

EFFECT OF ORAL SODIUM BICARBONATE IN MAINTAINING ACID BASE BALANCE AND QOL IN CHRONIC KIDNEY DISEASE AND LONG-TERM ACIDOSIS PATIENTS

ABSTRACT :

AIM: Aim of the study is to determine the effect of oral sodium bicarbonate in maintaining acid base balance and quality of life in chronic kidney disease and long-term acidosis patients.

Study design: A prospective observational study.

Study population: Approximately 174 people who came to nephrology department, Selected based upon inclusion and exclusion criteria.

Study criteria / patient enrollment: Patients are enrolled in study based on inclusion and exclusion criteria.

Inclusion criteria: the patients who are diagnosed with CKD and receiving oral sodium bicarbonate as part of treatment

Exclusion criteria: the patients who are having other comorbidities, hypertension, diabetes, and other cardiovascular problems who are not given with oral sodium bicarbonate.

Study Duration : 6 months (December 2021- May 2022)

METHODOLOGY: : A prospective observational study on **EFFECT OF ORAL SODIUM BICARBONATE IN MAINTAINING ACID BASE BALANCE AND QUALITY OF LIFE IN CHRONIC KIDNEY DISEASE AND LONG TERM ACIDOSIS PATIENT'S** which was carried out in the Department of nephrology.

RESULTS: Most of the patients are in between the age of 70-80 years, married, with good nutritional status, with minimum 5 months of CKD ,approximately 50%of the patients are suffering from HTN along with CKD followed by diabetes. Patients are using OSB for a minimum of 5 months with 500mg dose given thrice a day, along with Calcium channel blockers and pantoprazole. OSB is given as a oral tablet.

CONCLUSION: Oral bicarbonate is widely used to correct acidosis in advanced CKD, this is not underpinned by trial evidence, and real uncertainty exists regarding the balance of benefit and risk for this intervention. That we concluded that most of the patients using OSB was analyzed from nephrology department in QOL, in maintaining acid-base balance was observed in CKD patients.

KEYWORDS: Chronic kidney disease, Metabolic disease, Oral sodium bicarbonate,

Quality

of

life.

.

1.INTRODUCTION: Chronic kidney disease (CKD) is the progressive, irreversible decreasing of renal function. Which is resulting from long standing disease, CKD sometimes derives from AKI that does not respond to treatment. [1,15] In a clinical study in patients suffering with CKD (circle 15-30ml/min/1.73(2)), sodium bicarbonate 600mg orally 3 times a day were administered to preserve renal function. Serum bicarbonate was adjusted as needed to maintain serum bicarbonate levels of at least 23mmol per liter Decreased pH due to HCO₃ – reduction is known as metabolic acidosis.[3,24]

Bicarbonate deficit – blood concentration of bicarbonate decreases from 22mEq/L. Oral sodium bicarbonate is used in treating metabolic acidosis in patients suffering with CKD.[5]

ORAL SODIUM BICARBONATE ^[5]

DOSE:

GENERAL DOSING INFORMATION:

178mg of sodium per tablet effervescent contains 770mg of sodium per capful

Neonates and children younger than 2 years, limit rate of administration because rapid injection (10ml/min) may produce hypernatremia.

METABOLIC ACIDOSIS CHRONIC:

Initial,600mg orally 3times daily, increase to maintain serum bicarbonate level at 23mmol/liter or greater.

USES:

Diarrhea severe

Indigestion

Metabolic acidosis chronic

Toxicity of drug

Cardiac arrest due to hyperkalemia

Injection site pain -rocuronium adverse reaction

DOSING ADJUSTMENTS:

ORAL ROUTE

METABOLIC ACIDOSIS (CHRONIC):

In a clinical study in patients suffering with CKD (circle 15-30ml/min/1.73(2)), sodium bicarbonate 600mg orally 3 times a day were administered to preserve renal function. Serum bicarbonate was adjusted as needed to maintain serum bicarbonate levels of at least 23mmol per liter.

SODIUM CONTENT:

The sodium bicarbonate tablet contains 178mg of sodium per tablet

ADMINISTRATION:

If the dosage is in the form of powder, then dissolve in one half glass of cool water, take while effervescing.

CONTRAINDICATIONS:

Chloride loss, by vomiting or from continuous gastrointestinal suction.

Concomitant use with diuretics that produce hypochloremia alkalosis.

PRECAUTIONS:

Elderly, dose adjustment recommended.

Metabolic acidosis associated shock monitoring recommended.

Potassium depletion increased risk of metabolic alkalosis.

Renal impairment, sodium retention may occur.

Sodium restricted diet, use not recommended unless advised by physician.

Anuria or oliguria, increased risk for excessive sodium retention.

ADVERSE EFFECTS

CARDIOVASCULAR EFFECTS:

Decreased cardiac output

Hypotension

Injury of vein

DERMATOLOGICAL EFFECTS:

Cellulitis

Injection site extravasation

Skin ulcer

Tissue necrosis

Vascular calcification

ENDOCRINE METABOLIC EFFECTS:

Metabolic alkalosis

DRUG INTERACTIONS:

Acalabrutinib

Amphetamine

Aspirin

Atazanavir

Benzenediamine

Bosutinib

Cabotegravir

Cefpodoximeproxetil

Chloroquine

Chlorpropamide

Coltronic acid
Cysteamine • Masitinib
Deflazacort
Dextroamphetamine
Digoxin
Erdafitinib
Erlotinib
Flecainide
Gefitinib
Hydroxychloroquine
Iron
Itraconazole
Ketoconazole
Ledipasvir
Lisdexamfetamine
Lithium
Mecamylamine
Mefenamic acid Memantine
Mepenzolate
Methamphetamine
Neratinib
Octreotide
Pazopanib
Ponatinib
Pseudoephedrine
Rifampin
Sotorasib
Selpercatinib
Sulpiride
Tetracycline
Velpatasvir

PREGNANCY AND LACTATION

A. TERATOGENICITY/EFFECTS IN PREGNANCY:

Crosses placenta –unknown

Frequent use of this drug as an antacid may result in metabolic alkalosis and fluid overload in both

mother and fetus injection or infusion of sodium bicarbonate has been used to treat fetal hypoxic stress, fetal acidosis to prevent metabolic acidosis during labor and to improve acid base balance in normal full-term infants.

B. BREAST FEEDING:

World health organization: compatible with breast feeding.

Infant risk is minimal. Except consensus suggests this drug poses minimal risk to the infant when used during breast feeding.

The WHO considers sodium bicarbonate to be compatible with breast feeding:

No reports describing the use of sodium bicarbonate during human lactation or measuring the amount, if any of the drug excreted into milk have been located.

MONITORING EFFECTS OF SODIUM BICARBONATE A. THERAPEUTIC:

LABORATORY PARAMETERS:

Blood ph.

Arterial blood gases

Total co2

Urinary Ph

CLINICAL:

Correction of acidosis

Increase in renal clearance of acidic drugs /chemicals

Bowel evacuation

TOXIC PARAMETERS:

LABORATORY PARAMETERS

Blood pH

Arterial blood pH

Total co2

Serum electrolytes

Serum osmolality

Blood glucose

Renal function

Urinary chloride

EKG

CLINICAL:

Nausea, vomiting, weakness

Blood pressure.

MECHANISM OF ACTION SYSTEMIC ALKALISER:

Increase the plasma bicarbonate, buffers excess hydrogen ion concentration, and raises blood pH, thereby reversing the clinical manifestations of acidosis:

ALKALIZER:

URINARY:

Increases the excretion of free bicarbonate ions in urine, thus effectively raising the urinary pH. By maintaining an alkaline urine, the actual dissolution of uric acid stones may be accomplished

2. MATERIALS AND METHODS/EXPERIMENTAL DETAILS/METHODOLOGY:

Sodium Bicarbonate In Maintaining Acid Base Balance And Quality Of Life In Chronic Kidney Disease And Long Term Acidosis Patient's which was carried out in the Department of nephrology.

Study design: A prospective observational study.

Place of study: A prospective observational study on Effect Of Oral Sodium Bicarbonate In Maintaining Acid Base Balance And Quality Of Life In Chronic Kidney Disease And Long Term Acidosis Patient's which was carried out in the Department of nephrology.

Study population: Approximately 174 people who came to nephrology department.

Study criteria / patient enrollment: Patients are enrolled in study based on inclusion and exclusion criteria.

Inclusion criteria: the patients who are diagnosed with CKD and receiving oral sodium bicarbonate as part of treatment

Exclusion criteria: the patients who are having other comorbidities, hypertension, diabetes, and other cardiovascular problems who are not given with oral sodium bicarbonate.

Study Materials:

A. Patient informed consent form

B. A specially designed patient data collection proforma.

Study Method: This study will be initiated after obtaining the permission from the institutional review board. The patients will be enrolled in study after taking informed consent from them, the enrolment of patient will be done on basis of inclusion and exclusion criteria.

The data for the present will be collected by graph pad prism, which is well-suited to identify all necessary baseline information, which includes

Patient demographics like

Study procedure:

Age

Socio economic status

Educational status

High risk factors

Past and present history

Laboratory data

Radiographic data

Physician medication order form

NURSE'S medication administration record (drug chart) and any other verbal communication data

1. Analytical epidemiologic studies are most useful for testing a hypothesized association between human exposure and health effects. Analytic study design includes prospective studies.

A prospective observational study was conducted for six months of duration in the NEPHROLOGY DEPARTMENT.

Based on inclusion and exclusion criteria the CKD patients receiving oral sodium bicarbonate were recruited in the study.

The data was collected from graph pad prism and personal (patient representative /and patient). Interviews, by using a well – structured.

Patient data collection proforma and followed up.

All the necessary and relevant baseline information was collected on patient data collection proforma which includes:

Patient demographic details such as age, gender, personal history, habits, and employment status.

Past medication history.

Past medical history.

Present medication.

Risk factors (modifiable and non-modifiable).

The collected and documented data was analyzed based on following parameters.

1. PATIENT DISTRIBUTION BASED ON DEMOGRAPHIC DATA:

Patient distribution based on age

Patient distribution based on gender

Patient distribution based on personal history and social habits.

2. Patient distribution based on risk factors
3. Patient distribution based on drug regimen.
4. Patient distribution based on stage of CKD.

Statistical analysis:

The Percentage method was used to analyse the patient distribution based on various parameters.

T-test will be performed to calculate p-value for the purpose of comparison of results.

The main data was collected from the patients using the questionnaire which was specially designed based on WHO and other health care organizations regulations.
Demographics of patient

DETAILS:-

NAME:-	AGE:-	SEX:-	IP.NO:-	WEIGHT:-
BLOOD GROUP:-		OCCUPATION:-		DIAGNOSIS:-

Present illness: -	Personal history: -
Smoking(Y/N) :-	Personal history: -
Comorbid conditions: -	Hypertension(Y/N):-
Diabetes mellitus:(Y/N) :-	Others:

VITALS:-

BP:-	Temperature:-	Pulse:-	Respiratory rate:-
------	---------------	---------	--------------------

LABARATORY REPORTS:-

	MCHC	
	RDW	
	ROUTINE URINE EXAMINATION	
	Physical appearance	
	colour	
	Specific gravity	
	ANALYTES	
	Protein	
	glucose	
	ketones	
	bilirubin	
	urobilinogen	
	MICROSCOPY	
	RBC	

	Pus cells	
	Epithelial cells	
	ACR	
	casts	
	24 Hour Urea Protein	

ASSESSMENT PARAMETERS OF METABOLIC ACIDOSIS

Arterial blood gas	
PaCo2	
PaO2	
bicarbonate	

Anion gap	
SODIUM BICARBONATE	
Dose per day:	
Dosage form:	
Number of doses/days:	
Frequency :	
Duration of therapy:	
Any ADRS Observed:	
Any interactions found:	

DIALYSIS INFORMATION
No of times in a week:
Duration of each dialysis :
Type of dialysis performed:
Drugs used during session:

DRUG	BRAND	DOSE	ROA	FREQUENCY

MEASUREMENT OF QOL OF PATIENTS:The QOL of the patients was measured or estimated based on the following factors

TREATMENT REGIMEN:-

Chronic Kidney Disease Patient Questionnaire

You have most likely been referred to this clinic by a health care professional or yourself to address concerns about impaired kidney function. This is a short questionnaire designed to help your doctor fully evaluate and manage your kidney health.

Section I: Kidney Disease

1. Have you ever been told you have kidney disease? Y / N (If no, skip to next section)
2. How long has it been since you were first diagnosed? (Circle one) < 1 year / 1-3 years /3-5 years / 5-10 years / > 10 years
3. How was this diagnosed? (Check those that apply)
Blood test (elevated creatinine)

Protein in the urine

Other: _____

4. Have you been told what caused your kidney disease (e.g. diabetes, high blood pressure, glomerulonephritis, kidney stones, medication, related to surgery or severe medical illness)

5. Have you ever had any of the following (Check if yes):
Kidney problems at birth or in childhood?
Hospitalization due to kidney failure?
Kidney failure while hospitalized for another reason?
Kidney stones?
Bladder or kidney infections?
Difficulty emptying your bladder?
Bladder or other urologic surgery?
Radiation to the abdomen or pelvis?
Chemotherapy for cancer?
Family history of kidney disease?
Blood in the urine?
Foamy urine?

If you answered yes to any of the above, please enter more details here:

Section II: Medications

1. Do you use regularly pain or antiinflammatory medicines or NSAIDS (i.e. Aleve, naproxen, ibuprofen, Motrin)? Y / N
 - a. If yes, how often? at least daily / 3 times per week / once a week / once amonth
 2. Do you use herbal supplements? Y / N
- a. If yes, list them here please:

Section III: High blood pressure

1. Do you have high blood pressure or take medicine for high blood pressure? Y / N
(If no,skip to next section).
2. How long ago were you first diagnosed? < 1 year / 1-3 years / 3-5 years / 5-10 years / >10 years
3. Do you check your blood pressure at home? Y / N
4. If yes, how often? Daily / several times per week / once per week / once per month)
5. How often is your blood pressure greater then 140/90? Most of the time / occasionally /never
6. Do you add salt to your food? No / occasionally / often / with each meal
7. Do you eat canned or processed food? No / occasionally / few times a week / every day
8. If you exercise, how often? at least daily / 3 times per week / once a week /once a month
9. Do you snore? Y / N
10. If yes, are you sleepy during the daytime or take frequent naps? Y / N
11. Have you ever been hospitalized for high blood pressure? Y / N
12. Have you had a stroke? Y / N
13. Do you have heart failure? Y / N
14. Have you had a heart attack? Y / N
15. Have you had a surgery for arteries supplying the legs? Y / N

Section IV: Diabetes

1. Have you ever been told you have diabetes or prediabetes? Y / N (If no, skip to nextsection)
2. How long ago were you first diagnosed? < 1 year / 1-3 years / 3-5 years / 5-10 years / > 10 years
3. Do you take or have you ever taken pills for diabetes? Y / N
-If yes, how many years did you take it? < 1 / 1-5 / 5-10 / > 10

-If you have stopped taking, how long ago did you stop (yrs)? < 1 / 1-5 / 5-10 / > 10
4. Do you take or have you ever taken insulin? Y / N
-If yes, how many years did you take it? < 1 / 1-5 / 5-10 / > 10

- If you have stopped taking, how long ago did you stop (yrs)? < 1 / 1-5 / 5-10 / > 10
5. How well have you blood sugars been controlled? Usually < 100 / 100-150 / 150-200 / > 200 / I don't check them
6. Do you have eye disease from diabetes? Y / N

-
-
7. Have you had laser treatment for your eyes? Y / N
 8. Do you have numb feet? Y / N

Section V: Anemia

1. Have you ever been told you were anemic, had a low blood or hemoglobin count? Y / N (If no, skip to next section).
2. How long ago were you first diagnosed? < 1 year / 1-3 years / 3-5 years / 5-10 years / > 10 years
3. Have you had to take medication to prevent anemia? Y / N If yes what type:Folate or folic acid Y / N

Dose:_____

Iron (pills or injections) Y / N

Dose:_____

Vitamin B12 Y / N

Dose:_____ Epogen or .

Dose:_____

4. Do you have any black stools? Y / N
5. Do you have any bright red blood in your stool? Y / N
6. Do you have any blood in your urine? Y / N
7. If female, do you still menstruate? Y / N

If yes, how often:_____

8. Do you have a family history of anemia? Y /NIf yes, please explain below:

9. Have you ever been diagnosed with the following:

Lymphoma	Y / N
Leukemia	Y / N
Vomiting blood	Y / N
Stomach ulcers	Y / N
Recurrent nosebleeds	Y / N

Any other cance

RESULTS AND DISCUSSION: Most of the patients are in between the age of 70-80 years, married, with good nutritional status, with minimum 5 months of CKD ,approximately 50%of the patients are suffering from HTN along with CKD followed by diabetes. Patients are using OSB for a minimum of 5 months with 500mg dose given thrice a day, along with Calcium channel blockers and pantoprazole. OSB is given as a oral tablet. In our study we have gathered the data of the patients who are using oral sodium bicarbonate are considered based on inclusion and exclusion criteria. The main reason for admission in the nephrology ward and reasons for using oral sodium bicarbonate are evaluated and estimated in the CKD patients .The comorbid conditions of the patients and duration of treatment its effects are also analyzed .Mostly the information regarding oral sodium bicarbonate is analyzed and documented. The quality of life of the patient before and after oral sodium bicarbonate usage and treatment outcomes changes in lifestyle was also discussed. The following tables are used to obtain results.

Table:1 Showing age, marital status, nutritional status and education of patients.

Age	No. of patients	Percentage(%)
10-20	2	1.14
20-30	6	3.44
30-40	19	10.91
50-60	36	20.68
60-70	38	21.83
70-80	51	29.31
80-90	22	12.643
90-100	00	00
Marital status		
Married	166	95.4
Unmarried	8	4.5

Education		
Primary education	2	1.1
Secondary education	120	68.9
Higher education	4	2.2
Uneducated	48	27.5
Nutritional status		
Excellent	13	7.47
Good	97	55.7
Poor	64	36.7

Table:2 Showing duration of chronic kidney disease

Duration of CKD	No. of patients	Percentage(%)
12	32	18.39
5	74	42.52
1	13	7.47
3	34	19.54
6	3	1.72
8	18	10.34

Table:3 Showing reasons for patient admission

Reason for admission	No. of patients	Percentage(%)
CKD with HTN	86	49.42
DCMP WITH LV Dysfunction	22	12.6
DM with CKD	38	21.38
Urosepsis	12	6.8
Anemia	8	4.59
UTI	8	4.59

Table:4 Showing treatment outcomes

Treatment outcomes	No. of patients	Percentage(%)
Recovered	124	71.26
Not recovered	47	27.0
No change	00	00

Shifted to higher centres	00	00
Left against to medical advice	00	00
Economic burden	3	1.724

Table:5 Showing Duration of oral sodium bicarbonate

Sodium bicarbonate duration (months)	No . of patients	Percentage (%)
1	13	7.47
3	34	19.54
5	106	60.91
6	3	1.72
8	18	10.34

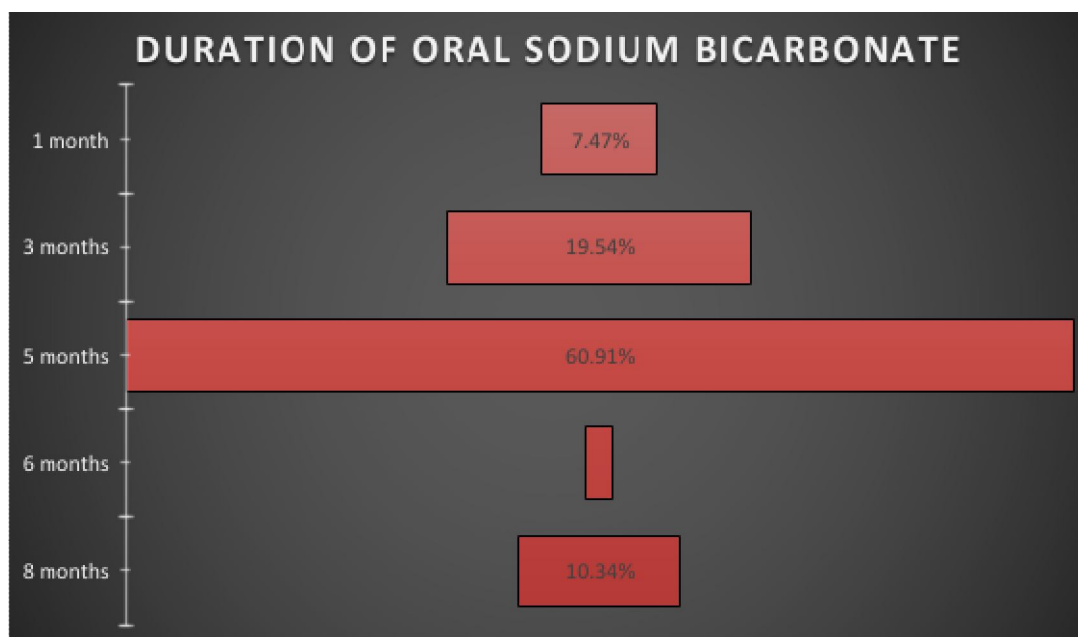


Figure 2 : Duration of oral sodium bicarbonate

Table:6 Showing routes of oral sodium bicarbonate

Sodium bicarbonate route	No. of patients	Percentage (%)
Oral	174	100
Other routes	0	0

Table:7 Showing treatment for metabolic acidosis

Treatment for acid base balance	No. of patients	Percentage (%)
Sodax	116	66.66
Sobonix	1	0.57
Sobosis	57	32.75

Table:8 Showing doses of oral sodium bicarbonate

Dose of oral sodium bicarbonate	No. of patients	Percentage(%)
1 gm ,OD	35	20.11%
500mg , TID	139	79.88%

Table 9:Showing different class of drugs used in CKD

Class of drug	No. of patients	Percentage(%)
Calcium channel blockers	97	55.74%
Aminoglycosides antibiotics	53	30.45%
Cephalosporin antibiotics	72	41.37%
Nutritional supplements	159	91.37%
Antacids	162	93.1%
Ca supplements	45	25.8%
Alkalisng agent	174	100%

Table:10 Showing mostly used drugs with oral sodium bicarbonate.

Drug	No. of patients	Percentage(%)
Tab.Nicardia	97	55.74%
Tab.Lasix	72	41.37%
Tab.Azithromycin	53	30.45%
Tab.Cefglobe	72	41.37%
Tab.Pantoprazole	162	93.1%
Tab.Shelcal	45	25.8%
Tab.Meropenem	46	26.43%

Table:11 Showing quality of life of patients

Quality of life	No. of patients	Percentage(%)
-----------------	-----------------	---------------

Excellent	44	25.28
Good	69	39.65
Poor	61	35.05

DISCUSSION

In our study we have gathered the data of the patients who are using oral sodium bicarbonate are considered based on inclusion and exclusion criteria the patients who are willing to provide the information are gathered and tabulated in the results like demographics which include age ,marital status, education and nutritional status .The main reason for admission in the nephrology ward and reasons for using oral sodium bicarbonate are evaluated and estimated in the CKD patients .The comorbid conditions of the patients and duration of treatment its effects are also analyzed .Mostly the information regarding oral sodium bicarbonate is analyzed and documented. Different categories of drugs used for this complications and mechanism and effect of drug on this health was observed .We also estimated the most frequent used drugs in CKD was reported in our study .The quality of life of the patient before and after oral sodium bicarbonate usage and treatment outcomes changes in lifestyle was also estimated and evaluated our study also explains about the acid base balance regulation by using different class of drugs for this conditions which are also regulated and discuss. The main data was collected from the patients using the questionnaire which was specially designed based on WHO and other health care organizations regulation.

CONCLUSION:

Oral bicarbonate is widely used to correct acidosis in advanced CKD, this is not underpinned by trial evidence, and real uncertainty exists regarding the balance of benefit and risk for this intervention. As most patients with CKD are old, and many are frail, it is critical that trials testing such interventions enroll typical patients and use outcome measures that are relevant to older people. Few older people with even advanced CKD will progress to end-stage renal disease; the risk of death from cardiovascular disease or infection often supervenes long before the need for renal replacement therapy. The range of outcomes selected for this study will allow an estimation of overall net benefit or harm across a range of disease outcomes including renal, and also maintaining acid base balance, as well as focusing on outcomes that are important to patients. So that we concluded that most of the patients using OSB was analyzed from nephrology department in QOL, in maintaining acid-base balance was observed in CKD patients .OSB supplements produce a dose dependent increase in serum

bicarbonate was observed. Clinicians and clinical pharmacists have updated knowledge for treating the condition by using OSB. Future studies should determine improvement .

Consent

As per international standard or university standard, patients' written consent has been collected and preserved by the author(s).

Ethical Approval:

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

Conflict of interest: No

Funding: Self

ACKNOWLEDGEMENTS: All thanks and praises to God almighty for his countless, abundant and never-ending blessings in completing this work. It is a proud privileged honor for us to express our heartfelt thanks and gratefulness to all the persons who backed us directly or indirectly through out of this research work as magnitude. Most importantly authors are thankful to patients and health care professionals.

REFERENCES:

1. Comprehensive pharmacy review for NAPLEX, VIIIth edition 2013 By Leon Shargel, Alan H. Mutnick, Paul F. Souney, Larry N. Swanson, chapter 48 page no. 986-990. Published by Wolters Kluwer health.
2. Quality of life patient needs power point presentation by Dr. Magda Bayoumi, Lecturer, Nursing college, King Saud University. <https://slideplayer.com/slide/5866944/>.
3. [https://www.kidney-international.org/article/S0085-2538\(15\)54104-5/fulltext](https://www.kidney-international.org/article/S0085-2538(15)54104-5/fulltext)
4. [https://www.ackdjournal.org/article/S1548-5595\(07\)00098-5/fulltext](https://www.ackdjournal.org/article/S1548-5595(07)00098-5/fulltext)
5. Product Information: sodium bicarbonate IV injection, sodium bicarbonate IV injection. Hospira, Inc, Lake Forest, IL, 2006.
6. Product Information: sodium bicarbonate oral tablets, sodium bicarbonate oral tablets. Rugby Laboratories, Inc, Duluth, GA, 2008.
7. Product Information: BRIOSCHI effervescent antacid, sodium bicarbonate effervescent..antacid. Brioschi, Inc, Fair Lawn, NJ, 2005.
8. VandenHoek TL, Morrison LJ, Shuster M, et al: 2010 American Heart Association guidelines for cardiopulmonary resuscitation and emergency cardiovascular care science. Part 12: cardiac arrest in special situations. *Circulation* 2010;122(18Suppl3):S829-S861.
9. de Brito-Ashurst I, Varaganam M, Raftery MJ, et al: Bicarbonate supplementation slows progression of CKD and improves nutritional status. *J Am Soc Nephrol* 2009;20(9):2075-2084. [PubMed Abstract: http://www.ncbi.nlm.nih.gov/...](http://www.ncbi.nlm.nih.gov/...)
10. Kleinman ME, Chameides L, Schexnayder SM, et al: 2010 American Heart Association guidelines for cardiopulmonary resuscitation and emergency cardiovascular care. Part 14: pediatric advanced life support. *Circulation* 2010; 122(18Suppl.3):S876-S908.
11. Kleinman ME, Chameides L, Schexnayder SM, et al: Pediatric advanced life support: 2010 American Heart Association Guidelines for Cardiopulmonary Resuscitation and

- Emergency Cardiovascular Care. Pediatrics 2010; 126(5):e1361-e1399.
12. Wear J, McPherson TB, &Kolling WM: Stability of sodium bicarbonate solutions in polyolefin bags. Am J Health Syst Pharm 2010; 67(12):1026-1029. [PubMedAbstract:http://www.ncbi.nlm.nih.gov/...](http://www.ncbi.nlm.nih.gov/...)
13. Mylan Suma Bhuvana, Murthysetty Likitha, Thirugabathina Swathi, A.C Nikila Teja, Dr. Kudipudi Harinadha Baba, Dr. Kanamala Arun Chand Roby (2021). Evaluation of Safety and Efficacy of Antibiotics in Respiratory Tract Infection Patients in a Tertiary Care Teaching Hospital: Prospective Observational Study. Int Res J Clin Stud Pharm Trends, 1(2);1-6. [PubMedAbstract:http://www.ncbi.nlm.nih.gov](http://www.ncbi.nlm.nih.gov)
14. Kirkland WD, Jones RW, Ellis JR, et al: Compatibility studies of parenteral admixtures. AmJHospPharm 1961;18:694-699.
15. Brar SS, Shen AY, Jorgensen MB, et al: Sodium bicarbonate vs sodium chloride for the prevention of contrast medium-induced nephropathy in patients undergoing coronary angiography: a randomized trial. JAMA 2008; 300(9):1038-1046. [PubMedAbstract:http://www.ncbi.nlm.nih.gov/...](http://www.ncbi.nlm.nih.gov/...)
- 16.. Merten GJ, Burgess WP, Gray LV, et al: Prevention of contrast-induced nephropathy with sodium bicarbonate: a randomized controlled trial. JAMA 2004;291(19):2328-2334. [PubMedAbstract:http://www.ncbi.nlm.nih.gov/...](http://www.ncbi.nlm.nih.gov/...)
17. Product Information: sodium bicarbonate intravenous injection solution, sodium bicarbonate intravenous injection solution. Fresenius Kabi USA, LLC (perDailyMed), Lake Zurich, IL, 2013.
18. Roby KAC, Bhargavi SL, Sri GD, Madhuri A, Kamakshi S, Bhagyaraj K, et al. Effect of a novel coronavirus in human and its clinical diagnosis and implications by students of community pharmacy. Int J Basic Clin Pharmacol 2020;9:1140-6.
18. Product Information: Sodium bicarbonate injection, sodium bicarbonate. LyphoMed, 1987.
19. Anon: Breastfeeding and Maternal Medication. World Health Organization, Geneva, Switzerland, 2002.
- 20, Hamm, LL; Nakhoul, N; Hering-Smith, KS (7 December 2015). "[Acid-Base Homeostasis](#)". *Clinical Journal of the American Society of Nephrology*. **10** (12): 2232–42. [doi:10.2215/CJN.07400715](https://doi.org/10.2215/CJN.07400715). [PMC 4670772](#). [PMID 26597304](#).
- 21.J., Tortora, Gerard (2012). *Principles of anatomy & physiology*. Derrickson, Bryan. (13th ed.). Hoboken, NJ: Wiley. pp. 42–43. [ISBN 9780470646083](#). [OCLC 698163931](#).
22. Stryer, Lubert (1995). *Biochemistry (Fourth ed.)*. New York: W.H. Freeman and

Company. pp. 347, 348. [ISBN 0-7167-2009-4](#).

23. Adrogué, H. E.; Adrogué, H. J. (April 2001). "Acid-base physiology". *Respiratory Care*. **46** (4): 328–341. [ISSN 0020-1324](#). [PMID 11345941](#).

24. Garrett, Reginald H.; Grisham, Charles M (2010). *biochemistry*. Cengage Learning. p. 43. [ISBN 978-0-495-10935-8](#).

25. Diem, K.; Lentner, C. (1970). "Blood – Inorganic substances". in: *Scientific Tables (Seventh ed.)*. Basle, Switzerland: CIBA-GEIGY Ltd. p. 527.

26. Caroline, Nancy (2013). *Nancy Caroline's Emergency care in the streets (7th ed.)*. Buffer systems: Jones & Bartlett Learning. pp. 347–349. [ISBN 978-1449645861](#).

27. Hamm, L. Lee; Nakhoul, Nazih; Hering-Smith, Kathleen S. (2015-12-07) *acid base homeostasis*. *Clinical Journal of the American Society of Nephrology*. **10** (12): 2232–2242. [doi:10.2215/CJN.07400715](#). [ISSN 1555-905X](#). [PMC 4670772](#). [PMID 26597304](#).

28. Levitzky, Michael G. (2013). *Pulmonary physiology (Eighth ed.)*. New York: McGraw-Hill Medical. p. Chapter 9. Control of Breathing. [ISBN 978-0-07-179313-1](#).

29. Rose, Burton; Helmut Rennke (1994) *renal pathophysiology*. Baltimore: Williams & Wilkins. [ISBN 0-683-07354-0](#).

30. Brandis, Kerry. Acid-base physiology Respiratory acidosis: definition. http://www.anaesthesiamcq.com/AcidBaseBook/ab4_1.php

31. Maurizio Bosola., stefaniagiungi., luigitazza., et.al., "Long Term Oral Sodium Bicarbonate Supplementation Does Not Improve Serum Albumin Levels In Hemodialysis Patients" Published online: April 02,2007 PMID: 17409769 DOI: 10.1159/000101484. Published in: Clinical practice.

32. Miles D Witham., Margaret., aimunahmed., et.al, "Clinical And Cost Effective Of Oral Sodium Bicarbonate Therapy For Older Patients With CKD And Low Grade Acidosis A Programmatic ,Double Blind ,Placebo-Controlled Trial" . Published Online: April 09,2020. PMID :32268897. DOI :PMC7144058. Published in : Research article

33. Vandana Menon., Hocinetighiouart., Nubia Smith Vaughn., et.al., "Bicarbonate And Long Term Outcomes In Chronic Kidney Disease" Published on : June 04,2010. PMID :20605301 DOI: 10.10530/j.akjd .2010.03. 023. Published in: American society of nephrology

34. Fang Cheng., Seinlinli., Jinglinwang. et.al., "The effect of oral sodium bicarbonate on renal functions and CVS risk in patients with CKD -A systematic review and meta-analysis". Published on : 7 December ,2021. PMID :34908841 DOI: 10.2147/TCRM.S344592. Published in: Threptic and clinical risk management.

- 35.**Kalani Raphael., Tamara Isakova., et.al., “A Randomized Trial Comparing The Safety, Adherence And Pharmacodynamic Profiles Of 2 Doses Of Sodium Bicarbonate In CKD The Base Pilot Trial”. Published online :17December,2019 PMID :31848294 DOI :10.1681/ASN.2019030287 .Published in :American society of nephrology
- 36.**Michal Melamed., Edward Horwitz., Thomas Hostetter “Effects Of Sodium Bicarbonate In CKD Stages 3 And 4: A Randomized, Placebo – Controlled, Multicenter Clinical Trial”. Published online: November 5,2019 PMID :31699517 DOI: 10.1053/j.ajkd.2019.07.018.Published in: American journal of kidney disease
- 37.**Suhan Alva.,Deviat.,Sharma parkas “ A Study On Effect Of Bicarbonate Supplementation On Progression Of Chronic Kidney Disease” Published Online :Feb 11,2020 PMID: 32269432 DOI: 10.4103/ijn.IJN_93_19. Published in : Indian journal of nephrology
- 38.**Christof Aigner., Daniel Ceja., ChristopherSliber., et.al., “Oral Sodium Bicarbonate Supplementation Does Not Affect Serum Calcification Propensity In Patients With Chronic Kidney Disease And Chronic Metabolic Acidosis” Published online: October 16, 2018 PMID: 31067546 DOI: 10.1159/0004.Published in: clinical trials.
- 39.**BiagioR.DiDiOrio., AntonioBelasis., et.al., “Treatment Of Metabolic Acidosis With Sodium Bicarbonate Delays Progression Of Chronic Kidney Disease: The UBI Study”. Published Online :October 9,2019,PMID :31598912,DOI :10.1007/s406020-019-00656-5.Published in :American society of nephrology
- 40.**PaweenaSusantitaphong., KamalSewaralthahab., NicholasE.Madias “Short- And Long-Term Effects Of Alkali Therapy In Chronic Kidney Disease: A Systematic Review”. Published Online : May 29,2012 PMID :22653322 DOI :10.1159/000339329 .Published in :American society of nephrology
- 41.**LineDeBrito., Mira.,Muhammad., M.Yaqoob “Bicarbonatesupplementation Slows Progression Of CKD And Improves Nutritional Status.” .Published Online: May 18,2009 PMID :19608703 DOI :10.1681/ASN.2008111205. Published in: American society of nephrology
- 42.**Dennis Y Wu.,et.al., “Association Between Serum Bicarbonate And Death In Hemodialysis Patients: Is It Better To Be Acidotic Or Alkalotic?” Published Online: October 20,2005 DOI :10.2215/CJN.00010505. Published in: American society of nephrology
- 43.**Baris Afar.,Reinsurer “Association Between Serum Bicarbonate And Ph. With Depression ,Cognition And Sleep Quality In Hemodialysis Patients”

PublishedOnline:April20,2015,PMID:25894326,DOI:10.3109/0886022X.2015.1038476.Published in: Clinical study.

44.AndreasBodices., Iliana Kiriakou., SofiaSpaia., et.al., “Aiming For The Optimal Bicarbonate Prescription For Maintenance Hemodialysis Therapy In ESRD”PublishedOnline:Feb14,2019PMID:30762289DOI:10.1111/hdi.12710.Published in : American society of nephrology

45.Philippe Choureau.,ClaireRouthier.,Christian Coombe “Con: Higher serum bicarbonate in dialysis patient is protective”. Published Online: July 13,2016 PMID: 27411724 DOI: 10.1093/net/gfw255.Published in: Nephrology dialysis transplantation.

46.Cheuk-Chun Szeto.,et.al., “Oral Sodium Bicarbonate For The Treatment Of Metabolic Acidosis In Peritoneal Dialysis Patient: A Randomized Placebo Control Trial”. Published Online: July 21,2003 PMID: 12874466 DOI:10.1097/01.asn.0000080316.37254.7a Published in: American society of nephrology.

47.Ezio Merville., Paola Gaga., CorradoCamerini., et.al., “Effect Of Oral Sodium Bicarbonate Supplementation On Interdialytic Weight Gain, Plasma Sodium Concentrations And Predialysis Blood Pressure In Hemodialysis Patients”. .PublishedOnline:August25,2005PMID:16088106DOI:10.1159/000087195.Published in: Clinical trial.

48.MartinaGaga., AlexanderRepitz., et.al., “Effect Of Oral Sodium Bicarbonate Treatment On 24-Hour Ambulatory Blood Pressure Measurements In Patients With Chronic Kidney Disease And Metabolic Acidosis”. Published Online: September06,2021DOI: 10.3389/fmed.2021.711034.Published in: Clinical research.

49.Daniel Cejka., MaxPlischke., Alice Schmidt., et.al., “Effect Of Oral Sodium Bicarbonate Supplementation On Progression Of CKD In Patients With Chronic Metabolic Acidosis : Study Protocol For A Randomized Controlled Trial (So Bic-Study)”. Published Online :July 04,2013 PMID :23826760 DOI :10.1186/1745-6215-14-196 .Published in : Clinical trials.

50.Nimrit Gorayaet.al.,“Fruits And Vegetable Treatment Of Chronic Kidney Disease – Related Metabolic Acidosis Reduces Cardiovascular Risk Better Than SodiumBicarbonate”.PublishedOnline:April17,2019PMID:30995657DOI:10.1159/00050004 2. Published in: American journal of nephrology.

ABBREVIATIONS:

SL.NO	ACRONYMS & ABBREVIATIONS	TERMINOLOGY
1	OSB	Oral Sodium Bicarbonate
2	QOL	Quality of life
3	CKD	Chronic Kidney Disease
4	GFR	Glomerular Filtration Rate
5	AKI	Acute Renal Failure
6	CHF	Congestive Heart Failure
7	GIF	Gastro Intestinal Tract
8	BUN	Blood Urea Nitrogen
9	ACE	Angiotensin Converting Enzyme
10	PT	Prothrombin Time
11	FDA	Food and Drug Administration
12	ESRD	End Stage Renal Disease
13	WHO	World Health organization
14	VA	Alveolar Ventilation
15	COPD	Chronic Obstructive Pulmonary Disease
16	ABG	Arterial Blood Gas
17	CO	Carbon monoxide
18	OHS	Obesity Hypoventilation Syndrome
19.	DCMP	Dilated cardiomyopathy

