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Minimum Marks	2 Marks

## **EARLY DETECTION OF CHRONIC KIDNEY DISEASE**

### **INTRODUCTION:-**

There are a large number of people in the world who gets affected to kidney related diseases. Our country India ranks first in terms of people getting affected by kidney related disease. Though population plays a major factor in it, the fact that China which has higher population than us actually ranking in a much lower place than us in the term of people getting affected by kidney related disease. Generally, the kidney diseases are caused by the abnormal physiological functionalities of human kidney. The difference in the functionality of kidney is mainly due to the lifestyle and the food preference people have in their life. The main motive of this project is to find the symptom and its cure as soon as possible

### **Literature Review:-**

[1]

<b>DATE OF PUBLICATION</b>	<b>PAPER NAME</b>	<b>AUTHOR NAME</b>	<b>LINK</b>
February 12, 2019	Detailed Review of Chronic Kidney Disease	Yesubabu Kakitapallia, Janakiram Ampolua, Satya Dinesh Madasa, M.L.S. Sai Kumar	<a href="https://www.karger.com/Article/Pdf/504622">https://www.karger.com/Article/Pdf/504622</a>

The proposed method is used to explain about the effects of kidney diseases. In this method Kidney damage can be assessed by albumin creatinine rate (ACR); albuminuria is one of the identifiers of kidney function in a timed urine collection. It was stated that one of the reasons for CKD, i.e., excretion of protein uria, which is due to the intake of cooked meat or increased intake of protein or any kidney infection.

[2]

DATE OF PUBLICATION	PAPER NAME	AUTHOR NAME	LINK
October 1, 2019	Chronic Kidney Disease Diagnosis and Management	Teresa K. Chen, MD, MHS, Daphne H. Knicely, MD, and Morgan E Grams, MD, PhD	<a href="https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7015670/">https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7015670/</a>

The proposed system uses CKD method for diagnosis. In this method once a diagnosis of CKD has been made, the next step is to determine staging, which is based on GFR, albuminuria, and cause of CKD . Staging of GFR is classified as G1 (GFR  $\geq 90$  ml/min/1.73 m<sup>2</sup>), G2 (GFR 60–89 ml/min/1.73 m<sup>2</sup>), G3a (45–59 ml/min/1.73 m<sup>2</sup>), G3b (30–44 ml/min/1.73 m<sup>2</sup>), G4 (15–29 ml/min/1.73 m<sup>2</sup>), and G5 (<15 ml/min/1.73 m<sup>2</sup>).

[3]

DATE OF PUBLICATION	PAPER NAME	AUTHOR NAME	LINK
27 November 2013	Risk factors for chronic kidney disease: an update	Rumeyza Kazancioğlu	<a href="https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4089662/">https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4089662/</a>

This system explains about inheritance in the kidney disease such as Uromodulin. It is another identified mutation is related to APOL1. An autosomal recessive pattern of inheritance is demonstrated and associated with a substantially higher risk of ESRD (10-fold higher risk of ESRD due to focal glomerulosclerosis and 7-fold higher risk of ESRD due to hypertension).

[4]

DATE OF PUBLICATION	PAPER NAME	AUTHOR NAME	LINK
31 December2014	Systems biology towards novel chronic kidney disease diagnosis and treatment.	Dr. Bernd Mayer	<a href="https://cordis.europa.eu/docs/results/241/241544/final1-syskid-final-report-2015-03-13.pdf">https://cordis.europa.eu/docs/results/241/241544/final1-syskid-final-report-2015-03-13.pdf</a>

This system explains about the hemodynamic in our glomerulor. Alterations in glomerular hemodynamic were considered of upmost importance. Both afferent arteriolar glomerular vasodilatation and efferent vasoconstriction increase intra-glomerular filtration pressure thus leading to hyper filtration, which on the short term stabilizes GFR but on the long term leads to progressing glomerular sclerosis thereby initiating a vicious cycle.

[5]

DATE OF PUBLICATION	PAPER NAME	AUTHOR NAME	LINK
June 2020	Chronic kidney disease: prevalence and risk factors.	A.M. Aringazina, O.Zh.Narmanova, G.O. Nuskabaeva, Zh.A. Tagaeva	<a href="http://www.researchgate.net/publication/342930212_Chronic_kidney_disease_prevalence_and_risk_factors_literature_review">www.researchgate.net/publication/342930212_Chronic_kidney_disease_prevalence_and_risk_factors_literature_review</a>

This system explains about the disease risks and affects that has on us and our surrounding. It also explains about the ill factor it might have and chances of spreading to anyone in our surrounding.

[6]

DATE OF PUBLICATION	PAPER NAME	AUTHOR NAME	LINK
July 2011	The Burden of Chronic Kidney Disease on Developing Nations: A 21st Century Challenge in Global Health	Nugent R.A, Fathima S.F., Feigl A.B, Chyung D	<a href="https://www.karger.com/Article/Fulltext/321382">https://www.karger.com/Article/Fulltext/321382</a>

The proposed system explains about the ill effects these kidney diseases have on developing countries. In developing nations, the growing prevalence of chronic diseases such as chronic kidney disease has severe implications on health and economic output. The rapid rise of common risk factors such as diabetes, hypertension, and obesity, especially among the poor, will result in even greater and more profound burdens that developing nations are not equipped to handle.

[7]

DATE OF PUBLICATION	PAPER NAME	AUTHOR NAME	LINK
FEBRAURY ,2020	A Comparative Analysis of Machine Learning Techniques	Alvaro Sobrinho, Andessa C.M. Da Silveira, Leandro Dias da Silva, Evandro de B. Costa	<a href="https://www.researchgate.net/publication/339014686_ComputerAided_Diagnosis_of_Chronic_Kidney_Disease_in_Developing_Countries_A_Comparative_Analysis_of_Machine_Learning_Techniques">https://www.researchgate.net/publication/339014686 ComputerAided Diagnosis of Chronic Kidney Disease in Developing Countries A Comparative Analysis of Machine Learning Techniques</a>

This system explains about the use of diagnosing with the help of computer. Software systems have been developed to assist physicians during CKD monitoring and diagnosis. For example, CKD-Go is a web application (app) to help users verify their kidney function by inputting their ACR and GFR.

[8]

<b>DATE OF PUBLICATION</b>	<b>PAPER NAME</b>	<b>AUTHOR NAME</b>	<b>LINK</b>
January 2018	Diagnosis of Kidney Conditions Using Low-Cost Paper Diagnostics	Md. Nazibul Islam	<a href="https://www.researchgate.net/publication/325499924_Diagnosis_of_Kidney_Conditions_Using_Low-Cost_Paper_Diagnostics">https://www.researchgate.net/publication/325499924_Diagnosis_of_Kidney_Conditions_Using_Low-Cost_Paper_Diagnostics</a>

This proposed system uses Low cost paper diagnosis method. The method Paper diagnostic devices (PADs) can play a vital role in low-cost and rapid diagnosis of kidney condition, resulting in early detection of kidney complications. Paper diagnostics are paper and cellulose based analytical devices capable of qualitative or quantitative detection of biomarkers.

[9]

<b>Date OF PUBLICATION</b>	<b>PAPER NAME</b>	<b>AUTHOR NAME</b>	<b>LINK</b>
December 2019	Machine Learning Applied to Kidney Disease Prediction: Comparison Study	Akm Shahariar Azad Rabby, Rezwana Mamata, Monira Akter Laboni, Ohidujjaman	<a href="https://www.researchgate.net/publication/338356158_Machine_Learning_Applied_to_Kidney_Disease_Prediction_Comparison_Study">https://www.researchgate.net/publication/338356158_Machine_Learning_Applied_to_Kidney_Disease_Prediction_Comparison_Study</a>

The proposed system uses applied machine language for early detection of kidney disease. The main aim is to find an optimized and efficient machine learning (ML) technique that can effectively recognize and predict the condition of chronic kidney disease. the data has been divided into two sections. In one section train dataset got trained and another section got evaluated by test dataset. The analysis results show that the Decision Tree Classifier and Gaussian Naive Bayes achieved the highest performance than the other classifiers, obtaining the accuracy score of 100% and 1 recall (Sensitivity) score.

[10]

<b>Date OF PUBLICATION</b>	<b>PAPER NAME</b>	<b>AUTHOR NAME</b>	<b>LINK</b>
January 2022	Development of a Graphical User Interface Software for The Prediction of Chronic Kidney Disease	S.C. Nwaneri and H.C. Ugo	<a href="https://www.ajol.info/index.php/njt/article/view/225270/212516">https://www.ajol.info/index.php/njt/article/view/225270/212516</a>

The proposed system explains about the training and development of model for kidney diagnosing. This process involves building the neural network architecture and determining the activation functions to be used at the output of each layer of the network. The ANN model is built using the Keas libraries in python. Dense is used to assign the number of layers for the network. The ANN model consists of 25 neurons in the input layer and one neuron at the output layer.

## **References:**

- [1] Detailed Review of Chronic Kidney Disease, Department of Electrical and Electronics Engineering, Aditya Institute of Technology and Management, Tekkali, India; Department of Electrical and Electronics Engineering, Bapatla Engineering College, Bapatla, India; Department of Electrical and Electronics Engineering, National Institute of Technology Jamshedpur, Jamshedpur, India, February 12, 2019.
- [2] Chronic Kidney Disease Diagnosis and Management from the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) and Yale University. Dr Grams reported receipt of grants from the NIDDK , October 1, 2019.
- [3] Risk factors for chronic kidney disease article were supported by the Turkish Society of Hypertension and Renal Diseases, a nonprofit national organization in Turkey, 27 November 2013.
- [4] Systems biology towards novel chronic kidney disease diagnosis and treatment, Dr. Bernd Mayer Managing Partner energetic bio development GmbH, 31 December 2014.
- [5] Chronic kidney disease: prevalence and risk factors, June 2020.
- [6] The Burden of Chronic Kidney Disease on Developing Nations: A 21st Century Challenge in Global Health, July 2011.
- [7] Computer-Aided Diagnosis of Chronic Kidney Disease in Developing Countries: A Comparative Analysis of Machine Learning Techniques, Federal University of the Agreste of Pernambuco, Garanhuns, Pernambuco 55292-270, University of Campina Grande, Campina Grande, Paraíba, Brazil, February 2017.
- [8] Diagnosis of Kidney Conditions Using Low-Cost Paper Diagnostics, MASTER OF SCIENCE IN ENGINEERING (CHEMICAL), January 2018
- [9] Machine Learning Applied to Kidney Disease Prediction: Comparison Study, 10<sup>th</sup> international Conference on Computing, Communication and Networking Technologies, Kanpur, India, December 2019.
- [10] Development of a Graphical User Interface Software for The Prediction of Chronic Kidney Disease, Vol. 41, No. 1, January, 2022, pp.175 –183, January 2022.