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EVALUATION OF SERUM ELECTROLYTES IN TYPE 2 DIABETES MELLITUS PATIENTS

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Abstract: This study has been undertaken to investigate the Serum concentration of Electrolytes which play a crucial role in Type 2 Diabetes Mellitus (T2DM) by -Regulating fluid balance in the body, preventing dehydration caused by high blood glucose level and by facilitating insulin signaling. A cpmparative cross sectional study was conducted among 500 individuals, out of which 250 were cases having T2DM, and 250 healthy indivuals among the population of Chhattisgarh, India. It was found that the mean value of serum sodium (Na^+) was high and serum potassium (K^+) were low in cases compared to healthy individuals. We also found that electrolyte abnormalities are present commonly in diabetic patients and also associated with complications leading to increased morbidity or mortality.

IndexTerms **-** Type 2 Diabetes Mellitus (T2DM), Electrolytes, serum sodium (Na^+), serum potassium (K^+)**.**

INTRODUCTION

- DIABETES – "Diabetes is a chronic(long-standing) disease that occurs either when the pancreas does not produce enough insulin or when the body cannot effectively use the insulin it produces". Type 2 Diabetes Mellitus s normally found in people who are overweight. An electrolyte is a substance that dissociates in water into charged particles called ions. Positively charged ions are called cations. Negatively charged ions are called anions. In our body the 2 important type of electrolytes are sodium & potassium. Sodium (Na+): - Helps regulate fluid balance, blood pressure, and blood volume. Potassium (K+): -Vital for maintaining the electrical potential across cell membranes. It also help in entry of insulin in the cell.
  Normal value of sodium is between 135 & 145 (mEq/L), Normal value of potassium is 3.5 to 5.5 (mEq/L).

- Role of electrolytes in type 2 D.M.---

Electrolytes play a crucial role in managing Type 2 Diabetes Mellitus (T2DM) by :
- Regulating fluid balance in the body, preventing dehydration caused
by high blood glucose levels.
- Facilitating insulin signaling, with electrolytes like magnesium and potassium playing a key role.
- Regulating glucose metabolism, with electrolytes

NEED OF THE STUDY.

- To determine the serum sodium and potassium level in type 2 diabetes mellitus patients which are the most common electrolyte abnormality that are encountered. Early management of the electrolyte abnormality in T2DM can help in early management of complications in T2DM along with glycemic monitoring.

POPULATION AND SAMPLE –

- 500 individuals, out of which,Cases:250 Patients diagnosed with type 2 diabetes mellitus (T2DM) and 250 Individuals without diabetes or any other significant medical conditions.; among the population of Chhattisgarh, India, attending Chhattisgarh Institute Of Medical Sciences, Bilaspur, Chhattisgarh, India from the duration of May 2022 to March 2024.
- STUDY DESIGN – Comparative Cross-sectional study
- Individuals were taken comprising age groups of (18-90) years.
- SAMPLE COLLECTION -Blood samples were collected from both patients and controls using standard venipuncture techniques. Samples were collected in appropriate blood collection tubes and processed promptly. Samples were analysed for electrolyte estimation by Ion Selective Electrode method And Plasma glucose was quantified by (Glucose Oxidase Peroxidase) method

S.No.	Name of Investigation	Methods	Techniques	Vacutainer
1.	Blood glucose	GOD-POD Method	Spectrophotometry	Grey
2.	Serum Na^+	Ion selective Electrode	Potentiometric	Red
3.	Serum K^+	Ion selective Electrode	Potentiometric	Red

REVIEW OF LITERATURE

- Mustafa A et al. (2020) found that glucose homeostasis in type 2 DM may be altered due to disturbance of sodium, potassium and chloride levels, therefore assessment of electrolytes related abnormalities are important to monitor the prognosis of type 2 DM patients.
- Liamis G et al. (2014) observed that electrolyte abnormalities are common in diabetic patients and may be associated with increased morbidity and mortality.
- Reshma et al. (2020) found that there was a significant reduction in blood sugar and serum sodium level while significant elevation of potassium levels among severe T2DM patients compared to diabetes control. Serum sodium and chloride showed significant inverse association while potassium had significant positive correlation with RBS of severe T2DM patients compared to diabetes control.

Statistical tools and econometric models- Descriptive Statistics was used to analyze the relation between cases and healthy individuals by using Mean ± S.D

RESULTS AND DISCUSSION

Age group	Subjects	Numbers	Mean ± standard deviation				
			FBS	PPBS	RBS	S. Na^+	S. K^+
>20	Cases	19 (7.6%)	187±109.00	236±109.00	222±109.00	140±6.67	3.95±0.65
	Control	50 (20%)	41±14.53	90±14.53	76±14.53	136±3.49	4.13±0.48
21-40	Cases	65 (26%)	171±107.87	220±107.87	206±107.87	141±6.68	4.21±0.65
	Control	125 (50%)	40±15.07	89±15.07	75±15.07	139±3.45	4.05±0.48
41-60	Cases	104(41.6%)	210±108.06	259±108.06	245±108.06	138±6.70	4.13± 0.66
	Control	53 (21.2%)	48±15.15	97±15.15	83±15.15	139±3.49	4.08±0.49
61-80	Cases	62(24.8%)	194±108.28	243±108.28	229±108.28	140±6.76	4.24±0.66
	Control	22 (22%)	44±15.11	93±15.11	79±15.11	138±3.49	4.25±0.48
Total	Cases	250	190.5±108.35	239.5±108.35	225.5±108.35	139.75±6.70	4.13±0.65
	Control	250	43.25±14.96	92.25±14.96	78.25±14.96	138±11.30	4.12±0.48

- It has been found that max. no. of cases of Type 2 D.M. are in the age group of 41 – 60 which accounts 41.6% of cases. This age group is found to have poor glycemic control as compared to other age group.
- We have found in the study that among the cases(diabetes) level of serum sodium is higher than healthy controls which is consistent or similar with the findings of Sreenivasulu uppara et al.
- It has been found that there is slightly shift of serum sodium towards higher side among the young age group having diabetes. It has been observed in our study that the mean ± standard deviation of serum sodium among the diabetes patients, higher in the age group of 21- 40yrs whereas the young age of hypernatremia is more prominent among the early affected diabetic patients.
- Serum potassium was found to have no such significant increasing the level as age progresses among the diabetes the serum potassium level was also found to have no significant change in this study as compared to cases & controls.

CONCLUSION

- In this study, the mean value of serum sodium was high and serum potassium were low in cases compared to healthy indivuals. We conclude that electrolyte abnormalities are present commonly in diabetic patients and may be associated with complications leading to increased morbidity or mortality. So, early management of the electrolyte abnormality in T2DM can help in early management of complications in T2DM along with glycemic monitoring.

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REFERENCES

- Shridhar R, Sushith S, Balakrishna PM, D'Sa J, Pragathi G, PK KK, Mohandas R, Sukhlal KB. Serum electrolytes levels in patients with type 2 diabetes mellitus: a cross-sectional study. 2020;23(3):223-8.
- Liamis G, Liberopoulos E, Barkas F, Elisaf M. Diabetes mellitus and electrolyte disorders. World Journal of Clinical Cases: WJCC. 2014 Oct 10;2(10):488.
- Mustafa A, Abubaker N, Suliman A, Ibrahim M, Hamza A, Elfaki E. Assessment of electrolytes level among type 2 diabetes Sudanese patients. J Glob Biosci. 2020;9(3):6921-6.