB. Interlobular septal thickening demonstrates a lymphatic spread of disease, which is usually associated with enlarged regional lymph nodes. Its absence in our case makes it an extremely rare presentation.

Chronic obstructive pulmonary disease (COPD) is a known risk factor for respiratory failure in active pulmonary TB.⁸ Our patient, even though not spirometrically diagnosed with COPD, had extensive bilateral upper lobe emphysematous changes, which might have predisposed him to develop respiratory failure. In non-miliary pulmonary TB, the most dominant mechanism causing hypoxemia is the destruction of pulmonary parenchyma caused by the inflammatory response against the bacillary antigen of *M. tuberculosis*.⁹ Given the destructive inflammatory response, corticosteroids have been used along with antitubercular drugs for managing TB ARDS. Their use in pulmonary TB with

non-ARDS respiratory failure is controversial. Our patient was managed with first-line antitubercular drugs and was successfully weaned off oxygen within 6 weeks of initiation of therapy.

CONCLUSION

Pulmonary TB can have a myriad of clinical presentations. The clinicians should have high suspicion, especially in endemic countries like India. Unilateral interlobular septal thickening with hypoxemic respiratory failure, though rare, is a possible presentation of pulmonary TB.

Compliance with Ethical Standards

The authors have no conflict of interest to disclose. Informed written consent of the patient was taken for the publication of his medical information.

REFERENCES

1. Cohen A, Mathiasen VD, Schön T, Wejse C. The global prevalence of latent tuberculosis: a systematic review and meta-analysis. *Eur Respir J*. 2019;54(3):1900655.
2. World Health Organization (WHO). Global Tuberculosis Report 2022. Available at: <https://www.who.int/publications/i/item/9789240061729>. Last accessed July 4, 2023.
3. Choi D, Lee KS, Suh GY, Kim TS, Kwon OJ, Rhee CH, et al. Pulmonary tuberculosis presenting as acute respiratory failure: radiologic findings. *J Comput Assist Tomogr*. 1999;23(1):107-13.
4. Agarwal MK, Muthuswamy PP, Banner AS, Shah RS, Addington WW. Respiratory failure in pulmonary tuberculosis. *Chest*. 1977;72(5):605-9.
5. Mohan A, Sharma SK, Pande JN. Acute respiratory distress syndrome (ARDS) in miliary tuberculosis: a twelve year experience. *Indian J Chest Dis Allied Sci*. 1996;38(3):157-62.
6. Kilaru SC, Prasad S, Kilaru H, Anneela RR, Hasan A, Nandury EC. Active pulmonary tuberculosis presenting with acute respiratory failure. *Respirol Case Rep*. 2019;7(7):e00460.
7. Akira M, Sakatani M. Clinical and high-resolution computed tomographic findings in five patients with pulmonary tuberculosis who developed respiratory failure following chemotherapy. *Clin Radiol*. 2001;56(7):550-5.
8. Frame RN, Johnson MC, Eichenhorn MS, Bower GC, Popovich J Jr. Active tuberculosis in the medical intensive care unit: a 15-year retrospective analysis. *Crit Care Med*. 1987;15(11):1012-4.
9. Dannenberg AM Jr. Immune mechanisms in the pathogenesis of pulmonary tuberculosis. *Rev Infect Dis*. 1989;11 Suppl 2:S369-78.

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Doctors' Pride and Ethics: Time to Introspect

ALEYA ANITHA

ABSTRACT

A doctor's role in society is unique. Over years, medical science has advanced; public's expectations have changed; recent pandemic challenged it. Doctors' face is blemished by accusations. An online survey was done to analyze the change in the attitude and respect of the public towards doctors. For this a questionnaire was forwarded through WhatsApp contacts. Data was extracted to an excel sheet and analyzed. The cohort (n = 328) included both doctors (34.1%) and non-doctors (65.9%). Non-doctors comprised of the general public (47.3%) and people who worked with doctors (18.6%). Overall, 93.3% of those surveyed agreed that "doctors deserve respect". More doctors (89.3%) as compared to non-doctors (39.4%) ($p < 0.001$) perceived a reduction in respect towards doctors. On an objective scale (0-10), respect had reduced from an average of 8.55 to 6.76 over 10 years; doctors felt steeper reduction (8.68 to 5.42 [$p < 0.05$]) than non-doctors [8.48 to 7.46 [$p < 0.05$]]. Among doctors, 64.3% opined that "doctors' profession should be considered as service", while 49.1% agreed that "doctors' profession can be a business model". A portion of the public, agreed that medications (61.3%) and investigations (56.1%) were prescribed/advised only when necessary. An important reason for reduction in respect was the perception that the "medical profession is run as a business model" (16.8%). Respondents other than doctors, when given an opportunity, wanted to practice ethically (19.4%).

Keywords: Medical profession, business model, service model, ethics, leadership, introspection

Doctors, the "guardian of health", don a unique role in society; their profession has been tagged "noble". Over the years the medical profession has evolved. It has witnessed several scientific advances, identification of newer diseases, newer branches of speciality services, better treatment modalities, revision in health care policies, to name a few. Health care information available on social media, is easily accessible but rarely authentic. Science and its practitioners have limitations; however, the public's expectations from doctors have increased disproportionately. Instances of aggression, accusations and litigations have tainted the profession.

The thoughtful practitioner, tries to protect "Self", before following the traditional teachings of "Patient First"; this is countered by rants of needless investigations, interventions and medications.

However, the public cannot be criticized, for not understanding. Doctors are faced with dilemma of "service" versus "business" model and haunted by a sense of betrayal or loss of charisma and hence this study was undertaken.

MATERIALS AND METHODS

An online survey analyzing the change in public's opinion about doctors, ethics of medical practice and their respect towards this profession over the years was done.

A questionnaire was forwarded through WhatsApp contacts and groups. Open-end questions in search of "reason behind change in level of respect if any" and "what non-doctors, would want to do if they had an opportunity to step into a doctor's shoe", were asked. Open-ended questions had received more than one response covering different aspects.

All responses were extracted onto an excel sheet, grouped under appropriate common headings and analyzed. Questions, that had responses graded between strongly agreed to strongly disagreed, were simplified during analysis; agreed and strongly agreed were clubbed under "Agreed", and similarly, disagreed and strongly disagreed were clubbed as "Disagreed", while "Neutral" were retained as such.

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RESULTS

There were 328 respondents (Fig. 1). Their average age was 41.3 ± 13.26 years. Among them, 50.6% were males and 34.1% were doctors. Out of 216 (65.9%) who were non-doctors, 61 (18.6%) were working with doctors and 155 (47.3%) were general public.

Among all respondents, 46.3% had visited or interacted with at least 5 doctors for themselves or for their close family members' health; 48.8% agreed that doctors are trained for at least 5 years before they are permitted to start practicing medicine. Approximately 93.3% and 91.5% of all respondents, considered that, "doctors deserve respect" and "doctors are knowledgeable", respectively.

Respect towards doctors in the community was felt to be decreasing by 56.4% of all respondents. Around 89.3% of doctors as compared to 39.4% of non-doctors felt so ($p < 0.01$) (Fig. 1). When respect was assessed objectively on a linear scale from 0 to 10, reduction in the score was

from 8.55 to 6.76 over 10 years. Doctors perceived the reduction to be much steeper than non-doctors (Fig. 1). Change in respect, assessed by subjective response and objectively on a scoring system correlated well ($r = 0.754$).

Out of all respondents, 78.7% felt that "doctors' profession should be considered as service"; (Fig. 2) the general public (87.1%) as compared to doctors (64.3%) ($p < 0.001$) was more likely to consider that doctors' profession should be a service. Forty-six percent of all respondents agreed that "doctors' profession can be run on business model".

Around 49.1% of doctors as compared to 48.4% of general public ($p = 0.78$) agreed that doctors' profession can be run on business model. Medical profession being a business model was considered as a reason for change in respect by 20% of general public. If given an opportunity, 10.3% and 5.2% of the general public would serve poor/needful/do free service and would stop greed, respectively.

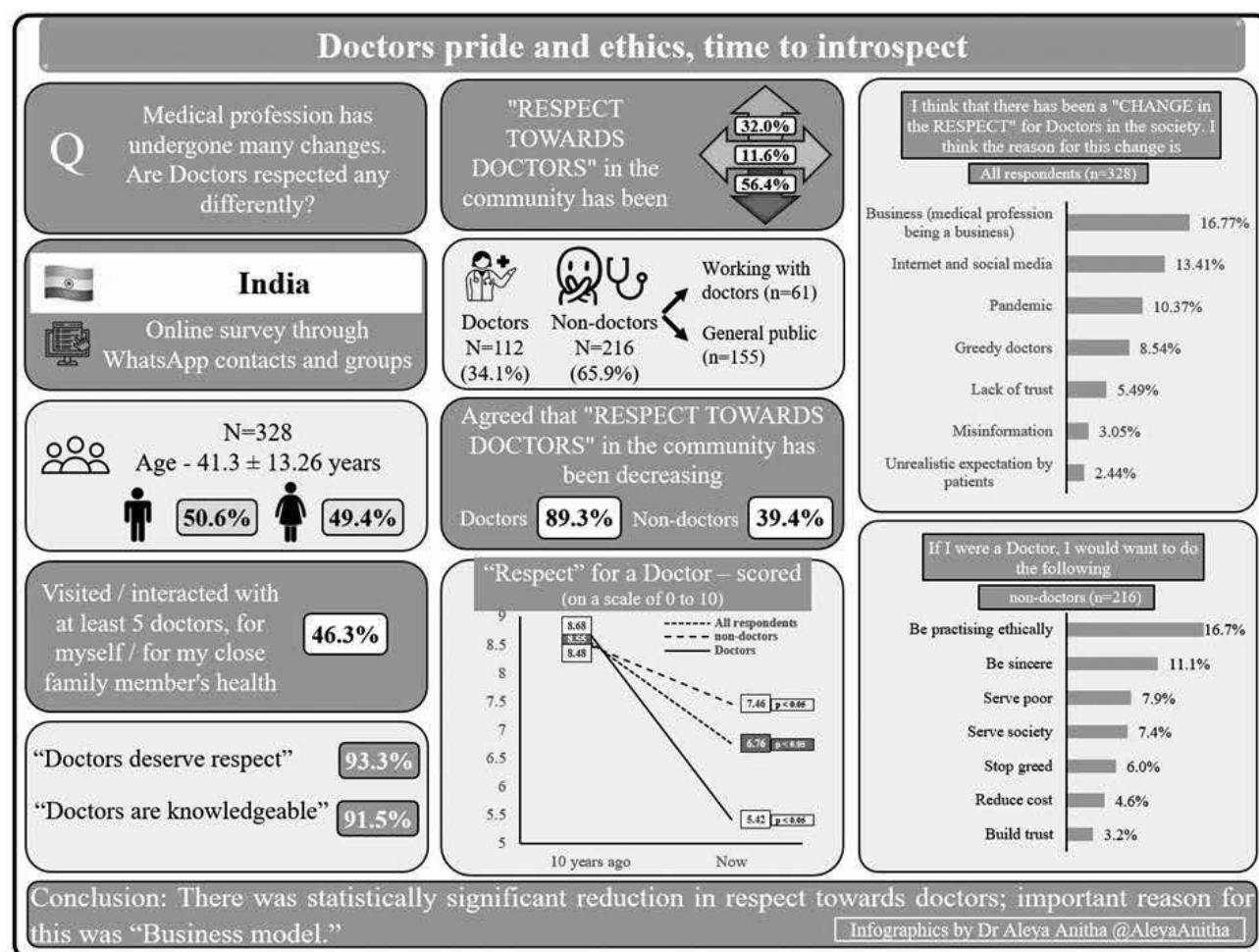


Figure 1. Change in the respect towards doctors over 10 years.

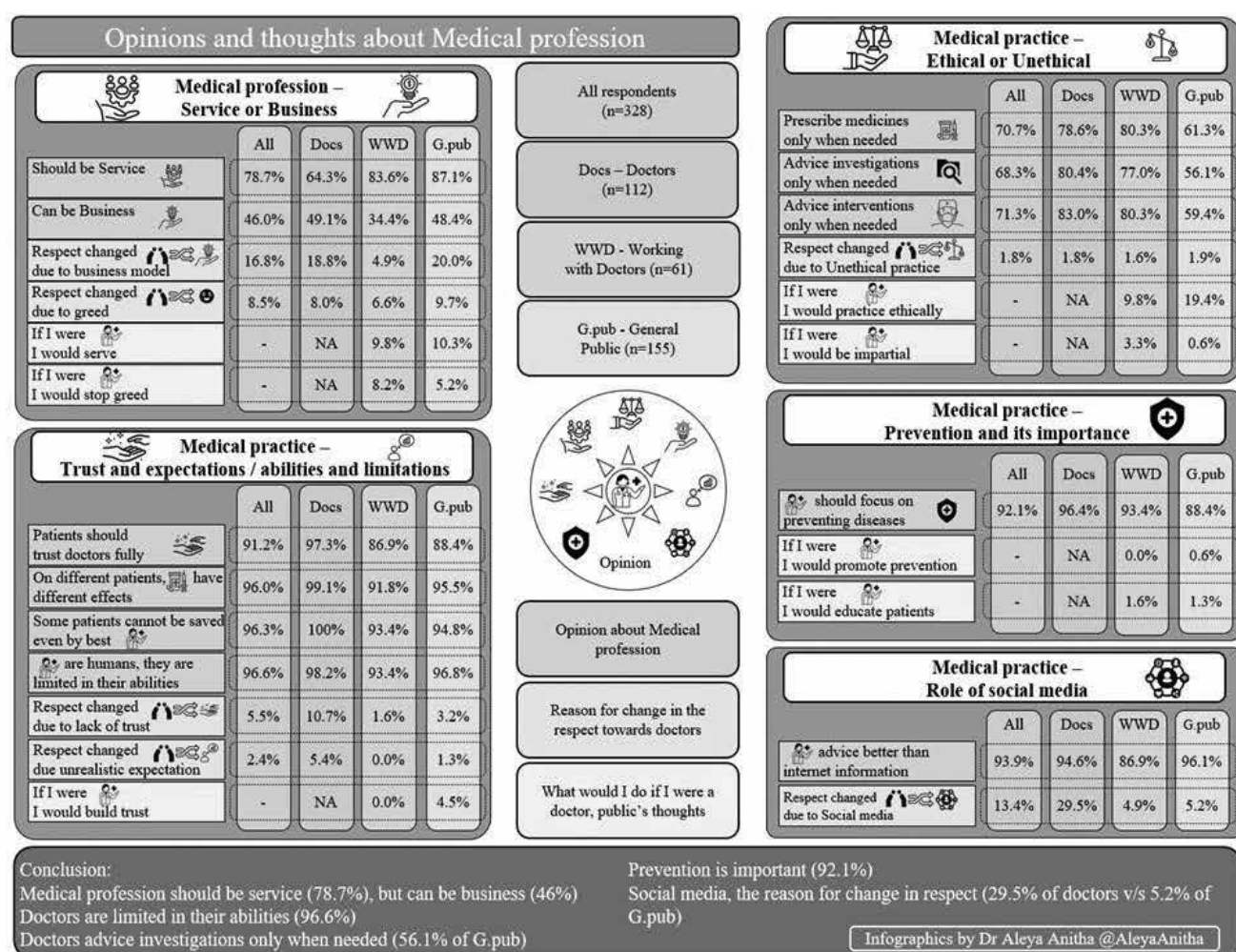


Figure 2. Opinions and thoughts about medical profession.

Among all responders, some agreed that doctors prescribe/advise medications (70.7%), investigations (68.3%) and interventions & procedures (71.3%) “Only when necessary” (Fig. 2). Doctors (78.6%, 80.4% and 83%) and general public (61.3%, 56.1% and 59.4%) also agreed upon doctors prescribing/advising medications, investigations and intervention/procedures, respectively (Fig. 2). While 1.9% of general public considered unethical practice as a reason for change in respect; if given a chance, 19.4% of general public wanted to practice ethically.

Around 97.3% of doctors as compared to 88.4% of general public ($p < 0.01$) agreed that patients should trust doctors (Fig. 2); 95.5% of general public agreed that each patient is different and same medications will have different effect in different individuals, and 94.8% of general public agreed that some patients cannot be saved at times, even when treated by best of doctors. Lack of trust was blamed as the reason for change in respect by 3.2% of general public, and when given an

opportunity only 4.5% of the general public wanted to build trust.

Around 96.4% of doctors agreed that “doctors should focus on preventing diseases also” (Fig. 2); if given an opportunity, 0.6% and 1.3% of the general public would do prevention and patient education, respectively.

Limitation of information available in the social media, and role of the doctor in personalizing treatment was accepted by 96.1% of general public (Fig. 2). Though only 5.2% of general public considered that internet and social media was a cause for change in respect towards doctors; 29.5% of doctors felt so.

Analyzing factors that were indicated as reasons for change in the respect, the coronavirus disease 2019 (COVID-19) pandemic improved the respect towards doctors: while greed, business model, internet and social media, lack of trust and unethical practice were reasons for reduction in respect towards doctors (Fig. 3).

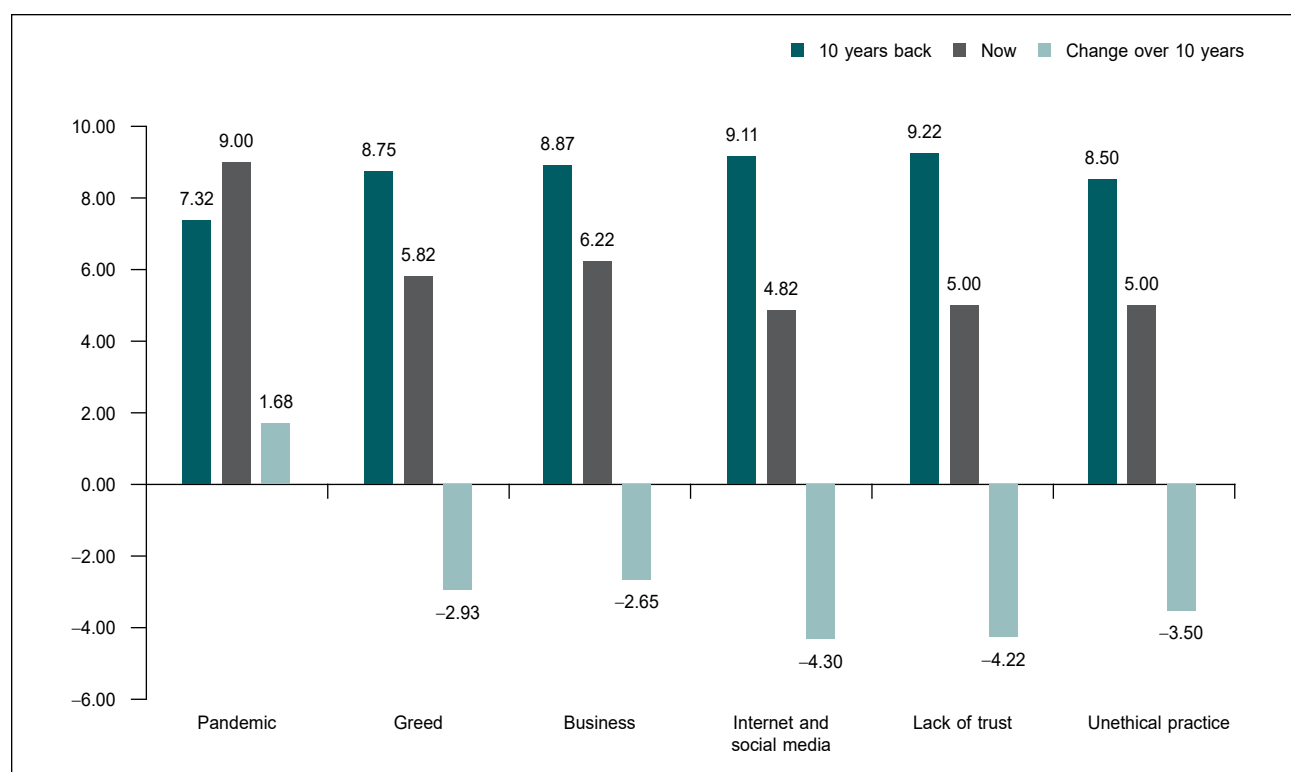


Figure 3. Reasons for change in respect and its magnitude.

DISCUSSION

Doctor's Life Drill

Doctors in India are trained for 4.5 years, with an additional 1 year of internship, where they rotate among departments of medicine including pediatrics, surgery, obstetrics and gynecology and community health. During this period, they work day/night shifts and on holidays too. They miss many meals and several nights sleep. Many years are spent in post-graduation training, to finally become a specialist.

Doctors are first human beings, with families, emotions, personal challenges in life and individual abilities/limitations. As professionals they are bound by legal corpus (medical ethics) mostly written.¹ They also follow many unwritten rules, for example – “Do not drink water in front of a dialysis patient as you may tempt them to breach fluid restrictions”.

Patients visit doctors for ailments, but their approach to doctors, depends on multiple factors like legitimacy and understanding of their problems, affordability, previous experience with doctors, trust and respect towards doctors, peer and media influence.

Due to the large patient load, outpatient consultations typically last for 10 to 15 minutes, sometimes shorter,

during which, doctors must understand the reason for consultation, go through old medical history/ investigations, do a thorough examination, write a note of all the findings in a logical manner, convey the diagnosis and treatment plan and hand over a detailed advice and prescription. If it is the first consultation, an impression, trust and rapport are also built. Inpatient consultations can begin in an emergency room, intensive care unit or a ward. Here, the priority is to pick up diagnosis faster, facilitate quick recovery and discharge in a reasonably stable condition. Investigations requested help narrow down differential diagnoses and monitor recovery. The sicker the patient, more the investigations; this rationale is to prevent loss of time in sequential investigations.

Terms Associated with a Doctor

Here are a few terms that adorn the life of a medical professional, and their dictionary meaning.

“Respect” – a feeling of deep admiration for someone or something elicited by their abilities, qualities or achievements.

“Pride” – a feeling of deep pleasure or satisfaction derived from one's own achievements, the achievements of those with whom one is closely associated or from qualities or possessions that are widely admired.

“Ethics” – moral principles that govern a person’s behavior or the conducting of an activity.

“Trust” – firm belief in the reliability, truth or ability of someone or something.

Respect and Trust

In India, doctors were respected and trusted, as the unfeigned advocates of patients. This resonated in the phrase “Vaidhyo Narayano Harihi”, which translates to “Doctor is God”. It indeed described a doctor who impersonated compassion, empathy, knowledge and selflessness. Undeterred devotion towards doctors, continued till a few decades ago. The family physician was a friend, philosopher and guide.

Moving fast forward to present situation, the medical profession has progressed by leaps and bounds. It has spread its roots to many specialties and sub-specialties and experiences are now shared across continents. Medical profession falls under the ambit of the Consumer Protection Act. Doctors are indicted on counts of corruption, professional negligence and immoral financial gains.² Many cases are won against doctors. This sets a bad precedent as all members of this profession will be seen through this lens. In the present study, we found that there was a reduction in the respect towards doctors, over the last 10 years, and it was significant. Doctors perceived it more than others (Fig. 1). There were many reasons for the change in the respect towards this noble profession (Fig. 3).

Trust reposed in a doctor is associated with better health care seeking, adherence to advice and follow-up, which in turn translates to improved long-term outcomes.³ It is important to remember that trust is fragile, difficult to earn and easy to lose.² Systems trust (trust in the medical profession/health care system) does not equate to interpersonal trust (trust between doctor-patient).² Ideally both should coexist, align parallel and run like wheels of a cart, with the focus fixed on patient’s well-being. Dualities in the medical practice prevents trust from building. Building back trust is not only the need of the hour, but what doctors owe to their patients.²

Conversely, unrealistic expectations are also harmful. In this study, we found that 5.4% of doctors perceived that unrealistic expectation was the reason for change in respect (Fig. 2). About 88.4% of general public agreed that patients should trust the doctors fully and follow them correctly for better patient outcomes. Around 96.8% of the general public agreed that “Doctors are human beings and are limited in their abilities”; while 94.8% of the general public agreed that “Some patients cannot be saved at times, even when treated by best of doctors”.

Service versus Business Models are Conflicting

Doctors are taught that the medical profession is “Service” and hence a noble one. Intrusion of business concerns into medical practice, has its repercussions. There are several angles to it. While individual doctor works on “service model”, Health Care Industry (HCI) in India, comprising hospitals, medical devices and equipment, health insurance, clinical trials, telemedicine and medical tourism is a “business”.⁴ HCI is one of the largest sectors of the Indian economy in terms of revenue and employment; with a growth rate of about 22%.⁴ Indian government encourages Foreign Direct Investment (FDI), and its policies have been liberalized.⁴ There are several benefits of FDI. Government enjoys lesser burden on its finances, while there is better quality of health care/choices for nationals of the host country, who can afford private health services. But it may also worsen inequality. There can be brain drain from public sector to multinationals.⁵

HCI offers incentives (financially or non-financially) and sometimes disincentives to doctors in the name of maintaining consistency in their services towards patients.⁶ Such incentives will be speculated as unholy by the general public. Financial investment in HCI fetches consistent returns that are uncorrelated with stock market. It can influence pricing of the end products, be it medications or services. In addition, health care system in India is one of the most privatized systems in the world, at about 80%.^{7,8} This business model has promoted “materialistic approach” which some medical practitioners have embraced without remorse. Internet and its various apps run business; they provide easily accessible services; their authenticity and moral binding are questionable.⁹

Accepting large corporate donations for any reasons, can be ethically worrisome; such criticism needs ethical justification, lest, character of such organization will be questioned.¹⁰ Pharmaceutical industry being a business, promotes its sales by influencing prescription habits of physicians. Promotion is done by various methods such as sponsoring research, conferences, providing travel grants/accommodation to physicians. Attending company sponsored continuing medical education (CME) or accepting facilities from them are known to increase physicians’ prescription of sponsor’s medications.¹¹ Receiving sizable gifts from pharmaceutical industry is punishable.¹¹ It is important to remember that sponsorship is not just about ethics, it affects pricing of drugs.¹¹ National Medical Commission (NMC), which superseded the Medical Council of India (MCI), has forbidden sponsorship of medical conferences.¹²

In a business model, physician has been demoted to a “Provider”.¹³ In Indian dialect, any part of the medical profession run as a business is adjudged as ruled by Goddess Lakshmi, instead of Goddess Saraswati. Unsurprisingly, public considers business model as one of the main reasons for reduction in respect towards doctors (Fig. 1).

Oath and Ethical Conflicts

“Hippocrates oath” was written over 2,500 years ago. There are several translations and newer versions. Oath was intended to create virtuous physicians.¹³ It binds doctors to ethical practice, to keep patients before self, and to ensure equal treatment for all. Some physicians, adhere to it, even when it may be self-destructive.¹⁴ “Patients first” is ingrained into medical students; their care gets an “interruptive priority”. That cannot happen 24/7/365 for years; after all well-being of oneself and family is also crucial.¹⁴ Such burdensome demands contribute to physician burn out.¹⁴

Quotes from the Hippocrates Oath¹⁵ – “I will apply, for the benefit of the sick, all measures [that] are required, avoiding those twin traps of overtreatment and therapeutic nihilism.” “I will remember that there is art to medicine as well as science, and that warmth, sympathy, and understanding may outweigh the surgeon’s knife or the chemist’s drug.” “I will remember that I do not treat a fever chart, a cancerous growth, but a sick human being, whose illness may affect the person’s family and economic stability. My responsibility includes these related problems, if I am to care adequately for the sick.”- Swearing by this Oath, doctors are bound to provide “the best treatment” in any given situation for each of their patients.

In our study, we found that 61.3%, 56.1% and 59.4% of general public agreed that doctors prescribe medications, advice investigations and interventions ONLY when necessary, which implies, that about 38% to 44% did not agree (Fig. 2). About 19.4% of general public conveyed their intention to practice ethically, if they could step into the shoes of a doctor. While general public, lacking medical knowledge should be prohibited from questioning the sincerity of doctors; as professionals, this allegation needs introspection.

Physicians are bound to face several ethical conflicts in one’s career; some genuine and some not. Common among such dilemmas are best versus affordable treatment; convincing a doubting patient while being wary of possible litigation; differing in one’s advice when patient has consulted many doctors from the

same specialty; defending a well-meaning colleague who discussed one-sided opinion, while the best option would be slightly different; just to name a few. Handling dilemmas may be a challenge. Administering oath is not sufficient. Ethics should be taught as a part of medical school curriculum, with an aim to develop ethically sensitive individuals, who can anticipate, identify and solve ethical dilemma. Ethical abilities should be assessed just like other subjects.¹⁶

Prevention

Doctors have taken an oath to prevent diseases.¹⁵ Hippocrates oath – “I will prevent disease whenever I can, for prevention is preferable to cure”. All levels of prevention are important. Preventive medicine in its true sense is cost-effective, and constructively preserves quality of life. For a society, focus is on promoting healthy lifestyles, early detection and treatment of communicable and noncommunicable diseases. Prevention at individual level depends on their risk factors. Addiction of any kind, and poor self-care should be demoted; health education in school curriculum and social media is inexpensive.

Preventive health care sector in India is also a business; projected to reach 197 billion US Dollars by 2025, growing at a compound annual growth rate (CAGR) of 22%.¹⁷ India’s National Health Policy (2017) emphasizes greater investment in preventative and primary health care and aims to increase government spending on health to 2.5% of GDP by 2025.⁴ There are several companies providing preventive health care, which includes an array of experts like fitness maestros and dieticians; gadgets such as fitness trackers and health-monitoring devices.

While business focuses on financial growth, there is a need for a) well-meaning physicians to avoid wasteful expenditures, and b) public that trusts the profession. In our study, 88.4% of general public agreed that doctors should focus on preventing diseases also (Fig. 2). Effective prevention needs to be considered closely.

Internet and Social Media

Internet in India is cheap, easily available and its outreach has steadily expanded. Around 4.5% of all internet searches are related to health, and it is gradually increasing.¹⁸ Information available in the internet is uploaded by many individuals; it comprises both authentic and nonauthentic contents. Few minutes of browsing provides a sense of control to patients/care takers. Patients with thus obtained “instant wisdom” approach doctors, in a manner comparable to a child

getting home from kindergarten and asking parents, if they know alphabets. Browsed information may not be applicable to individual patients and obviously cannot equate to years of practical experience of professionals, who will understand the problem, examine patient, and provide personalized advice. In our cohort, 29.5% of doctors considered internet and social media as the reason for reduction in respect (Fig. 2).

Regardless, internet and social media are here to stay. Artificial intelligence and machine learning (AI and ML) are at the helm. Such encounters are bound to increase. Doctors must accommodate patients with (mis)information from internet. On a positive note, we can use social media to spread authentic health-related information widely.¹⁸

Pandemic

The pandemic has taught us many lessons; many lives were lost with innumerable left in doom. People learnt the importance of unity, sharing and helping one another. Government changed its priorities, tailored health care policies, fast tracked research, shared necessary information across countries, declined patents on life-saving drugs, hastened production of necessary medications, showed magnanimity in providing vaccines across borders. People from many walks of life took to frontline, medical fraternity stood guard, accepting its professional risk. Business and money took a back seat. Public recognized the service rendered and respect towards doctors increased (Fig. 3).

STRENGTH

There were open-ended questions permitting the responders to convey their thoughts without being guided by limited options. It included subjective scoring system and an objective question asking for change in the respect which correlated ($r = 0.754$). There was representation from doctor community, those working with doctors and general public. The differences in their views were well perceived.

LIMITATIONS

This was a small cohort; it has the inherent bias of an online survey. This study was influenced by the COVID-19 pandemic where doctor community was both praised and criminalized.

CONCLUSION

Certainly, there is a change in the respect towards doctors. It has left a negative impact on the profession.

It is time for us to introspect. Change for the better, will happen, when a true leader, one who becomes the voice of profession and its individual professionals; one who becomes the moral advocate of patients that trust us, takes the forefront. Unregulated business practice, malpractice and corruption can be removed only when well-meaning doctors lead; not self-centered proxy leaders.¹⁹ It is time for medical profession to clean up its white coat, the symbol of purity, that is tarnished now.

REFERENCES

1. Singh MM, Garg US, Arora P. Laws Applicable to medical practice and hospitals in India. *Int J Res Foundation Hosp Healthc Admin*. 2013;1(1):19-24.
2. Kane S, Calnan M. Erosion of trust in the medical profession in India: time for doctors to act. *Int J Health Policy Manag*. 2017;6(1):5-8.
3. Gopichandran V, Chetlapalli SK. Factors influencing trust in doctors: a community segmentation strategy for quality improvement in healthcare. *BMJ Open*. 2013;3:e004115.
4. InvestmentOpportunities_HealthcareSector_0.pdf. Available from: https://www.niti.gov.in/sites/default/files/2021-03/InvestmentOpportunities_HealthcareSector_0.pdf. Accessed November 3, 2023.
5. Can FDI improve the resilience of health systems? Available from: <https://www.oecd.org/investment/Can-FDI-improve-the-resilience-of-health-systems.pdf>. Accessed November 3, 2023.
6. Lee TH. Financial versus non-financial incentives for improving patient experience. *J Patient Exp*. 2015;2(1):4-6.
7. Private Healthcare Sector – A Vibrant Force in Indian Healthcare Industry. IIHMR Delhi. Available from: <https://www.iihmrdelhi.edu.in/uploads/articles/pdf/private-health-care-sector.pdf>. Accessed November 3, 2023.
8. Kapur R. The Public Health System in India. *Acta Scientific Nutritional Health*. 2019;3(11):130-3.
9. Roy B, Kumar A, Kumar A, Gowda KR. Ethical conflicts among the leading medical and healthcare leaders. *Asia Pacific J Health Manag*. 2022;17(1):1491.
10. Brody H. Professional medical organizations and commercial conflicts of interest: ethical issues. *Ann Fam Med*. 2010;8(4):354-8.
11. Nagral J, Roy N. The Medical Council of India guidelines on industry-physician relationship: breaking the conspiracy of silence. *Natl Med J India*. 2010;23(2):69-71.
12. getDocument (nmc.org.in). Available from: <https://www.nmc.org.in/MCIRest/open/getDocument?path=/Documents/Public/Portal/LatestNews/NMC%20RMP%20REGULATIONS%202022%20Draft%20Final%20YM.pdf>. Accessed November 3, 2023.
13. Clark SA. The Impact of the Hippocratic Oath in 2018: The Conflict of the Ideal of the Physician, the Knowledgeable

- Humanitarian, Versus the Corporate Medical Allegiance to Financial Models Contributes to Burnout. *Cureus*. 2018;10(7):e3076.
14. Chesanow N. Does the Hippocratic Oath promote burnout? *Medscape*. Mar 29, 2017.
 15. Hippocratic Oath - Wikipedia, Available from: https://en.wikipedia.org/wiki/Hippocratic_Oath. Accessed September 25, 2023.
 16. Eckles RE, Meslin EM, Gaffney M, Helft PR. Medical ethics education: where are we? Where should we be going? A review. *Acad Med*. 2005;80(12):1143-52.
 17. The rise of preventive healthcare in India. *TOI*. January 3, 2023. Available from: <https://timesofindia.indiatimes.com/blogs/voices/the-rise-of-preventive-healthcare-in-india/>. Accessed November 3, 2023.
 18. Renganathan L, Ray S, Nagpal D. Use of internet for accessing healthcare information among patients in an outpatient department of a tertiary care center. *J Marine Med Soc*. 2017;19(1):15-7.
 19. Kumar R. The leadership crisis of medical profession in India: ongoing impact on the health system. *J Family Med Prim Care*. 2015;4(2):159-61.



Pregnancy Complications Increase Heart Disease Risk in Obese Women: Study

Research published in *Circulation Research* revealed a significant association between obesity in the early stages of pregnancy and an elevated risk of developing cardiovascular disease (CVD) in the future. Furthermore, this condition has been connected to adverse pregnancy outcomes, including high blood pressure, pre-eclampsia and gestational diabetes.

The study found that while complications accounted for a small portion of the increased CVD risks for obese women in the years after pregnancy, adverse pregnancy outcomes were linked to higher CVD risks during pregnancy. The study sheds light on the possible timing of therapies for overweight or obese women considering becoming pregnant. The researchers examined data from the nuMoM2b Heart Health Study, which included more than 4,200 first-time mothers, with approximately half of them being overweight or obese. They discovered that, compared to participants with normal body weight, moms who were overweight or obese during the first trimester of pregnancy had around double the chance of developing gestational diabetes or having a pregnancy accompanied by high blood pressure. In contrast, only 13% of future chances of having high blood pressure if obese may be attributed to pregnancies complicated by high blood pressure. To promote heart health, particularly during pregnancy, focusing on achieving and sustaining a healthy body weight, staying aware of your heart health metrics, and incorporating regular physical activity into your routine is essential.

(Source: <https://www.tribuneindia.com/news/health/pregnancy-complications-enhance-short-long-term-risk-of-heart-disease-for-people-with-obesity-study-553535>)

Study: The Link Between Plant Nutrients and Gut-Brain Function

In a research conducted at the University of Leipzig Medical Center, it was discovered that high-dose prebiotics led to a reduction in brain activity associated with food rewards, potentially attributed to alterations in gut microbiota. This reveals a potential link between the gut microbiota and the brain, suggesting new avenues for the treatment of obesity and the promotion of healthy eating habits using microbiome-targeted approaches. Prebiotics are substances in foods, including onions, leeks, artichokes, wheat, bananas and chicory root that help the growth and activity of good gut bacteria. According to the interventional study conducted by the University of Leipzig Medical Centre, eating large doses of dietary prebiotics causes the brain's reaction to high-calorie food stimuli to be less reward-related.

The study stated that functional microbial alterations may be responsible for the altered brain response to stimuli from high-calorie foods. If therapies that modify the microbiota can provide new pathways for less intrusive methods to prevent and treat obesity, more research is required. A more profound comprehension of the interconnections between the microbiota, stomach and brain may aid in creating fresh tactics for encouraging healthy eating habits in vulnerable populations.

An ongoing follow-up research is investigating how long-term, high-dose prebiotic treatment over 6 months affects eating habits, cognitive function and body weight in individuals with overweight and obesity.

(Source: <https://scitechdaily.com/new-research-reveals-how-plant-derived-nutrients-can-affect-the-gut-and-brain/>)

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Status of Urinalysis in Nigeria: Way Forward

ADEYEMO AW*, OLANREWAJU TO†, ADERIBIGBE A‡, SOURABH SHARMA§, SOJE MO#, BUSARI KA¥, FAPONLE AE*, OYEDEPO DS†

ABSTRACT

Urinalysis serves as a diagnostic procedure employed to assess the condition of a patient's urinary system, encompassing the examination of physical, chemical and microscopic attributes within a urine sample. In Nigeria, urinalysis stands as a frequently utilized diagnostic modality, widely accessible within health care facilities and is generally cost-effective. Nevertheless, despite its widespread availability, certain obstacles persist that hinder its effective utilization. Through this review, we aim to emphasize the significance of urinalysis in the diagnosis of kidney diseases within low-income nations, while also addressing the impediments that hinder its proper application. We also propose a range of requisite measures for enhancement.

Keywords: Urinalysis, Nigeria, standardization, training, public education, kidney diseases

Urinalysis is a diagnostic test that is used to evaluate the health of a patient's urinary system. It involves analyzing the physical, chemical and microscopic characteristics of a patient's urine sample. According to the International Society of Nephrology (ISN) 0by25 study, point of care urinalysis with dipstick and creatinine estimation added to symptom-based health score helps in early diagnosis and treatment of kidney diseases in low-resource settings.¹

More recently urinalysis was found to predict the development of acute kidney injury in coronavirus disease 2019 (COVID-19) patients in a low-resource setting.²

Urinalysis is an important disease surveillance tool in Nigeria. The prevalence of urinary abnormalities in young adults ranges between 20.7% and 54% in south-eastern Nigeria.^{3,4} Microscopic hematuria suggestive of subclinical kidney damage is common among hypertensive Nigerians despite a high false-negative rate with dipstick urinalysis.⁵ Bilirubinuria, urobilinogenuria,

proteinuria and hematuria may be present in malaria and used as predictors of severity.⁶ In Nigeria, urinalysis is a widely used diagnostic tool for various medical conditions that affect the urinary system. Dipstick urinalysis for example, is effective in community-based screening, clinic settings and occupational health assessments.⁷⁻⁹ This is because dipstick urinalysis is cheap and can easily be deployed in rural settings.¹⁰ Also, it does not involve any special training other than understanding the information pamphlet in the urinalysis strip kit as outlined by the manufacturer. Unfortunately, microscopic examination of urine is an art that is fast declining among nephrologists due to limited expertise, inadequate equipment and poor infrastructure. In the absence of other effective diagnostic tools such as immunofluorescence and electron microscopy in many centers across Nigeria, the clinical utility of light microscopy for both urinalysis and histological diagnosis, even though limited, cannot be overemphasized.¹⁰

A major drawback of urine examination is the inter-observer variations when doing the physical, chemical and microscopic assessment of urine. However, there are still some other challenges that need to be addressed in Nigeria. This article will discuss the status of urinalysis in Nigeria, the problems and suggest some ways to improve its use.

STATUS OF URINALYSIS IN NIGERIA

Urinalysis is a commonly used diagnostic tool in Nigeria. It is readily available in most health facilities and is relatively affordable. However, despite its availability,

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there are still some challenges that affect its use. Some of the challenges include:

- **Lack of standardization:** Urinalysis results in Nigeria are often not standardized. This means that different laboratories may produce different results for the same urine sample, making it difficult to interpret the results accurately. Also, the availability of different test kits for chemical assessment, which were mainly imported has made standardization difficult. Additionally, phase contrast microscope needed for optimal characterization of urine sediments is largely not available in many training centers and institution; hence, development of a standardized method of examination across the country cannot be easily achieved. Lack of national guidelines or protocols is a major challenge of urinalysis in Nigeria.
- **Inadequate training:** Some laboratory technicians in Nigeria are not adequately trained in urinalysis. This can lead to inaccurate results and misdiagnosis of medical conditions. This is not unexpected as there is inadequate laboratory equipment. Fogazzi et al¹¹ in a visit to Ahmadu Bello University Teaching Hospital, a foremost training institution in northern Nigeria, reported only one functional phase contrast microscope, which had never been used for urine microscopy. This finding led to establishing a program for urine microscopy between nephrologists and microbiologists in the hospital and a further training in Italy to acquire skills in urine microscopic examination.
- **Poor laboratory infrastructure:** Some health facilities in Nigeria lack the necessary laboratory infrastructure to carry out accurate and reliable urinalysis. This can result in delays in diagnosis and treatment of medical conditions.

WAY FORWARD

To improve the use of urinalysis in Nigeria, there are several steps that can be taken. These include:

- **Standardization:** There is a need to standardize urinalysis in Nigeria. This can be achieved through the establishment of national guidelines for the performance and interpretation of urinalysis. Standardization will ensure that results are accurate and reliable, making it easier for doctors to diagnose and manage medical conditions.
- **Training:** There is a need to train laboratory technicians in Nigeria on the proper techniques for conducting urinalysis. This will improve the accuracy

of results and reduce the risk of misdiagnosis. There may also be a need for result verification by a pathologist to improve quality assurance.¹²

- **Infrastructure improvement:** There is a need to improve laboratory infrastructure in Nigeria. This can be achieved through the provision of adequate laboratory equipment and facilities. Both the chemical and microscopic assessment of urine can be automated to reduce human errors and inter-observer variability. This will ensure that results are obtained in a timely and accurate manner, improving patient outcomes.
- **Public education:** There is a need to educate the public on the importance of urinalysis. This will increase awareness about the test and encourage patients to seek medical attention when necessary. It can also reduce time to obtaining urine samples and sampling errors, which could reduce time to diagnosis and care in emergency settings.¹³

CONCLUSIONS

Urinalysis is an essential diagnostic tool that is used to diagnose and manage various medical conditions affecting the urinary system. In Nigeria, there is a need to standardize urinalysis, provide adequate training to laboratory technicians, improve laboratory infrastructure and increase public education on the importance of the test. By addressing these challenges, Nigeria can improve the use of urinalysis and improve patient outcomes.

REFERENCES

1. Macedo E, Hemmila U, Sharma SK, Claire-Del Granado R, Mzinganjira H, Burdmann EA, et al; ISN 0by25 Trial Study Group. Recognition and management of community-acquired acute kidney injury in low-resource settings in the ISN 0by25 trial: a multi-country feasibility study. *PLoS Med.* 2021;18(1):e1003408.
2. Sundaram S, Soni M, Annigeri R. Urine abnormalities predict acute kidney injury in COVID-19 patients: an analysis of 110 cases in Chennai, South India. *Diabetes Metab Syndr.* 2021;15(1):187-91.
3. Ugwuja EI, Ugwu NC. Urinary findings in young adults in Abakaliki, Nigeria. *Niger J Clin Pract.* 2008;11(3):275-8.
4. Mmoh IC, Ogbuagu CN, Modebe IA, Ogbuagu EN, Ogbuagu CM, Emelumadu OF, et al. Dipstick urinalysis profile of an asymptomatic female group in south-east Nigeria. *SAGE Open Med.* 2022;10.20503121221135575.
5. Olanrewaju TO, Aderibigbe A. Pattern of urinary sediments and comparison with dipstick urinalysis in hypertensive Nigerians. *J Nephrol.* 2010;23(5):547-55.

6. Ugwuja EI, Ugwuja NC. Abnormal findings on dipstick urinalysis of out-patients with malaria in Abakaliki, Nigeria. *J Vector Borne Dis.* 2011;48(4):205-9.
7. Olanrewaju TO, Aderibigbe A, Popoola AA, Braimoh KT, Buhari MO, Adedoyin OT, et al; Ilorin Renal Study Group. Prevalence of chronic kidney disease and risk factors in North-Central Nigeria: a population-based survey. *BMC Nephrol.* 2020;21(1):467.
8. Dike AI, Okechukwu AA, Ocheke I, Airede KI. Asymptomatic proteinuria and haematuria in healthy public primary school children in Abuja, Nigeria. *West Afr J Med.* 2021;38(1):8-14.
9. Egbi OG, Okafor UH, Miebodei KE, Kasia BE, Kunle-Olowu OE, Unuigbo EI. Prevalence and correlates of chronic kidney disease among civil servants in Bayelsa state, Nigeria. *Niger J Clin Pract.* 2014;17(5):602-7.
10. Ramos-Rincón JM, Cuadros-González J, Malmierca-Corral E, de Górgolas-Hernández M. Medical diagnosis in resource-poor tropical countries. *Rev Clin Esp (Barc).* 2015;215(1):43-9. English, Spanish.
11. Fogazzi GB, Bosan IB, Garigali G, Arogundade F. A theoretical and practical course on urine microscopy in Nigeria: a model for nephrological skill transfer. *Nephron Clin Pract.* 2011;117(4):c398-402.
12. Fogazzi GB, Attolou V, Kadiri S, Fenili D, Priuli F. A nephrological program in Benin and Togo (West Africa). *Kidney Int Suppl.* 2003;(83):S56-60.
13. Pandey M, Lyttle MD, Cathie K, Munro A, Waterfield T, Roland D; GAPRUKI, PERUKI. Point-of-care testing in Paediatric settings in the UK and Ireland: a cross-sectional study. *BMC Emerg Med.* 2022;22(1):6.



Indirect Airway Hyperresponsiveness Test Enhances Asthma Control in Children

Incorporating indirect airway hyperresponsiveness (AHR) test with hypertonic saline in the management of asthma in children can reduce the risk of mild exacerbations, suggests a new study published in the journal *Pediatric Pulmonology*.^{1,2} Eosinophil counts were associated with the risk for recurrent exacerbations.

Janusz Ciółkowski from the Allergology Outpatient Clinic at the Regional Public Hospital in Lesko, Poland and colleagues conducted this study to establish the usefulness of indirect AHR testing with hypertonic saline in maintaining asthma control in children. For this, they enrolled 104 patients, aged 7 to 15 years, with mild to moderate atopic asthma in the study. All patients underwent spirometry and assessment of exhaled nitric oxide and blood eosinophils assessment at the start of the study and then every 3 months for 1 year. Patients were randomized to either a symptom-only monitored group or a group in which treatment was modified on the basis of symptoms and severity of AHR.

At the end of 1 year, the patients in the AHR group had fewer mild exacerbations compared to the symptom-only monitored group; 44 versus 85, respectively. The absolute rate per patient was 0.83 versus 1.67. However, changes in clinical (except asthma control test) parameters including inflammatory and lung function measures were comparable in both groups. The baseline eosinophil count was found to be linked to AHR and was “a risk factor for recurrent exacerbation in all patients”, noted the authors. No significant difference was detected between the two groups when the final dose of inhaled corticosteroids (ICS) was being decided; 287 (AHR group) versus 243 (symptom-monitored group).

Performing a hypertonic saline test in children with asthma in addition to clinical monitoring of patients improves asthma control as evidenced by reduction in the number of mild exacerbations. The dose of ICS required to maintain asthma control was also comparable between the two groups. “The hypertonic saline test appears to be a simple, cheap, and safe tool for monitoring the treatment of mild to moderate asthma in children”, concluded the authors.

References

1. Ciółkowski J, et al. Childhood asthma treatment based on indirect hyperresponsiveness test: randomized controlled trial. *Pediatr Pulmonol.* 2023;58(9):2583-91.
2. Grossi G. Indirect Airway hyperresponsiveness test shows promise in optimizing asthma treatment for children. Dated June 28, 2023. Available from: <https://www.hcplive.com/view/indirect-airway-hyperresponsiveness-test-optimizing-asthma-treatment-children>. Accessed October 19, 2023.

Not Practising Accepted Protocols While Examining a Patient

A man approached the medical council and filed a complaint against the treating doctor stating that his wife died because the treating doctor did not properly examine her well at the first visit and simply prescribed treatment for upper respiratory infection. As a result, his wife developed serious complication during the course of treatment. She eventually succumbed to her illness despite treatment.



Lesson: In a order DMC/DC/F14/246/2007, the council highlighted the importance of right protocols being followed while examining a patient.

CASE SUMMARY

A complaint was submitted to the Delhi Medical Council by Mr X (Complainant) against Respondents 1 to 4 alleging medical negligence and professional misconduct. The council examined the complaint, written statements of Respondents 1, 2 and 4, medical records of Hospital Y and other documents on record. Respondent No. 3 did not participate in proceedings in spite of notice.

Course of Events

- 21.8.2003: Respondent No. 1 first saw the patient in his clinic. The diagnosis was upper respiratory tract infection (URTI); treatment started accordingly.
- 24.8.2003: Respondent No. 1 was called for a home visit as the patient continued to have symptoms. Further necessary treatment was started after examination.
- 25.8.2003: The patient was still unrelieved and her condition worsened. Dr B examined her and advised immediate hospitalization in Hospital Y. A diagnosis of Pneumonia L with viral fever was made; necessary treatment started.
- 28.8.2003: Despite treatment, the patient could not recover and died. An autopsy was not done,

because the patient clinically had fulminant type of pneumonia, which is associated with high mortality rates even with treatment.

Complainant Allegation

The main complaint was that Respondent No. 1 missed the diagnosis on the two occasions he saw the patient because he did not examine the patient properly.

Council Observations

According to Respondent No. 1, he had examined the patient and had also done a chest examination. However, the court observed that as the patient had already died it was not possible to verify this statement. Moreover, fulminant type of pneumonia was not easy to diagnose in its early stages and it also takes a rapidly progressive course. The treatment prescribed by Respondent No. 1 encompassed the entire spectrum of the existing clinical situation. Respondent No. 1 did not have access to the daily progress of the patient. Dr B was contacted only when the patient developed difficulty in breathing, subsequent to which the patient was hospitalized in Hospital Y.

The hospital authorities also failed to provide the patient records to the complainant despite repeated requests.

Council Opinion

The treatment administered to the patient at Hospital Y was in line with the accepted professional practise for such clinical situations. And, the patient died due to the disease, which takes a natural fulminant clinical course. The patient unfortunately developed the complication of several fulminant type of pneumonia complicating a simple viral URTI. The approach taken in the initial treatment provided to the patient is disturbing because a doctor is expected to examine a patient properly or to at least follow the scientific assessment protocol, which may enable him to arrive at a probable diagnosis.

Respondent No. 1 stated in a written statement that the presenting complaints on the first visit on 21.8.2003 were fever, blocked nose, slight cough and loss of appetite. On examination, vital signs were normal; there was mild congestion in the throat, patient was febrile and the chest was clear on examination. When he saw the patient the second time on 24.8.2003, the vitals were stable, throat was congested; there were few crepts on auscultation; so, he diagnosed the patient as having lower respiratory tract infection (LRTI) with URTI for which he prescribed ofloxacin, cough expectorant, analgesics and gargles. Though the prescription notes of Respondent No. 1 contain the treatment prescribed, they do not mention the diagnosis, which he stated in his written statement.

Council Judgement

The Council issued a warning to Respondent No. 1 with a direction to adopt accepted protocol whilst examining patients in future. The complaint was disposed as no medical negligence could be attributed in the treatment of the patient.

Reference

1. DMC/DC/14/2/Comp.246/2007/dated 29th May, 2007.

FOLLOW THE FIVE PRINCIPLES OF AIDET TO IMPROVE DOCTOR-PATIENT RELATIONSHIP

Most doctor-patient disputes today are because of a communication gap or miscommunication. To ensure a better doctor-patient relationship, there are etiquettes that doctors should observe, whenever a patient comes for a consultation. Remember the acronym AIDET; it represents the principles that doctors should follow to communicate better with their patients and build a doctor-patient relationship based on mutual trust and respect. These principles are:

- **Acknowledge:** Whenever a patient comes to you, greet the patient and call them by his/her name.

- **Introduce:** Introduce yourself or any other member of your staff to the patient and what you would be doing for the patient.
- **Duration:** Keep your patient informed about the expected duration of treatment; how long would treatment continue or, any waiting time.
- **Explanation:** Always describe to your patients the diagnosis, the tests or procedures in a language they are able to understand. *This is the concept of informed consent.*
- **Thank you:** Say thank you to the patient for their communication and cooperation. *Doing this will develop trust and respect in the patient for you as his/her physician.*

Adapted from: www.studergroup.com/hardwired-results/hardwired-results-03/hardwire-the-five-fundamentals-of-service

THE THREE COMPONENTS OF MEDICAL NEGLIGENCE

Negligence is the breach of a duty caused by the omission to do something which a reasonable man, guided by those considerations which ordinarily regulate the conduct of human affairs would do, or doing something which a prudent and reasonable man would not do.¹

The essential components of negligence, as recognised, are three: "duty", "breach" and "resulting damage", that is to say:²

- The existence of a duty to take care, which is owed by the defendant to the complainant;
- The failure to attain that standard of care, prescribed by the law, thereby committing a breach of such duty; and
- Damage, which is both causally connected with such breach and recognised by the law, has been suffered by the complainant (Para 1.23). If the claimant satisfies the court on the evidence that these three ingredients are made out, the defendant should be held liable in negligence (Para 1.24).

The standard of care has to be judged in the light of knowledge or equipment available at the time (of the incident) and not at the date of the trial.

References

1. Yadav M, Singh H, Sharma G, et al. Recent scenario of criminal negligence in India doctor, community & apex court. JIAFM. 2005;27(4):252-7.
2. 334/2005/SCI/144-145 of 2004: Jacob Mathew vs State of Punjab and Anr: 5th day of August 2005: R C Lahoti, CJI: Hon'ble Mr. Justice G P Mathur, Hon'ble Mr. Justice P K Balasubramanyan.

What is not Medical Negligence?

A “medical accident” is not negligence

In Jacob Mathew v. State of Punjab SC/0457/2005: (2005) 6 SCC 1, the Supreme Court of India has observed: “... a mere accident is not evidence of negligence.”

“Not getting cured” is not negligence

In its judgement in Jacob Mathew v. State of Punjab SC/0457/2005: (2005) 6 SCC 1, the Supreme Court of India has observed: “Simply because a patient has not favourably responded to a treatment given by a physician or a surgery has failed, the doctor cannot be held liable per se by applying the doctrine of res ipsa loquitur.”

“Error of judgement” is not negligence

In Jacob Mathew v. State of Punjab SC/0457/2005: (2005) 6 SCC 1, the Supreme Court of India has observed: “... an error of judgement on the part of a professional is not negligence per se.”

Deviation from medical practise does not always mean medical negligence

The Supreme Court of India has observed in Jacob Mathew vs. State of Punjab SC/0457/2005: (2005) 6 SCC 1: “Deviation from normal practise is not necessarily evidence of negligence. To establish liability on that basis, it must be shown:

- That there is a usual and normal practise
- That the defendant has not adopted it and
- That the course in fact adopted is one no professional man of ordinary skill would have taken had he been acting with ordinary care.”

Errors can be made in an emergency even by experts and may not amount to negligence

In SCI: 3541 of 2002, dated 17.02.2009, Martin F. D’Souza vs Mohd. Ishfaq, the Supreme Court of India has observed: “The higher the acuteness in an emergency and the higher the complication, the more are the chances of error of judgement.”

Difference of opinion is not negligence

The Supreme Court of India has observed in Jacob Mathew v. State of Punjab SC/0457/2005: (2005) 6 SCC 1: “In the realm of diagnosis and treatment there is ample scope for genuine difference of opinion and one men clearly is not negligent merely because his conclusion differs from that of other professional men. The true test for establishing negligence in diagnosis or treatment on the part of a doctor is whether he has been proved to be guilty of such failure as no doctor of ordinary skill would be guilty of if acting with ordinary care.”

■ ■ ■ ■

Study: Low Birth Weight Increases Fatty Liver Disease Risk Fourfold

Researchers have identified a significant correlation between birth weight and the onset of metabolic dysfunction-associated steatotic liver disease (MASLD) in young individuals. It was found that infants with low birth weight are at a fourfold higher risk of developing MASLD during childhood, adolescence or young adulthood. The research, presented at the current United European Gastroenterology (UEG) Week 2023 in Denmark, discovered that those with low birth weights had a fourfold higher risk of developing MASLD than people with normal birth weights. The 165 MASLD cases identified between January 1992 and April 2017 in adults 25 years of age and younger were used in a population-based case-control study by the researchers to examine the relationship. They discovered that compared to people with an average birth weight, those with low birth weights had a fourfold higher chance of developing MASLD. Those born short for gestational age (SGA) had a more than threefold increased risk of developing MASLD in infancy compared to those with a healthy birth weight. The researchers also discovered that those who were born prematurely or as SGA had a sixfold increased relative chance of having cirrhosis or liver fibrosis, which are more severe forms of MASLD.

(Source: <https://www.daijiworld.com/news/newsDisplay?newsID=1130926>)

HCFI Dr KK Aggarwal Research Fund

Round Table Environment Expert Zoom Meeting on “Implementation Issues and Challenges of the Revised GRAP, Issued by the CAQM to Address Adverse Air Quality during Winter”

October 1, 2023 (Sunday, 12 noon-1 pm)

- The revised Graded Response Action Plan (GRAP) is being implemented from 1st October to control air pollution. It has been issued as a direction by the Commission for Air Quality Management (CAQM) to address adverse air quality during winter.
- The cleanliness week “Swachhata Hi Seva Abhiyan” will also start from 2nd October to mark Gandhi Jayanti, marking the birth anniversary of Mahatma Gandhi.
- Not just the Delhi-NCR region, almost every city in North India is affected, especially in the Indo-Gangetic Plain. Air pollution in this region has been a matter of great concern and requires urgent action to address the issue.
- The first GRAP was issued by Ministry of Environment, Forest and Climate Change (MoEFCC), Government of India on 12th January, 2017 as per direction of the Hon’ble Supreme Court of India and after recommendation of the Central Pollution Control Board (CPCB) of India. The implementation of this GRAP was been assigned to EPCA (Environment Pollution [Prevention & Control] Authority) appointed by the Supreme Court till 2020. It was replaced by the CAQM in 2020. The Commission for Air Quality Management in NCR & Adjoining Areas (CAQM) Act was introduced in 2021. It reviewed the earlier GRAP and on 5th August, 2022, the modified GRAP was notified.
- Based on the experience of last 1 year, the CAQM issued a direction under Section 12 of the CAQM Act 2021 on 27th July, 2023 for implementation of modified GRAP. It was issued to all authorities for strict implementation w.e.f. from 1st October, 2023.
- Implementation is a huge challenge. There are several issues such as low temperature (causing inversion), climate pattern, meteorological conditions, very low wind speed (vertical and horizontal). GRAP has been classified under four stages to address the adverse state of air quality in Delhi: Stage 1 (poor), when AQI (air quality index) is 201-300; Stage 2 (very poor) when AQI is 310-400; Stage 3 (severe) when AQI is 401-450 and Stage IV (severe plus) when AQI is >450.
- Stage 1 Action points: Proper implementation of guidelines on dust mitigation measures in Construction and Demolition (C&D) activities and sound environmental management of C&D waste, regular lifting of municipal solid waste (MSW), C&D waste and hazardous wastes, prohibit dumping of such waste in open land areas, periodic mechanized sweeping and water sprinkling on roads, anti-smog guns in areas >20,000 sq. m, water sprinkling and dust suppression measures in road construction/maintenance/repair projects, prohibition on open burning of biomass and MSW, ensure smooth traffic flow especially in areas with heavy traffic and congestion prone intersections, enforcement of Pollution Under Control (PUC) norms for vehicles and ensure that diesel generator sets are not used as regular source of power supply.
- Stage 2 Action points: Daily mechanical/vacuum sweeping and water sprinkling of the identified roads, use of dust suppressants (at least every alternate day, during non-peak hours) on roads to arrest road dust especially at hotspots, heavy traffic corridors, ensure uninterrupted power supply to discourage use of Generator sets, alert in newspapers/TV/radio to advise people about air pollution levels and Do’s and Don’ts for minimizing polluting activities, Resident Welfare Associations (RWAs) should provide electric heaters to security staff to avoid open burning of biomass and MSW.
- Stage 3 Action points: Increase in the frequency of mechanized/vacuum-based sweeping of roads, daily water sprinkling along with dust suppressants before peak traffic hours, on roads (including hotspots, heavy traffic corridors), proper disposal of the collected dust in designated sites/landfills, strict ban on construction and demolition activities (with exceptions as defined), ban on operations of stone crushers, closure of all mining and associated activities, physical classes up to Class V may be discontinued and shift to online classes.
- Stage 4 Action points: Ban on entry of truck traffic (except for trucks carrying essential commodities/ providing essential services), ban on plying of Delhi-registered diesel operated goods vehicles, Ban on C&D activities, consider allowing offices to

work on 50% strength and the rest to work from home, additional emergency measures like closure of colleges/educational institutions and closure of non-emergency commercial activities and running of vehicles on odd-even basis.

- A Citizen Charter defining responsibilities of citizens is also spelled out for each stage.
- In Delhi-NCR, the AQI reaches up to 900 or even more during Diwali or in smog like conditions on some days in winter.
- Based on the dynamic model and meteorological forecast by India Meteorological Department (IMD) and Indian Institute of Tropical Meteorology (IITM), on day-to-day basis, actions under stages 2, 3 and 4 shall be invoked, at least 3 days in advance of AQI reaching the projected levels. All the restrictions under the previous stage/s will continue, if the next stage is invoked.
- GRAP is a set of actions expected to be taken by the government and the community as per the severity of air pollution levels starting with post-Kharif harvest time. It is issued every year, but its implementation is very poor. GRAP starts with a particular reading in place. But the impact of poor air quality is felt round the year by citizens, especially in Delhi-NCR.
- PM2.5 and PM10 levels are usually taken into consideration; SO_x, NO_x, NH₃ are not being talked about. So, if the level of SO₂ or NO_x increases, the GRAP does not come into effect.
- The analysis of data of last 4 years has shown that the season-wise number of days having mean PM10 concentration in the "good" category is only one day each in the winter seasons of 2016-17 and 2020-21, while on most days it remained "moderate" to "severe". The mean concentration of PM10 reached "emergency" levels in the winter months for 6 and 2 days during 2018-19 and 2020-21, respectively. While the GRAP kicks in only during winter pollution days, the PM10 concentration has reached "severe" or "emergency" levels in the summer, and autumn seasons of all the years, except in 2020-21 when there was a country-wide lockdown.
- We have to realize that environment plays a major role in our health. Air quality is a health issue and not a legal issue. Health, wealth and environment are all interconnected.
- Respiratory diseases such as bronchitis is increasing due to air pollution.
- The entire country, and not just Delhi-NCR, will need such a program in the coming future.

- Delhi has recently introduced hydrogen buses. However, the side effects of using these buses needs to be studied. If successful, this could reduce consumption of fossil fuels such as coal, oil and natural gas.
- Lot of dust is generated during construction and demolition activities. Construction in sites >500 sq. m have to be registered with DPCC (Delhi Pollution Control Committee) or concerned pollution control boards in the state.
- The guidelines for national highways and roads such as Ring Road say that there should be some buffer zone on both sides of the road where no development activity can take place. This buffer land should be developed as a green belt so that the city has a ring road green cover. Trees with huge canopy covers should be planted here.
- Within the city, the medians of the road should be properly covered by grass. But they are usually not covered; hence, the dust keeps on circulating and remains in the air (re-suspended) due to vehicular movement. This dust is polluted as it is contaminated with the toxic emissions from the vehicles.
- Source apportionment needs to be done. There are a large number of incinerators especially in Delhi-NCR. These activities generate lot of dust in the environment.
- The government should focus on the maintenance of roads. Regular cleaning of roads will have an impact on the air quality and thereby on the health of the people.
- A plan is needed, not just GRAP-driven measures, which could be implemented given the readings of the monitors particularly if they are already in the red flag areas.
- The measures should not be implemented just in the winter season, but should be all through the year in a concerted, coordinated manner (inter-ministerial and Urban Local Bodies).
- The rural and urban primary health centers should be involved in the advocacy of how poor air quality impacts the different age groups and those with different health conditions. The immediate local sources of pollution should be identified and this information should be imparted by the auxiliary workers, ASHA workers and the Chief Medical Officer (CMO) of that particular health center.
- Waste is also connected to air quality. Hence, efforts should also be directed towards waste minimization.

MEDICAL VOICE FOR POLICY CHANGE

- Reuse culture should be promoted, advocated and adopted. The manufacturers should establish a refillable and recyclable delivery system.
 - The Food and Beverage (F&B) sector contributes to $\geq 40\%$ of waste production. This needs to come under regulation.
 - Plastic waste can be reutilized for road construction. A study by the Indian Institute of Technology (IIT) Madras in Chennai states that burning of plastic waste is a major contributor of smog in northern parts of India.
 - Burning of leaves and wood during winters to keep warm increases pollution.
 - The Sewage Treatment Plants (STPs) emit lot of gases (hydrogen sulfide, methane and carbon monoxide). This also needs to be controlled. Deodorization plants should be set up near the STPs to clean the air and release in the environment.
 - In many countries in the West, there is either greening on the road sides or small stones are put on the unpaved roads to reduce the dust that is suspended into the air.
 - GRAP should be used sincerely and diligently and enforced. It should be categorized according to severity and priority. Intervention is also needed at the policy level. While GRAP considers construction activities in areas ≥ 500 sq. m, there is no regulatory monitoring and enforcement capacity for areas < 500 sq. m. Activity in such areas is very high due to renovation of houses, shops.
 - Awareness about air pollution and its adverse impact on health has to be created similar to that for COVID-19.
- Participants:** Dr Anil Kumar, Mr Vivek Kumar, Mr RS Tyagi, Mr Neeraj Tyagi, Mr Sanjeev Kumar, Mr Rajesh Taneja, Ms Ruchika Sethi Takkar

■ ■ ■ ■

Boosting Health Care Access: 408 More Units in Haryana Embrace Ayushman Bharat

To expand the accessibility of medical treatments for patients from economically weaker groups, the state government has chosen to appoint nearly 400 government health institutions under the Ayushman Bharat initiative. These include birthing huts and primary health care centers (PHCs).

Previously, only civil hospitals and sub-divisional hospitals were impaneled. The program allows persons from economically disadvantaged groups to get medical care and 3 and 15 days' worth of pre- and post-hospitalization costs, respectively.

Each year, Ayushman Bharat, the National Health Protection Program, provides a health insurance benefit of Rs. 5 lakh per household. This program is accessible to individuals earning an annual income of Rs. 1.80 lakh or less.

According to Dr Virender Yadav, Chief Medical Officer of Gurgaon, all 12 PHCs in the city would be accredited under the Ayushman plan. In the facilities, patients can undergo any medical test that was previously inaccessible. Additionally, this will relieve pressure on public hospitals.

At 729 hospitals in Haryana with impaneled status, accessible care is now provided without payment or paperwork. It will now include 408 more health care institutions. The Haryana Health Department made this decision last week during a meeting in Chandigarh.

The Ayushman Bharat scheme in Haryana, launched in 2018, covers around 1,400 treatment procedures and OT expenses for about 1.2 crore people. Recipients are required to furnish evidence of their residency within the state and their Economically Weaker Section (EWS) status through documents such as a Below Poverty Line (BPL) card, Aadhaar card, Parivar Pehchan Patra, or Ayushman Bharat card within 24 hours of admission to the hospital. One of Ayushman Bharat's core principles is providing cooperative federalism and flexibility to states. The scheme was selected based on the 2011 Economic, Social, and Caste Census, with data verified for 9 lakh beneficiaries.

(Source: <https://timesofindia.indiatimes.com/city/gurgaon/408-more-healthcare-units-in-haryana-to-come-under-ayushman-bharat-scheme/articleshow/104482208.cms>)

CSI NIC Mid Term Meet 2023

LIMA INTERVENTIONS: HOW TO DO – STEP BY STEP?

Dr Rajpal KA, Coimbatore

LIMA, which stands for left internal mammary artery, is a commonly used artery for coronary artery bypass grafting (CABG) procedures. The LIMA is a conduit that can be used to bypass a blocked or narrowed coronary artery, typically the left anterior descending (LAD) artery.

In LIMA interventions, the LIMA is harvested from the chest wall and then used as a graft to bypass the diseased coronary artery.

Here are 10 commandments of LIMA interventions: Tortuosity of the LIMA looks worse than what it actually is; use nitroglycerin (NTG) liberally; beware of iatrogenic dissections of the LIMA, especially LIMA ostium; concertina effect; anatomical landmarks to guide stent replacement; LIMA restenosis is not common; do not lose time between steps; choose a stent wisely with features, such as good deliverability, little longer and good radio-opacity; look at the subclavian region too; LIMA can withstand complex work.

However, there are several tips to overcome some of these commandments of LIMA intervention. For instance, during iatrogenic dissections of the LIMA, keeping a wire in the subclavian and liberal dose of NTG is helpful. Although, tortuosity of the LIMA looks worse, but the tortuosity is never in one plane. Hence, it is much easier to negotiate.

LIMA is prone to spasms, but liberal use of NTG can help in visualizing the true size of the LIMA, and distal vessel. It can also help in inhibiting the concertina effect.

SACUBITRIL/VALSARTAN DELAYS USAGE OF ICD BY REVERSE REMODELING

Dr Kajal Ganguly, Kolkata

Heart failure management with reduced ejection fraction (HFrEF) has evolved significantly over the past two decades, with the introduction of implantable cardioverter-defibrillators (ICDs) and cardiac resynchronization therapy (CRT) in the first decade, followed by the incorporation of angiotensin-receptor neprilysin inhibitor (ARNI) therapy in optimal medical treatment (OMT) for HFrEF in the second decade.

The PARADIGM-HF trial, which involved 8,399 patients, assessed patterns of ICD implantation and eligibility based on clinical guidelines while also examining the impact of ICD utilization and sacubitril/valsartan therapy (ARNI) on the risk of sudden cardiac death (SCD) using cause-specific Cox models and competing risk analysis.

The study revealed that only 15% of the 7,145 patients eligible for ICD implantation had actually received an ICD at baseline. The use of ICDs varied across different regions, with the highest utilization rates in North America and the lowest in the Asia-Pacific region. Notably, the study demonstrated that a 56% reduction in the risk of SCD is attributed to ICD use among eligible patients, regardless of the underlying cause of heart failure (ischemic or nonischemic cardiomyopathy).

Moreover, sacubitril/valsartan therapy reduced the risk of SCD in patients who either had an ICD or were eligible for ICD but did not receive one. This effect was particularly significant in patients with nonischemic cardiomyopathy. The study did not identify a significant interaction between the cause of heart failure and the impact of sacubitril/valsartan therapy on SCD risk.

In conclusion, this study highlights the underutilization of ICDs in eligible HFrEF patients worldwide. Additionally, it demonstrates that sacubitril/valsartan therapy reduces the risk of SCD, regardless of ICD use or eligibility, with a more pronounced effect observed in patients with nonischemic cardiomyopathy.

ARNI therapy with sacubitril/valsartan may lead to reverse remodeling and attenuation of myocardial fibrosis, potentially reducing the risk of ventricular arrhythmias.

Clinically, sacubitril/valsartan has shown efficacy in reducing the burden of ventricular arrhythmias and appropriate ICD therapy.

LEFT MAIN STENTING VS. CABG: A COMPARATIVE REVIEW

Dr Mrinal Kanti Das, Kolkata

Factors determining the choice of percutaneous coronary intervention (PCI) and CABG:

- Feasibility of both types of vascularization – HEART Team, equipment, patient's preference

- SYNTAX score; Atherosclerotic burden; Need for surgical intervention
- Evaluation of completeness of vascularization
- Age – In younger patients, CABG is preferred; in patients with advanced age, PCI is preferred.

Revascularization for symptomatic left main (LM) coronary artery disease (CAD) is considered the standard of care. Data on recent advances in drug-eluting stents show similar outcomes with CABG and PCI. Nevertheless, long-term outcomes are better with CABG in cases with complex anatomic LM disease. Whereas, PCI is a short-term solution and is preferable in patients with simple anatomy and noncardiac comorbidities only.

CROSSING THE MITRAL VALVE IN DIFFICULT SITUATION

Dr Manjunath CN, Bengaluru

Balloon mitral valvuloplasty (BMV) is a minimally invasive procedure used to treat mitral valve stenosis, characterized by narrowing the mitral valve opening. It involves using a specialized balloon catheter to dilate the narrowed valve and improve blood flow through the mitral valve.

Some key points about BMV: BMV is safe and effective across a broad spectrum of clinical subsets with mitral stenosis. BMV is a guided, graded and gated procedure. BMV can provide positive outcomes in the long-term and is associated with a low rate of restenosis. Echocardiography during the procedure can optimize the outcomes in complex cases.

Additionally, the over-the-wire technique is helpful in difficult entry situations and left atrial thrombus, including type Ia, Ib and IIa.

INTRAVASCULAR LITHOTRIPSY IN THE REAL WORLD: THE REVOLUTION CONTINUES

Dr Sridhar Kasturi, Hyderabad

Advantages of intravascular lithotripsy (IVL):

- IVL offers an effective disruptive action on calcium – very low complication rate
- No debris – Less chances of slow-flow or no-flow phenomenon

- Prevents coronary dissection or perforation
- Selectively interacts with calcified plaque – even in the inner adventitial layer.

Rotablation is preferred over IVL for:

- Severely calcified balloon uncrossable lesions
- Long-segment calcified lesions as it requires multiple IVL balloons of different sizes.

In patients with severe coronary calcification, IVL is safe and effective with minimal complications compared to other techniques like:

- Cutting/scoring balloons
- High pressure balloons or
- Atherectomy devices.

LEFT MAIN BIFURCATION STENTING IN OSTIAL LAD ISR

Dr Tapan Kumar, Jamshedpur

A male patient (87 years old) was admitted with a history of acute-onset chest pain and breathing difficulty. The medical history of the patient showed that he was hypertensive. Additionally, he underwent an s/p percutaneous transluminal coronary angioplasty (PTCA) to ostio-proximal left anterior descending coronary artery (LAD) and proximal left circumflex coronary artery (LCX) in 2018.

The ECG reports of the patient showed that he had an increased level of troponin. Also, the deep T wave was in the lead. The results of the Echo indicated mild hypokinesia of LAD territory. Based on the results, it was diagnosed that the patient suffered from acute coronary syndrome in post-PTCA status. The treatment of the patient included a coronary angiogram and possible PCI.

The following points were highlighted in the case study:

- Ideally, left main bifurcation with LAD ostial in-stent restenosis (ISR) and involvement of other vessels should be considered for CABG surgery.
- Proper selection of bifurcation techniques and adequate planning can result in optimal PCI outcomes.
- It is important to optimize the results by intravascular imaging in LM bifurcation.

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News and Views

Waist-Calf Circumference Ratio: A Better Predictor of Mortality Risk in Older Adults?

Older adults, especially the very elderly, with higher waist-calf circumference ratio (WCR) are at a higher risk of all-cause and cause-specific mortality, according to a new study published in the journal *BMC Public Health*.¹ The study further suggests WCR as a better predictor of mortality compared to body mass index (BMI).

In this study, the associations between mortality (due to any cause as well as a specific cause such as respiratory disease, heart disease, cancer) and anthropometric measures namely WCR, waist circumference (WC), calf circumference (CC) and BMI, in older adults aged 65 years and above (mean age 84.7 years) was analyzed. Scientists from the Department of Geriatrics and Cardiology at Jiujiang First People's Hospital in Jiujiang, China collaborated on this research. For this, they reviewed data of 4,627 participants from the 2014 Chinese Longitudinal Healthy Longevity Survey carried out in 22 provinces of China and followed them up in 2018. More than half (52%) of the study subjects were female.

A total of 1,671 (36.1%) deaths occurred during a median follow-up of 3.5 years; of these, ~23% (n = 332) deaths were due to cardiovascular disease (CVD), 5.3% (n = 88) due to cancer, 10.4% (n = 174) due to respiratory diseases, while 61.5% (n = 1,027) were from other causes. Patients with higher WCR, calculated as the ratio of WC and CC, were older and less educated; women were more likely to have higher WCR. They were nonsmokers, did not drink alcohol, did not exercise regularly and ate fewer vegetables in their diet.

The risk of all-cause mortality was found to be higher in participants in the highest quartile (third and fourth) of WCR with hazard ratio (HR) of 1.22 and 1.42 versus those in second quartile. The risk of CVD-related mortality and death due to other causes was also increased in the fourth quartile of WCR with HR of 1.88 and 1.37, respectively. Subjects in the lowest quartile of CC (vs, second quartile) were at a greater risk of all-cause,

CVD (HR 1.69) and other-cause mortality (HR 1.46), whereas those in the highest quartile had a decreased risk of all-cause and other-cause mortality such as cancer (HR 0.71).

The risk of death due to cancer was more than doubled among participants in the first and fourth quartiles of WC with HRs of 2.19 and 2.69, respectively. However, the association of WC with all-cause mortality was not significant. The risk of death due to any cause (HR 1.15) and mortality related to respiratory diseases (HR 1.56) was increased among those in the lowest quartile of BMI.

The association of calf circumference with all-cause and CVD mortality was particularly strong among the very elderly participants aged 80 years and older compared to the younger subjects.

This study shows that patients with higher WCR and lower CC were at a greater risk of all-cause, CVD, and other-cause mortality. WC was associated with only cancer-related mortality and no significant association was found between WC and all-cause mortality, while lower BMI was associated with an increased risk of all-cause and respiratory disease mortality. These findings therefore suggest that WCR, which incorporates both central obesity and muscle mass, may be more useful as a predictor of all-cause and cause-specific mortality especially in the very elderly vis-a-vis BMI, WC or CC alone.

Reference

1. Dai M, et al. Association of waist-calf circumference ratio, waist circumference, calf circumference, and body mass index with all-cause and cause-specific mortality in older adults: a cohort study. *BMC Public Health*. 2023;23(1):1777.

High Mortality Risk among Smokers with Suspected Bronchiectasis

Persons who have been smokers for a long time with suspected bronchiectasis are at a higher risk of dying within a decade irrespective of their lung function, suggests a new research published in the *Annals of Internal Medicine*.¹

Alejandro A Diaz, from the Division of Pulmonary and Critical Care Medicine, Brigham and Women's Hospital in Boston, USA and colleagues conducted this prospective observational study to determine the association between suspected bronchiectasis and mortality in former and current smokers with a smoking history of 10 or more pack-years. A total of 7,662 adults, aged 45 to 80 years (mean age 60 years), from the COPD Gene (Genetic Epidemiology of Chronic Obstructive

Pulmonary Disease) study were selected for this study; 52% of them were female. On spirometry, 3,277 had normal spirometry results, 986 showed preserved ratio impaired spirometry (PRISm), while 3,399 showed obstructive pattern on spirometry. The primary end point of the study was a diagnosis of suspected bronchiectasis, which was defined as an airway-to-artery ratio (AAR) >1 of >1% on CT scan + 2 of the following symptoms: cough, phlegm, dyspnea and/or history of ≥ 2 exacerbations; 17.6% of the study group were found to have suspected bronchiectasis, while 37.7% had none of these criteria and acted as controls. Nearly 30% (n = 2,095) of the participants died over a median follow-up of 11 years.

After adjusting for variables such as age, sex, BMI, smoking status, subjects identified as suspected bronchiectasis were found to be at higher risk of mortality at 10 years compared to the controls. The difference in probability of 10-year mortality was 0.15 among adults with suspected bronchiectasis + normal spirometry, 0.07 in those with suspected bronchiectasis + PRISm spirometry and 0.06 in those with suspected bronchiectasis + obstructive spirometry versus those without suspected bronchiectasis. In a subgroup analysis of patients with suspected bronchiectasis based only on CT criteria, the 10-year mortality risk was no longer significant among those with normal spirometry with a lower difference in 10-year mortality probability (0.04) compared with the no suspected bronchiectasis group.

Among those with obstructive spirometry and suspected bronchiectasis, the 10-year mortality probability was comparable between those with Global Initiative for Chronic Obstructive Lung Disease (GOLD) stage 1 to 2 COPD and GOLD stage 3 to 4 COPD at 0.29 versus 0.28, respectively.

To conclude, adults with suspected bronchiectasis along with obstructive spirometry are more likely to die within the next decade as shown in this study. Surprisingly, smokers with suspected bronchiectasis but normal lung function were also found to be at higher risk of mortality. Results of this study suggest that incidental detection of features suggestive of bronchiectasis on a chest CT scan coupled with respiratory symptoms, in a person, who is a current or former smoker, warrants thorough evaluation for bronchiectasis.

Reference

1. Diaz AA, et al. Suspected bronchiectasis and mortality in adults with a history of smoking who have normal and impaired lung function: a cohort study. *Ann Intern Med.* 2023;176(10):1340-8.

NT-proBNP: A Marker of CV Risk in Persons with Prediabetes?

Prediabetes is characterized by blood glucose levels, which are higher than normal, but below the cut-off for a diagnosis of diabetes. It is therefore often not taken seriously and ignored. Prediabetes is now recognized as a part of the continuum of dysglycemia as described in a Position Statement of the American Association of Clinical Endocrinologists (AACE), which defined four stages of dysglycemia-based chronic disease: insulin resistance (Stage 1), prediabetes (Stage 2), type 2 diabetes (Stage 3) and vascular complications (Stage 4).¹ People with prediabetes will progress to overt type 2 diabetes in due course of time. There is a lot of evidence to show that prediabetes is not as benign as it was considered to be. People with prediabetes also have CVD risk factors. Hence, compared to normoglycemic individuals, persons with prediabetes are at a significantly higher risk of atherosclerotic cardiovascular disease (ASCVD) and are more likely to suffer an adverse cardiovascular (CV) event.

Can measuring N-terminal pro-B-type natriuretic peptide (NT-proBNP) predict new onset of CVD in persons with prediabetes? To explore this hypothesis, researchers from Cleveland Clinic enrolled 3,235 subjects with prediabetes, who were being evaluated for CV risk.² The participants were followed for occurrence of MACE at 3 years and death due to any cause at 5 years.

Results showed that plasma NT-proBNP was associated with 6 times increased risk of incident MACE at 3 years with HR of 6.04 and 8 times increased 5-year mortality risk (HR 8.64). This association was seen to persist even after adjusting for variables such as CV risk factors, CVD, left ventricular ejection fraction (LVEF) and use of medications (diuretics) with adjusted HR (aHR) of 2.65 for 3-year MACE (major adverse cardiovascular events) and 3.45 for 5-year mortality. "NT-proBNP significantly improved the clinical prognostic value (C-statistic, NRI, IDI) for both 3-year MACE and 5-year death when added to models", noted the authors.

Early intervention to prevent progression to type 2 diabetes is important to prevent the associated macro- and microvascular complications of type 2 diabetes. These findings validate NT-proBNP as a useful aid in predicting the risk of incident MACE and long-term mortality in persons with prediabetes. Identification of at-risk individuals expedites initiation of aggressive preventive measures – lifestyle-based or pharmacotherapy – to prevent acute CV events before they are diagnosed with type 2 diabetes.

References

1. Mechanick JL, et al. Dysglycemia-based chronic disease: an American Association of Clinical Endocrinologists position statement. *Endocr Pract.* 2018;24(11):995-1011.
2. Witkowski M, et al. NT-proBNP and cardiovascular event risk in individuals with prediabetes undergoing cardiovascular evaluation. *Diabetes Res Clin Pract.* 2023;205:110923.

Management of Cesarean Scar Ectopic Pregnancy

Hysteroscopic resection was superior to ultrasound-guided dilation and evacuation (D&E) for the management of cesarean scar ectopic pregnancy, suggests a new study published in the *American Journal of Obstetrics & Gynecology*.¹

This single-center trial was conducted at the University of Naples Federico II in Naples, Italy, between February 2020 and August 2022. For this they selected 54 women, mean age 34 years, with singleton cesarean scar ectopic pregnancies below 8 weeks and 6 days of gestation and myometrium thickness of ≥ 1 mm and who had chosen to terminate the pregnancy. All the women included had undergone previous, ranging from 1 to 3, cesarean births. The participants were randomized 1:1 to management with hysteroscopic resection (intervention group) or ultrasound-guided D&E (control group) 1 to 5 days after the last methotrexate dose. Both groups were administered injection methotrexate (50 mg/m²) prior to the procedure on day 1. A second dose was given on the third day. Seven (25.9%) women in the intervention group and 3 in the control group (11.1%) were administered a third dose of methotrexate due to persistent fetal heart activity. The objective of the study was to compare the efficacy of the two procedures for the treatment of cesarean scar ectopic pregnancy. The primary end point was the success rate of the procedures in either group, while the secondary end points comprised duration of hospitalization, need for additional procedures, complications, maternal ICU admission and death.

One hundred percent success rate, defined as “no further treatment required until the complete resolution of the cesarean scar ectopic pregnancy”, was noted in the women who underwent hysteroscopic resection, while in the control group, the success rate was 81.5% with a relative risk of 1.22. The resolution of the pregnancy was determined on the basis of decrease in β -hCG (beta-human chorionic gonadotropin) and finding of no residual gestational material in the endometrial cavity. Five women in the control group required additional procedures viz. laparotomic uterine segmental resection and hysteroscopic resection in one each and

hysterectomies in three cases. Hemorrhage occurred in nearly 15% women in the control group versus 3.7% in the intervention group. Length of hospitalization was shorter in the intervention group compared to the control group; 9.0 days versus 10.0 days, respectively with a mean difference of -1.00 days. None of the participants required intensive care and no maternal deaths occurred. This study demonstrates greater success rate of hysteroscopic resection for the management of cesarean scar ectopic pregnancy in comparison to ultrasound-guided D&E. Shorter length of hospital stay and lower hemorrhage rate were added advantages of hysteroscopy.

Reference

1. Di Spiezio Sardo A, et al. Hysteroscopic resection vs ultrasound-guided dilation and evacuation for treatment of cesarean scar ectopic pregnancy: a randomized clinical trial. *Am J Obstet Gynecol.* 2023;229(4):437.e1-437.e7.

Study Reveals: Leprosy can Affect the Brain and Spinal Cord

A recent systematic review and meta-analysis published in *The Royal Society of Tropical Medicine and Hygiene* revealed that leprosy can affect peripheral nerves, the brain and the spinal cord. The research paper was titled “The Spectrum of Central Nervous System Manifestations in Leprosy: A Systematic Review of Published Case Reports and Case Series.”

Professor RK Garg, Head of the Neurology Department at KGMU, commented that earlier, it was believed that *Mycobacterium leprae*, the bacteria that causes leprosy, primarily troubles the peripheral nerves and does not affect the brain and spinal cord. Hence, the systematic review aimed to explore the involvement of the central nervous system (CNS) in leprosy by analyzing various cohort studies, individual cases and case series. In total, 34 records were identified, consisting of 18 cohort studies and 16 reports describing 27 isolated cases. The study author explained that macroscopic changes in the spinal cord were observed, with *M. leprae* being detected in neurons of the medulla oblongata, the connection between the brainstem and the spinal cord. Additionally, spinal cord and brachial plexus abnormalities were detected in 78% of the patients.

Currently, multidrug therapy is the standard treatment for leprosy. Professor Garg clarified that there would be no immediate alteration in treatment protocols. However, he emphasized the need for doctors to exercise caution, considering that leprosy can affect the brain and spinal cord.

(Source: <https://www.daijiworld.com/news/newsDisplay?newsID=1132804>)

What is the Importance of Life Force?

A physical body becomes useless once the life force is gone. The same body, which was lovable to everyone, becomes a liability after death. Everyone wants to dispose it as early as possible as keeping a dead body at home is considered a bad omen.

During the transfer of dead body from one place to another nobody wants to keep the body in a vehicle other than a hearse van, whose job is only to transport dead bodies. No family will be willing to carry the dead body of a person in a car in which the deceased person has been traveling or driving for years.

Be it for any reason, health or rituals, once you touch a dead body you are required to take a bath before you commence your daily routine.

Within a matter of hours, in the absence of life force, the physical body starts disintegrating and in a matter of days, it shows signs of self-destruction and putrefaction.

This vital force is nothing but the soul, *aatma*, *brahma*, spirit or consciousness described in different Vedic texts.

Adi Shankaracharya in his book *Bhaja Govindam* Shloka 6 says:

Yávat-pavano nivasati dehe

távat-pocChatí kusalam gehe,

gatavati váyau dehápáye

bháryá bibhyati tasmin káye. (6)

“Till the life force remains in the body, people come and enquire about your welfare. But, the moment the life force goes out, even your wife is afraid of coming anywhere near your body”.

Life force can be equated to the network of information in computer, radio, television or mobile phone. All these gadgets without data are useless and are thrown away. This silent data, which can be retrieved by operational and application software, represent the life force or soul of these electronic gadgets.

Just as one does not give importance to a computer without data, one should not give importance to the physical body. It is the life force within the body which is respected and cared for and that is what real “I” or “We” is. All glories of the body are only until the life force remains in it.

In *Bhagavad Gita*, Lord Krishna in Chapter 2 (2.23) says about this life force or *atman*: “Fire cannot burn it, weapon cannot cut it, water cannot wet it, air cannot dry it; it is immortal”.

Life force has no dimensions: height, weight, color or image. It is immortal, omnipotent, omniscient and omnipresent. The weight of a live and a dead body immediately after the death is the same.

It is the same life force, which dwells in everybody and during life is modified by actions, memory and desire cycles. If one gets attached to any of the three, one starts getting detached from the soul or the life force. People who are in touch with their life force all the time attain peace and happiness and die young in old age.

Most Vedic mahavakyas say that it is the same spirit, which dwells in everybody and hence every person in the society should be welcomed and treated with equal importance. *Aham Brahmasmi*, *Tat Tvam Asi*, *Vasudhaiva Kutumbakam*, etc. are few such examples.

According to Adi Shankaracharya, one can achieve nonduality only by seeing God in everyone. *Athithi devo bhava* is also based on the same principle.





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INSPIRATIONAL STORY

IF AND WHEN

IF and WHEN were close friends. They met every week and had lunch. Their conversations were usually about the things they were going to achieve. They both had dreams and they would love to talk about them.

One Saturday when they met, WHEN could sense that IF was not in a good mood. They sat at the table reserved for them and ordered their lunch. WHEN asked IF, "IF what is wrong with you? You don't seem your usual self?"

IF looked at WHEN and said, "I'm not sure; I just don't feel like I am making any progress. I recently saw a course I wanted to take, if only I had the time to take it."

WHEN could understand how IF felt. "Yeah", replied WHEN, "I saw a course too and I will register when I get enough money." WHEN went on to say, "What about that new job you were going to apply for. You were so excited about it. Did you apply?"

IF replied, "If my computer didn't break down last week, I would have applied. I could not type my resume as my computer is not working."

"Don't worry about it IF, another job will come through. I have also been thinking about looking for another job, but I will wait. When the weather gets nicer, I will look then." WHEN then told IF about his week, hoping that it would cheer him up. The man at the next table couldn't hear WHEN and IF. They both were talking about when this and if that. Finally, he couldn't take it anymore.

HUMOR

AN ADDICTION

Connie told her 4-year-old grandson not to jump on the beds. After several warnings she punished him, explaining that should he fall, he would hurt himself badly.

Several minutes passed and he was back to jumping on the beds.

Connie said, "You weren't jumping on the beds again, were you?"

He stood with his little head dropped low and said, "I'm trying, but it's so hard to quit."

"Excuse me," the man said. The two friends looked at the man and wondered what he wanted? The man said, "I'm sorry, but I just heard your conversation. I think I know how you could solve your problems."

IF thought how could a stranger know how to solve their problems? If only he knew. IF asked the gentleman, "How do you think you can solve our problems?"

The gentleman smiled and said, "You only need listen to yourselves. It reminds me of an old proverb: 'If and When were planted, and Nothing grew'."

IF and WHEN looked confused. The gentleman smiled and said, "Start counting the times you use the words 'if' and 'when'. Rather than thinking 'if and when', start doing, take action. Just stop talking about 'if and when'."

IF and WHEN looked surprised, and realized that the gentleman was right. Both of them were guilty of thinking, acting and living their life for the "if's and when's".

The gentleman left and IF and WHEN's conversation changed. They decided that when they met for lunch next week, there would be no "if's and when's"; they would only talk about what they accomplished!

Dr. Good and Dr. Bad

SITUATION: An obese girl aged 16 years had T1DM. She was asked to control her diet and lose weight.



LESSON: It has been reported that adiposity and lipid-to-carbohydrate intake ratio have an impact on non-HDL-C, which is a gross index of CV risk, irrespective of HbA1c in children and adolescents with T1DM. Thus, it is advised that management of T1DM should also take into account the reduction of CV risk by focusing on glycometabolic control as well as adiposity and diet composition.

Acta Diabetol. 2017;54(6):599-605.

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Books

Stansfield AG. Lymph Node Biopsy Interpretation Churchill Livingstone, New York 1985.

Articles in Books

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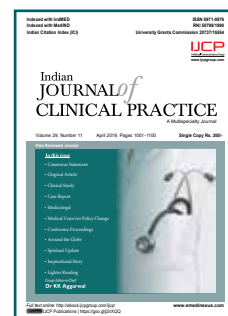
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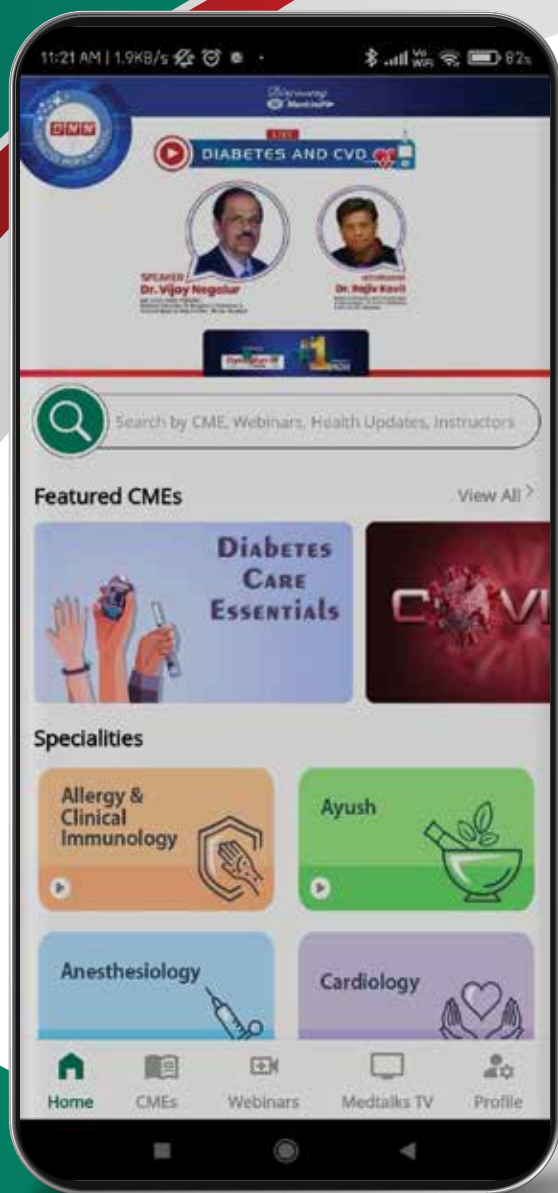
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