EVALUATING THE EFFECT OF A NATUROPATHIC DIET ON URINE PH IN PATIENTS AGED BETWEEN 18 AND 60 YEARS TAKING TREATMENT IN A RESIDENTIAL NATUROPATHY HOSPITAL AT COIMBATORE

Dr Ramya Satish[1], (Dr) SatyaLakshmi Komarraju[2], Dr Sathyanath D[3], Dr Shrikanth Muralidharan[4*]

Article History: Received: 12.12.2022 **Revised:** 29.01.2023 **Accepted:** 15.03.2023

Abstract

Background:
It is well recognized that dietary acidic load directly or indirectly affects overall health in many aspects. One's food habit is responsible for the dietary acidic load by producing acid or alkaline precursors. Naturopathy is an alternative system of medicine which highly emphasizes lifestyle changes for disease prevention and management. One of its basic principles is to consume more naturally available food like fruits and vegetables and avoid food from animal sources and processed food helping the body to maintain an appropriate acid-base balance. This study aims to evaluate the urine pH of patients admitted to a residential naturopathic hospital before and after the naturopathic diet intervention of 1 week.

Methods:
Every patient [n=35] who got admitted from February 2022 to April 2022 was recruited for this prospective single-centre single-arm pre-post study to evaluate the effect of a naturopathic diet on urine pH, considering the inclusion and exclusion criteria. A one-week naturopathic diet intervention was given to the patients. The urine pH was measured before and after the naturopathic diet intervention, as urine pH reflects our body's net endogenous acid production [NEAP]. Many clinical trials and reviews describe the importance of dietary acidic load in disease prevention and management. However, no study portrays the importance of the naturopathic diet principle in disease prevention and management relating to dietary acidic load.

Results:
There was a significant difference in the mean outcomes of the group [p=0.007]. The intervention increased the urinary pH after seven days.

Conclusion:
A naturopathy diet can positively affect health by maintaining the urine pH at appropriate levels and preventing our body from many metabolic conditions.

Keywords: dietary acidic load, naturopathic diet, urine pH

[1]Clinical Research Fellowship Student, National Institute of Naturopathy, Ministry of India, GoI, Pune, India
[2]Director, National Institute of Naturopathy, Ministry of India, GoI, Pune, India
[3]Senior Medical Officer, National Institute of Naturopathy, Ministry of India, GoI, Pune, India
[4*]Course Coordinator, Department of Research, National Institute of Naturopathy, Ministry of India, GoI, Pune, India

DOI: 10.31838/ecb/2023.12.s2.073

1. Introduction

The nature of a diet can affect the acid-base balance of our body by producing acid or base precursors. A protein-rich diet, especially from animal sources, increases acid production and causes a low-grade metabolic acidosis state. This low-grade metabolic acidosis [MA] can cause alterations in our body, including insulin resistance, diabetes, hypertension, bone disorders, and other complications. A diet rich in fruits and vegetables increases the production of base precursors [1,2]. Thus, the capacity of a food to produce acid or base precursors is termed the Potential Renal Acidic Load [PRAL]. Higher the PRAL higher the acid production and the lower the urine pH. Urine pH is an indicator of net endogenous acid production in our body. The net endogenous acid production [NEAP] is the total amount of acid excreted in urine [3]. Processed food and food from animal sources have a higher dietary acidic load. However, naturally available food like fruits and vegetables are alkaline which helps to prevent our health from disease conditions [4,5]. By following the naturopathic diet principle, one can prevent the occurrence of so many metabolic disorders by maintaining the urine pH at an appropriate level because increased net acid production in our body is highly linked to causing the number of metabolic disorders. To confirm this hypothesis, the subjects were given a one-week naturopathic diet intervention, and the urine pH was measured before and after the intervention.

2. Materials and methods

Ethical clearance from the National Institute of Naturopathy ethical committee was obtained [01/0822021] before the study, and permission from JSS Nature Cure and Yoga hospital was also obtained for data collection.

Type of Study

This was a prospective single centre single-arm pre-post study

Sampling method

Convenience sampling

Patient recruitment

The subject recruitment was from the naturopathy IP department at JSS Nature Cure and Yoga Hospital Coimbatore. Information about the study was provided during admission, and the patient's informed consent was taken. Based on inclusion and exclusion criteria, subjects were recruited for the study.

Eligibility criteria

Inclusion criteria

patient getting admitted to a naturopathic department for at least one week, adult male and female aged 18 to 60 years.

Exclusion criteria

The patient who is already following a naturopathic diet regimen and the patient with the following conditions are excluded from the study since it can affect the urine pH. They are Kidney stones, diabetic ketoacidosis, dehydration, acidosis, starvation, diarrhoea, kidney failure, gastric suctioning, respiratory alkalosis, kidney tubular acidosis, pyloric obstruction, and urinary tract infection. Patients taking medications which can alter the urine pH were also excluded from the study [6].

Sample size and study duration

Every patient [n=35] who got admitted from February 2022 to April 2022 was recruited for the study considering the inclusion and exclusion criteria, and the intervention was given for one week. Totally 40 patients were explained about the study and got informed consent. They were taken into the study during the mentioned above. 5 members were dropped from the study and left the hospital for one week.

Study settings

The study was conducted in JSS Nature Cure and Yoga hospital, Coimbatore. The urine samples were tested for pH in the biochemistry laboratory immediately after collecting the samples of each person. Each person recruited for the study was given a sterile container and explained how to collect the clean catch urine samples. The samples were again collected from the participants after one week of their treatment in the naturopathic hospital.

Data collection procedures and instruments used

A clean catch Urine sample was collected with a sterile container during the patient's admission, and the pH was measured immediately. A naturopathy diet was given as an intervention for one week. This includes 3 to 5 servings of fruits and vegetables and 1 to 2 servings of cooked millet. Again, the urine sample was collected after a week and analyzed for the results immediately. The urine pH test strip measures the pH of the urine.

Moreover, the measurement of the strip ranged between 1 and 14 [6]. A trained Pathologist carried out the test. The data were checked for normality of distribution using the Kolmogorov-Smirnov Test of Normality. It was not normally distributed. Hence, the Wilcoxon signed-rank test was used to compare the mean values of pre and post-intervention.

3. Results

The demographic characteristics of participants in the study are described in Table 01.

Table 01: Demographic distribution of the study population.

Age in years	Frequency	Percentage
19-35	14	40

36-50	14	40
51-60	7	20
Gender	**Frequency**	**Percentage**
Male	20	57.14
Female	15	42.86

The following table highlights the comparison of pre and post-intervention of mean urine pH using the Mann-Whitney U test [Table 02].

Table 02: Pre and post-mean value comparison of urine pH.

Group	Mean	SD	P value
Before	6.34	0.58	0.00714
After	6.64	0.55	

There was a significant difference in the mean outcomes of the group [p=0.007]. The intervention increased the urinary pH after seven days.

4. Discussion

The present study focused on the effectiveness of a Naturopathic diet on urine pH. It was a prospective single-centre pre-post study. A recent study reported that urine pH is one of the parameters indicative of dietary acidic load [6]. Most of the time, consuming food with a high dietary acidic load is highly linked to biomarkers of inflammation and hyperglycemia [7]. A higher dietary acid load can increase levels of glucocorticoid which has been associated with brain atrophy and glutamatergic neurotransmission dysfunction leading to depression [8]. The high dietary acidic load causes tubular injury through elevated renal ammonium concentration. The acid retention also activates the intrarenal renin-angiotensin system by stimulating the production of aldosterone and inducing the production of endothelin-1, leading to the progression of kidney disease and injury [9]. It is also a risk factor for developing metabolic disorders [10]. Certain drugs such as methionine [liver disorders and viral infections], mandelate [prevent or control returning urinary tract infections caused by certain bacteria], phosphate salts [cleansing of the bowel, decreased blood phosphate, constipation, high blood levels of calcium, and heartburn], or ammonium chloride [treatment of cough with mucus] reduce urine pH to some extent [11]. Also, furosemide, a loop diuretic used to treat kidney disease, acidifies the urine [12]. Other than the drugs, acidic urine also results from consuming food with a high dietary acidic load. This includes more protein-based animal food, processed food and consuming fewer fruits and vegetables. The present study also observed a low urine pH in most cases, mainly due to the dietary components. These components release acid and alkaline precursors; the acid precursors after metabolism are phosphorus and proteins [mainly the sulphur amino acids, such as cysteine, methionine and taurine, as well as cationic amino acids, such as lysine and arginine]. The nutrients precursors of alkali are potassium, magnesium and calcium. The kidneys eliminate the products from the metabolism of some anions [chlorine, phosphorus, and sulphate], organic acids and cations [sodium, potassium, calcium, and magnesium]. If the amount of anions exceeds that of cations, a mechanism of urinary acid excretion [hydrogen ions H^+] is stimulated. A diet high in protein and phosphorus and low in potassium, calcium and magnesium impacts long-term health since these are considered acidogenic. A continuous low urine pH is indicative of increased net endogenous acid production [13] and leads to low-grade metabolic acidosis [MA][1]. The normal range for urine pH is 4.5 to 7.8 [14]. Nevertheless, a urine pH of 6.5 or less can suggest low-grade metabolic acidosis [15]. One of the complications of low-grade MA is the increase in cortisol secretion and the decrease in its inactivation, leading to hypercortisolism which increases the risk of various metabolic disorders such as sarcopenia, insulin resistance, Type 2 diabetes mellitus and cardiovascular diseases [1] also the metabolic acidosis leads to tissue damage and initiates inflammatory responses. For instance, red meat has protein, phosphorus, and a N-glycolylneuraminic acid, that promotes inflammation. Cruciferous vegetables are a rich dietary source of isothiocyanates and indole chemicals, which have been shown to have anti-inflammatory functions [7]. A low-carbohydrate, high-protein diet with increased acid load results in urine chemistry. Magnesium levels, citrate levels and pH of the urine are decreased, while calcium, undissociated uric acid, and phosphate levels are increased. It results in an increased risk for kidney stones. Calcium as phosphates and carbonates ia a large reservoir of the base in human body. In response to an acid load, these salts are released into the circulation to ensure pH homeostasis, and hence calcium urine loss is always higher [2]. Hence urinary pH is an indicator of the net endogenous acid production in our body based on the dietary acidic load. Maintaining its unacceptable levels helps our body maintain health and prevent many other disease conditions. Naturopathy can play an essential role in controlling this pH and avoiding complications. Diet therapy is

the main modality under naturopathy which stresses that the food must be taken in natural or maximum natural form only. Seasonal fruits, fresh green leafy vegetables and sprouts are excellent natural foods. These diets are alkaline and purify the body, improve health and render it immune to disease. Naturopathy believes that to preserve health; the diet should consist of at least 20% acidic [cooked] and 80% alkaline [uncooked] food [5]. Considering the importance of food in Naturopathy, it is regarded as Basic Medicine. Thus, a naturopathic diet which is more alkaline with more fruits, vegetables and less processed food can help our body maintain an appropriate urine pH by reducing the net endogenous acid production in our body. When the diet is balanced with more alkaline food per the naturopathic diet principle, the body's ionic balance is maintained at appropriate levels and thus helps prevent disease conditions [5]. Hence a natural dietary intervention following the naturopathic diet principle helps to eliminate bodily toxins, helping the body to recover and rejuvenate. The results thus show that the naturopathic diet can maintain the urine pH towards the alkaline side and prevent the body from metabolic disorders during the later stages of life. This experiment provides new insight into the relationship between a Naturopathic diet and urine pH in preventing diseases. Further research is required to prove the efficacy of a naturopathic diet in preventing metabolic disorders with larger sample size and extended time span.

Limitations of the study

The study has a small sample size and a heterogeneous population with a short-term intervention. More studies with larger sample sizes and multicentric interventions are essential for better clinical evidence.

Author contribution:

Ramya Satish- Protocol development, data collection and writing of the manuscript

Satyalakshmi Komarraju- research idea, manuscript writing and approval

Sathyanath D- research idea, manuscript writing and approval

Shrikanth Muralidharan- protocol writing, data analysis, manuscript writing and approval

Conflict of interests- None

Funding- Intra-mural funds funded the study from the National Institute of Naturopathy, Pune

5. References

Osuna-Padilla IA, Leal-Escobar G, Garza-García CA, Rodríguez-Castellanos FE. Dietary Acid Load: mechanisms and evidence of its health repercussions. Nefrologia. 2019 Jul-Aug;39[4]:343-354. doi: 10.1016/j.nefro.2018.10.005.

Schwalfenberg GK. The alkaline diet: is there evidence that an alkaline pH diet benefits health? J Environ Public Health. 2012;2012:727630. doi: 10.1155/2012/727630.

Berardi JM, Logan AC, Rao AV. Plant-based dietary supplement increases urinary pH. J Int Soc Sports Nutr. 2008 Nov 6;5:20. doi: 10.1186/1550-2783-5-20.

Fleming SA, Gutknecht NC. Naturopathy and the primary care practice. Prim Care. 2010 Mar;37[1]:119-36. doi: 10.1016/j.pop.2009.09.002.

Rastogi R [2012] Current Approaches of Research in Naturopathy: How Far is its Evidence Base? J Homeopat Ayurv Med 1:107. doi: 10.4172/2167-1206.1000107

How a Urine pH Test Helps in the Diagnosis of Disease. Available from: https://www.webmd.com/a-to-z-guides/what-to-know-about-a-urine-pH-test

Wu T, Seaver P, Lemus H, Hollenbach K, Wang E, Pierce JP. Associations between Dietary Acid Load and Biomarkers of Inflammation and Hyperglycemia in Breast Cancer Survivors. Nutrients. 2019 Aug 15;11[8]:1913. doi: 10.3390/nu11081913.

Wu T, Hsu FC, Pierce JP. Acid-Producing Diet and Depressive Symptoms among Breast Cancer Survivors: A Longitudinal Study. Cancers [Basel]. 2020 Oct 29;12[11]:3183. doi: 10.3390/cancers12113183.

Rebholz CM, Coresh J, Grams ME, Steffen LM, Anderson CA, Appel LJ, Crews DC. Dietary Acid Load and Incident Chronic Kidney Disease: Results from the ARIC Study. Am J Nephrol. 2015;42[6]:427-35. doi: 10.1159/000443746.

Moghadam SK, Bahadoran Z, Mirmiran P, Tohidi M, Azizi F. Association between Dietary Acid Load and Insulin Resistance: Tehran Lipid and Glucose Study. Prev Nutr Food Sci. 2016 Jun;21[2]:104-9. doi: 10.3746/pnf.2016.21.2.104.

Barsanti JA. Urinary Disorders. Small Anim Clin Diagnosis by Lab Methods. 2012 Jan 1;126–55.

de Bruijn PI, Larsen CK, Frische S, Himmerkus N, Praetorius HA, Bleich M, Leipziger J. Furosemide-induced urinary acidification is caused by pronounced H+ secretion in the thick ascending limb. Am J Physiol Renal Physiol. 2015 Jul 15;309[2]:F146-53. doi: 10.1152/ajprenal.00154.2015.

Scialla JJ, Appel LJ, Astor BC, Miller ER 3rd, Beddhu S, Woodward M, Parekh RS, Anderson CA. Estimated net endogenous

acid production and serum bicarbonate in African Americans with chronic kidney disease. Clin J Am Soc Nephrol. 2011 Jul;6[7]:1526-32. doi: 10.2215/CJN.00150111.

Laboratory Assessment of Kidney Disease. In: Pocket Companion to Brenner and Rector's The Kidney. Elsevier; 2011. p. 21–41. Available from: https://linkinghub.elsevier.com/retrieve/pii/B9781416066408000026

Deena, S. R., Vickram, S., Manikandan, S., Subbaiya, R., Karmegam, N., Ravindran, B., ... & Awasthi, M. K. (2022). Enhanced biogas production from food waste and activated sludge using advanced techniques–a review. Bioresource Technology, 127234.

DiNicolantonio JJ, O'Keefe J. Low-grade metabolic acidosis as a driver of chronic disease: a 21st-century public health crisis. Open Heart. 2021 Oct;8[2]:e001730. doi: 10.1136/openhrt-2021-001730.