



**Bureau of Police Research and Development**  
Ministry of Home Affairs, New Delhi



Proceedings of the Webinar on  
**Chronic Kidney Diseases**



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**Chronic Kidney Diseases (CKD)**



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## Table of Contents

<b>Message</b>	<b>v</b>
<b>Message</b>	<b>vii</b>
<b>Executive Summary</b>	<b>ix-x</b>
<b>Minute to Minute Programme</b>	<b>1</b>
<b>Management of CKD – currently available options and latest developments</b>	<b>3-46</b>
<b>Basic knowledge &amp; Current status of CKD in the country and evaluation of risk factors with particular reference to Lifestyle</b>	<b>47-128</b>
<b>Prevention and Control strategies for CKD with particular reference to the Role of Diet, Lifestyle, and other Factors</b>	<b>129-137</b>
<b>Organizers and Expert Speakers</b>	<b>138</b>



बालाजी श्रीवास्तव, मा.पु.से.  
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### Message

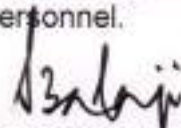
The rising incidence of Kidney Diseases in the country is a matter of grave concern. It is important to understand various causative factors of **Chronic Kidney Diseases (CKD)** so that appropriate preventive measures can be adopted. Unhealthy diet, physical inactivity, excessive intake of common salt, use of tobacco, smoking, and consumption of alcohol are among the factors causing CKD. Further, uncontrolled hypertension and diabetes may also lead to serious kidney problems.

The Police Forces of the country are exposed to a highly stressful and challenging work environment, which may further worsen their health conditions. Lifestyle factors, such as sedentary nature of the job, long working hours, inability to fulfil social commitments and inadequate sleeping hours, may also be responsible, among others.

With a view to increasing awareness about Prevention, Management, and Control of CKD in the Police Forces of the country, the Modernisation Division of the BPR&D conducted a webinar on '**CKD: Prevention, Management, and Control**' at the BPR&D Headquarters, New Delhi, on July 30, 2021. Three eminent experts of the country addressed important aspects of CKD and shared their experiences. They also clarified many of the issues raised by the participants.

I congratulate Dr. Karuna Sagar, IPS, Director, Modernisation Division, Shri B. Shanker Jaiswal, IPS, Director, NPM, and Dr. Ajit Mukherjee, PSO (LS), on successful conduct of this important webinar.

I am sanguine the proceedings of the webinar will be very useful for our Police Forces and will go a long way in preventing and controlling CKD so as to ensure overall health and well-being of our police personnel.

  
(Balaji Srivastava)

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### Message

Police forces in the country often work in a highly stressful and challenging work environment. They are required to be present, often at odd hours, at the scene of crime, mass agitations and demonstrations, and during court hearings. This results in irregular and unhealthy eating practices. Moreover, long hours at work without adequate rest, and persistent exposure to a stressful work environment and faulty lifestyles, aggravates their pre-existing health condition.

With a view to creating awareness about the prevention, management, and control of Chronic Kidney Diseases (CKD) among police forces of the country, the Modernisation Division conducted a webinar on '**CKD: Prevention, Management, and Control**' on July 30, 2021. Eminent domain experts delivered talks on different aspects of CKD, and clarified issues raised by the participants in the webinar.

I heartily congratulate Dr. Karuna Sagar, IPS, Director, Modernisation, Shri B. Shanker Jaiswal, IPS, Director, NPM and Dr. Ajit Mukherjee, PSO (LS) for conducting the webinar, and bringing out this useful publication.

The deliberations of the webinar have been documented in this publication in the hope that its proceedings would be read by a larger universe of stakeholders spread all over the country. The old adage of prevention being better than cure, still rings true. If more of us are able to take early preventive measures by imbibing what experts have to say, this publication would have ensured what it set out to achieve.



(Neeraj Sinha)



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### Executive Summary



The growing incidence of Kidney Diseases in our population and Police Forces is an issue of serious concern. Uncontrolled Diabetes and Hypertension along with dietary and other lifestyle factors might be the contributing factors in development of Kidney disorders.

To increase awareness about Kidney Diseases amongst Police Forces of the country, the Modernization Division of BPR&D organized a Webinar on "**Chronic Kidney Diseases (CKD): Prevention, Management, and Control**" on July 30, 2021 from 11AM-1.30 PM at the BPR&D Headquarters, New Delhi.

Three eminent speakers of the country namely, Prof. (Lt. Gen.) P VVarma, Primus Hospital, New Delhi, Dr. (Prof.) A K Bhalla, Sir Ganga Ram Hospital, New Delhi, and Dr.(Prof.) V Sakhuja, Max Super Speciality Hospital, Mohali, Punjab delivered talks on various important aspects of CKD and clarified many issues raised by the participants. Two hundred Police Officials from CAPFs, States/UTs, CPOs, and outlying units of BPR&D participated in the webinar from across the country.

Dr. Karuna Sagar welcomed all the expert speakers and participating officials and said that the webinar on CKD is being organized as a precursor to the 51<sup>st</sup> Foundation Day of BPR&D, which falls on August 28. Shri Neeraj Sinha while delivering the inaugural address also thanked the medical experts for taking out time from their busy schedule to address the police officials. He wished, the webinar would provide a good interactive session.



Speaking first on the topic of "Management of CKD", Prof. A K Bhalla said that one in every 10 persons in the general population suffers from CKD and therefore it is important to organize such sessions to create awareness about the disease. He talked about various modes of treatment including **Dialysis** and **Renal Replacement Therapy** and also discussed latest available devices such as **Portable and Implantable Artificial Kidneys** and explained their functioning. He also clarified many of the issues raised by the participants.

The second speaker of the webinar Prof. (Lt. Gen.) P P Varma gave basic knowledge about CKD and also discussed lifestyle and dietary factors associated with the disease. He also discussed **five different stages of CKD** and gave recommendations to cope with the disease.

Prof. V. Sakhuja the last speaker of the webinar discussed the prevention and control strategies of CKD. He said people with diabetes, high blood pressure, heart disease, kidney stones, family history of CKD, and obesity are more likely to develop CKD. He laid lot of emphasis on reducing body weight and bringing it to an ideal level, maintaining adequate fluid intake, and quitting smoking and reducing the alcohol intake. At the end of his talk, Prof. Sakhuja clarified many important points raised by the audience.

Overall, it was an excellent webinar covering all the important aspects on Prevention, Management, and Control of CKD. I hope, the proceedings of the webinar will cater to the health-needs of our Police Forces and help in preventing the menace of Chronic Kidney Diseases.

  
(Dr. Karuna Sagar, IPS)

# WEBINAR

## Chronic Kidney Diseases (CKD): Prevention, Management, and Control Modernization Division, BPR&D Hqrs, NH-8, Mahipalpur, New Delhi

Date: July 30, 2021

Venue: BPR&D Hqrs., New Delhi

Time: 11 am – 1.30 pm

### Minute to minute programme

Time	Topic	Speaker/Moderator
11 am	Welcome and Inaugural address	<b>Shri Neeraj Sinha</b> , ADG, BPR&D, New Delhi
11.20 am	Management of CKD – currently available options and latest developments	<b>Dr. (Prof.) A K Bhalla</b> , Padma Shri MBBS, MD, DM Sir Ganga Ram Hospital, New Delhi
11.50 am	Q/A session	Moderated by <b>Dr. Karuna Sagar</b> , Dir/IG (Mod), BPR&D, New Delhi
12 noon	Basic knowledge & Current status of CKD in the country and evaluation of risk factors with particular reference to Lifestyle	<b>Prof. (Lt. Gen.) P P Varma</b> , AVSM, Sena Medal, VSM (Rtd) MBBS, MD, DM, MNAMS, FICP, FACP, FRCP (Edin), FISOT, FISN, FASN, FAMS ILBS, Army Hospital & Venkateshwar Hospital, New Delhi, Chairman, Deptt. of Nephrology, Primus Hospital, New Delhi
12.30 pm	Q/A session	Moderated by <b>Dr. Karuna Sagar</b> , Dir/IG (Mod), BPR&D, New Delhi
12.40 pm	Prevention and Control strategies for CKD with particular reference to role of Diet, Lifestyle and Other Factors	<b>Dr.(Prof.) V Sakhuja</b> MBBS, MD, DM Max Super Speciality Hospital, Mohali, Punjab
1.10 pm	Q/A Session	Moderated by <b>Dr. Karuna Sagar</b> , Dir/IG (Mod), BPR&D
1.20 pm	Vote of Thanks	<b>Dr. Ajit Mukherjee</b> PSO (LS), BPR&D



# **PROCEEDINGS OF THE WEBINAR ON CHRONIC KIDNEY DISEASES (CKD): PREVENTION, MANAGEMENT, AND CONTROL**

**BPR&D Headquarters, NH-8, Mahipalpur, New Delhi  
July 30, 2021**

To increase awareness about Chronic Kidney Diseases among the Police Forces of the country, the Modernization Division of the Bureau of Police Research and Development (BPR&D) organized a webinar on “CKD: Prevention, Management, and Control” on July 30, 2021, at BPR&D Headquarters, New Delhi from 11 am – 1.30 pm. Two hundred Police Officials from CAPFs, States/UTs, CPOs, and outlying units of BPR&D participated in the webinar.

Shri Neeraj Sinha, ADG, Dr. Karuna Sagar, IG/Director, Modernization, Shri B Shanker Jaiswal, IG/Director, NPM were among the distinguished participants from BPR&D. Prof. (Lt. Gen.) P P Varma, AVSM, SM, VSM, Primus Hospital, New Delhi, Prof. A K Bhalla, Padma Shri, Sir Ganga Ram Hospital, New Delhi, and Prof. V Sakhuja, Max Super Speciality Hospital, Mohali, Punjab were among the three eminent speakers who delivered talks on various important aspects of CKD Prevention and Control.

Dr. Karuna Sagar welcomed all the expert speakers and participating doctors and other officials and said that the webinar on CKD is being organized as a precursor to the 51st Foundation Day of BPR&D, which falls on August 28. He mentioned that the webinar should be treated as a knowledge-sharing platform and encouraged all to raise questions and seek clarifications from the esteemed speakers.

Shri Neeraj Sinha while delivering the inaugural address also thanked the medical experts for taking out time from their busy schedule to address the police officials. He expressed his happiness on the multiple initiatives taken by the Modernization Division and setting high standards by inviting the best medical experts of the country to talk on contemporary health issues. He wished the webinar would provide a good interactive session.



## MANAGEMENT OF CKD – CURRENTLY AVAILABLE OPTIONS AND LATEST DEVELOPMENTS

Speaking first on the topic “Management of CKD” Prof. Bhalla said there is a lack of awareness about CKD in the general population. He felt that one in every 10 persons in the general population suffers from CKD and therefore it is important to organize such sessions to create awareness about the disease.

Talking about the **diagnosis** of CKD, he mentioned three types of urine tests namely, Urine analysis, 24-hour urine test, and **GFR (Glomerular Filtration Rate)**. He noted that GFR falls as kidney disease progresses. He also mentioned certain blood investigations (serum creatinine & urea) and other tests including ultrasound, CT scan, and MRI of the abdomen, renal biopsy, and scan.

Dr. Bhalla described the process of treatment in steps, viz., (i) preserving the renal function, (ii) delaying the need for dialysis or transplantation as long as possible, (iii) alleviate extra-renal functions as much as possible, (iv) improving the body chemistry values, and (v) ensuring optimal quality of life for the patients. He discussed both Non-pharmacological and pharmacological approaches of treatment. Amongst the non-pharmacological approaches, he mentioned restricted dietary intake of protein to 40 gm/ day, sodium (Na<sup>+</sup>), potassium (K<sup>+</sup>), and phosphate (PO<sub>4</sub>), avoiding potassium-rich foods such as banana. Maintaining water-electrolyte balance, daily weight record, smoking cessation, and avoiding herbal medications were some other factors discussed by Dr. Bhalla. Describing pharmacological approaches of treatment, he talked about drugs for taking care of fluid overload and other underlying health conditions such as diabetes, anemia, hyperkalaemia/ metabolic acidosis, hyperphosphatemia, hypocalcemia, and pruritis. Amongst the new approaches of treatment, he mentioned **Ketoanalog, Sodabcarb therapy, and SGLT2 inhibitors (Gliflozins)**.

Under Nutritional therapy, Dr. Bhalla advised a diet giving 35 Kcal/Kg/D and 30-35 Kcal/Kg/D for people below 60 years and ≥60 years of age respectively. He also specified protein intake for patients depending upon the stage of the disease. He showed the effects of excess fluid intake and explained how to contain the thirst and exercise fluid control by adopting various measures.

Dr. Bhalla next discussed **Renal Replacement Therapy**. He defined Dialysis as the procedure to remove fluid and uremic waste products from the body when the kidneys cannot do so. He mentioned two types of **dialysis** namely, **Hemodialysis** and **Peritoneal dialysis**. He also mentioned Renal Transplant as a treatment of choice for patients with irreversible kidney failure. He explained hemodialysis (HD) as a procedure to remove fluid and waste products from the blood and to correct electrolyte balances. It can be used in both acute and chronic kidney failure. He discussed the principle and types of hemodialysis and explained the entire process of dialysis. Dr. Bhalla also mentioned some chronic complications of hemodialysis, such





as anemia, cardiovascular disease, vascular calcification, calciphylaxis, nephrogenic systemic fibrosis, nutrition, and infection. Discussing peritoneal dialysis (PD) Dr. Bhalla said it is a process of dialysis that uses the peritoneum in a person's abdomen as the membrane through which fluid and dissolved substances are exchanged with the blood. It has better outcomes during the initial years, has greater flexibility and tolerability in patients with significant heart disease. It also has some complications associated with it, such as hypotension/hypertension with edema, perforated bowel, infection, impaired breathing, peritoneal sclerosis, peritonitis, malnutrition, hernia, low back pain, and hyperlipidemia.

Emphasizing the post-dialysis care, Dr. Bhalla advised taking proper rest, monitoring serum potassium levels, muscle weakness, diarrhoea, ECG changes, fever, chest pain, pericarditis, RBC count, and haemoglobin. The patient may need psychosocial intervention.

Talking about kidney/ renal transplantation, he said it is the organ transplant of a kidney into a patient who has end-stage renal disease. The kidney can be donated by either a brain-dead person or a person who had cardiac death. A living person who is in close relation to the recipient can also donate a kidney. There could also be paired exchange of kidneys between two families of the recipients. Dr. Bhalla thoroughly described the post-operative care, monitoring, and diet of the patients who have undergone kidney transplant surgery. He also discussed the nature of post-surgery complications such as bleeding, infection, vascular, thrombosis and urinary complications, imbalances in electrolytes, proteinuria, and hypertension, etc.

Describing post-operative nursing management, Dr. Bhalla said maintaining ideal weight without fluid and adequate nutritional intake is important. Assessment of factors contributing to fatigue such as, fluid and electrolyte imbalances, retention of waste products, and depression should be taken up regularly.

Dr. Bhalla concluded his talk by discussing some latest available devices such as **Portable and Implantable Artificial Kidneys** and explained their functioning.

Answering a question by Dr. Rohit Singh, Dr. Bhalla said, it is important to screen people for Diabetes and Hypertension for these are the two most important factors causing Kidney disorders. All known patients of type 2 diabetes and hypertension should undertake urine examination for **micro albumin urea** once a year. Shri Shanker B Jaiswal discussed the problem of his mother thoroughly with Dr. Bhalla. During the discussion, Dr. Bhalla mentioned that many people who have suffered from COVID-19 showed elevated levels of Serum Creatinine which came down to normal after some time. A **Battalion Commandant** wanted to know about simple screening methods during field-posting to which Dr. Bhalla responded that a simple routine urine examination can be done at the PHC level in rural areas. Urinary protein will indicate the presence of kidney disease. He again emphasized controlling blood sugar and blood pressure to prevent kidney diseases. To another question whether kidney diseases are hereditary, Dr. Bhalla replied that certain types of kidney diseases e.g., **Polycystic Kidney Disease** is hereditary. Nowadays genetic screening can be performed to rule out kidney disease.





# MANAGEMENT OF CKD-CURRENTLY AVAILABLE OPTION AND LATEST DEVELOPMENTS

**DR A.K BHALLA,**  
DM, MD, MNAMS, FISN, FASN, FRCP FISOT  
CHAIRMAN & HOD ,  
DEPARTMENT OF NEPHROLOGY,  
SIR GANGA RAM HOSPITAL





## DIAGNOSIS

### 1. Urine Tests:

- **Urinalysis:** Dipstick test, urine albumin & creatinine
- **24 hour urine tests:** Urine may be analyzed for protein and waste products (urea, nitrogen and creatinine)
- **Glomerular filtration rate :** As kidney disease progresses, GFR fall



## DIAGNOSIS

### 2. Blood Tests :

- Creatinine and urea (BUN) in the blood
- Electrolyte levels and acid-base balance
- Blood cell counts

### 3. Other Tests

- Abdominal ultrasound : Kidney with CKD are usually smaller (<95cm) than normal kidneys
- Renal biopsy
- Abdominal CT scan
- Abdominal MRI
- Renal scan



## MANAGEMENT

### Goals of treatments

- To preserve renal function
- To delay the need for dialysis or transplantation as long as feasible
- To alleviate extra renal manifestations as much as possible
- To improve body chemistry values.
- To provide an optimal quality of life for the patient



## NON-PHARMACOLOGICAL TREATMENT

- Admit patient especially in stage of exacerbation
- Diet: Restrict dietary protein to <40g/day, Restrict Na<sup>+</sup>, K<sup>+</sup>, PO<sub>4</sub>-intake ,avoid potassium containing foods e.g. banana
- Water and electrolyte balance :
  - Daily fluid intake =previous day'surine output +600ml (for insensible losses )
  - Strict fluid input and output chart
- Daily weight record
- General health advice e.g. smoking cessation
- Avoid nephrotoxins e.g. NSAIDs ,herbal medication



## PHARMACOLOGICAL TREATMENT

- Treatment of underlying condition (diabetes, HPT, autoimmune diseases etc.)
- Treatment of fluid overload

Diuretics : Furosemide, oral /IV, 40-120 mg daily

- **Treatment of Hypertension** (goal of BP <130/80mmHg):
  - i. **ACEIs**- Lisinopril, oral 5-40mg daily or Ramipril, oral 2.5-10mg daily or
  - ii. **ARBs**- Losartan, oral, 25-100 mg daily or Valsatan, oral, 80-160mg daily
- **Treatment of Anemia**
  - i. Injection erythropoietin 50-100units IV/SC 3times /week  
-Treatment is initiated at Hb <10g/dl
  - ii Tab Ferrous sulphate 200mg 3 times daily
- **Treatment of Hyperkalaemia /metabolic acidosis**
  - i. 10 % calcium gluconate,IV,10-20 ml over 2-5 minutes plus
  - ii. Sodium Bicarbonate, IV 8.4% 50mEq, over 5 minutes plus
  - iii. Regular insulin, IV 10 units in 50-100 ml Glucose 50 %



## PHARMACOLOGICAL TREATMENT CON'T...

- **Treatment of hyperphosphatemia :**
  - i. Phosphate binders (calcium acetate/calcium carbonate 2 capsules (1334mg) orally with food)
- **Treatment of hypocalcemia :**
  - i. Calcium citrate 1g/day / calcium gluconate
  - ii. Vitamin D supplement; 2 tablets (800IU) once daily
- **Treatment of pruritus:**
  - i. Capsaicin cream or cholestyramine





## NEWER TREATMENTS

- **Ketoanalogs**
- **Sodabcarb therapy**
- **SGLT2 inhibitors (Gliflozins )**



## NUTRITIONAL THERAPY

- 35 kcal/kg/D <60 yrs 30-35 kcal/kg/D ≥ 60 yrs
- **To increase the energy content of meal :**

Add extra oil to rice, noodles, breads, crackers.

Add extra salad dressing .

Non-protein calorie (NPC) supplement can be added



## PROTEIN INTAKE

**Stages 1-3**

**0.75 gm/kg/d**

**55 grams**

- ½ cup milk
- 1 egg or 2 egg whites
- 3 oz meat
- 3 veg. & 3 fruits
- 8 servings of grains

**Stages 4 or 5 -  
Not on dialysis**

**0.6 gm/kg/d**

**41 - 48 grams**

- ½ cup milk
- 1 egg or 2 egg whites
- 2 oz meat
- 5 - 6 veg. & fruits
- 5 - 6 servings of grains

**Stages 5 -  
On dialysis**

**1.2-1.3 gm/kg/d**

**82 grams**

- ½ cup milk
- 2 eggs or 4 egg whites
- 6 oz meat
- 3 veg. & 3 fruits
- 11 servings of grains

**Example**

A 150 lb  
(68 kg)

All Stage - if  
malnourished

- **Eat additional protein**



## FLUIDS

**“any food that is liquid at room temp”**

Soup, gelatin, ice cream, ect.

### HD

- Urine Output + 1000 ml
- Limit IDWG (2-5% Estimated Dry weight)

#### **Excess fluid** buildup

- Edema, HTN, CHF and Breathlessness
- Delays wound healing

#### **Fluid restriction estimations** are based upon:-

- Urinary output
- Disease state
- Treatment modality (dialysis etc.)



## TIPS FOR THIRST AND FLUID CONTROL!



### Track your fluids

- Avoid chewing lots of ice
- Avoid refills at restaurant
- Avoid super-sized beverages
- Limit salty foods
- Small glasses at meals & meds
- Add lemon or lime juice to water

### Hot weather, temperature

- Keep your skin cool: cold wash cloth, mist-bottle
- Keep you lips moist with a chap stick

### Keep your mouth wet

- Keep your mouth clean
  - toothpaste for dry mouth (biotene)
- Rinse your mouth with cold water, but don't swallow it
- Rinse your mouth with chilled mouthwash
- Chew on gum: Quench gum
- Try lemon wedges or freeze grapes & strawberries

**If diabetic, control blood sugars**



## RENAL REPLACEMENT THERAPY

- **Dialysis** : Dialysis is used to remove fluid and uremic waste products from the body when the kidneys can not do so. It may also be used to treat patients with edema that does not respond to treatment, hepatic coma, hyperkalemia, hypercalcemia, hypertension, and uremia. It is two type
  1. Hemodialysis
  2. Peritoneal Dialysis
- **Renal Transplant** : Treatment of choice for patients with irreversible kidney failure. However the use of transplantation is limited by organ availability



## HEMODIALYSIS

- A medical procedure to remove fluid and waste products from the blood and to correct electrolyte imbalances. This is accomplished using a machine and a dialyzer, also referred to as an “artificial kidney”
- Hemodialysis is used to treat both acute (temporary) and chronic (permanent) kidney failure .



## HEMODIALYSIS : 3 TO 4 HRS 3 TIMES / WEEK (MONDAY, WEDNESDAY & FRIDAY)







## PRINCIPLE OF DIALYSIS

- The objectives of hemodialysis are to extract toxic nitrogenous substances from the blood and to remove excess water
- **Diffusion, Osmosis, and ultra-filtration** are the principles on which hemodialysis is based



## TYPES OF HEMODIALYSIS

- **Conventional Hemodialysis** is usually done three times per week for about 3 to 4 hours for each treatment ,during which the patient's blood is drawn out through a tube at a rate of 200-400 mL/min
- **Daily Hemodialysis** is typically used by those patients who do their own dialysis at home .It is less stressful (home gentle) but does require more frequent access .
- The procedure of **Nocturnal Hemodialysis** is similar to conventional hemodialysis except it is performed three to six nights a week and between six and ten hours per session while the patient sleeps.



## CRITERIA FOR INITIATING PATIENTS

- Uremic symptoms
- Unresponsive hyperkalemia
- Persistent extracellular volume expansion despite diuretic therapy
- Acidosis refractory to medical therapy
- A bleeding diathesis
- A creatinine clearance or estimated glomerular filtration rate of  $< 10\text{ml/min}$



## VASCULAR ACCESS

### Venous Catheters

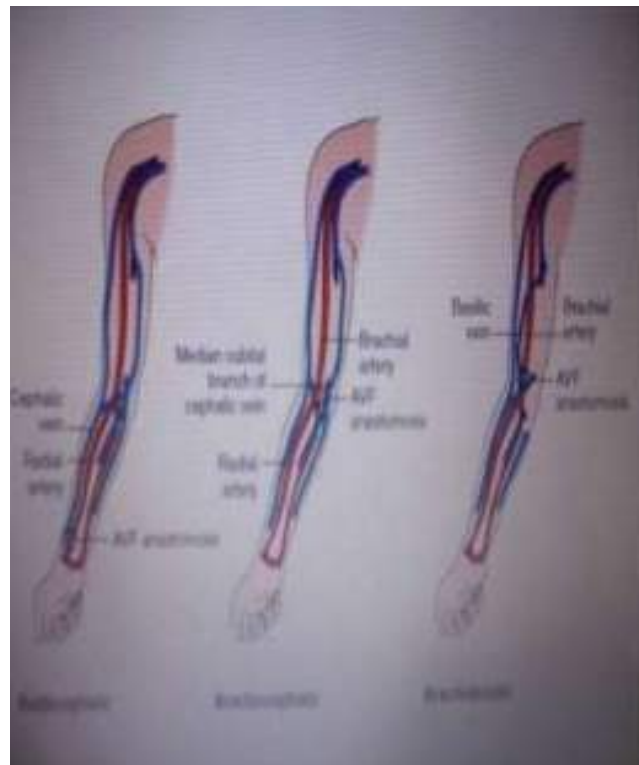
- For less than 3 weeks duration
- Cuff/uncuffed
- For patients with AKI, poisoning, in the ICU setting for CRRT
- Short-term bridge until more permanent access in CKD
- Preferred site - right internal jugular vein
- **Complications:** Thrombosis, Infection, Risk of permanent central venous stenosis or occlusion, Discomfort and cosmetic, Lower blood flow rates
- Use of subclavian venous catheters is generally contraindicated in dialysis patients except as a last resort.





## ARTERIOVENOUS FISTULA

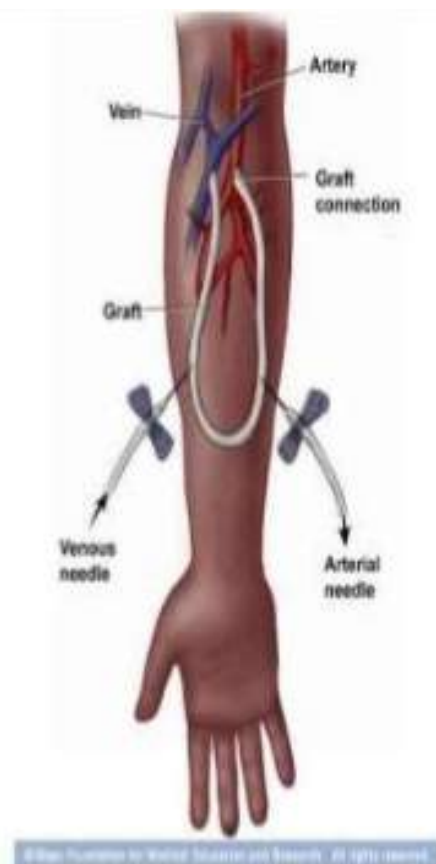
- Radio-Cephlic
- Brachio-cephalic
- Brachio-basilic
- Brachial-perforating vein fistula (Gracz)



- **Complications**
- Stenosis, thrombosis
- Ischemia and edema of limb,
- Pseudoaneurysm, infection, ccf

## ARTERIO-VENOUS GRAFTS

- If a Primary AV fistula cannot be established, a synthetic AV graft is the next preferred
- Made of ePTFE (Polytetrafluoroethylene) also known as Gortex
- Procedure- graft to the artery, a tunneling under the skin, and anastomosis to a vein.
- Can be used 2 wks after insertion
- Expected to last 3 to 5 years
- complications:- clotting, aneurysms and infection





## ANTICOAGULATION FOR HEMODIALYSIS

- Interaction of plasma with the dialysis membrane produces activation of the clotting cascade-thrombosis – dysfunction
- Most widely used anticoagulant for dialysis is heparin
- Monitor-activation clotting time (ACT)/APTT
- Heparin administration usually ceases at least 1 h before the end of dialysis
- 50 to 10 U/kg of heparin (LMWH) is used to improvement of lipid less osteoporosis, less pruritus and less hair loss, less blood transfusions need compared with UFH



## DIALYSIS WITHOUT ANY ANTICOAGULATION

- Using the saline flush technique
- HD is initiated at a high blood flow rate to reduce thrombogenicity.
- The Dialyzer is flushed every 15 to 60 minutes with 50mL of saline
- Used in pericarditis, recent major surgery, bleeding tendency.





## INTRADIALYTIC COMPLICATIONS

- Hypotension-Most common (incidence,15% to30%)
- Muscle cramps
- Dialysis Disequilibrium Syndrome
- Dialyzer Reactions First-use-syndrome
- Arrhythmia
- Cardiac arrest
- Intradialytic Hemolytic
- Hypoglycemia
- Hemorrhage
- Toxic water system treatment contaminants –hemolysis/anemia/osteomalacia and encephalopathy/Fluoride bone disease and cardiac arrhythmia
- Infectious complications



## CHRONIC COMPLICATIONS OF HD

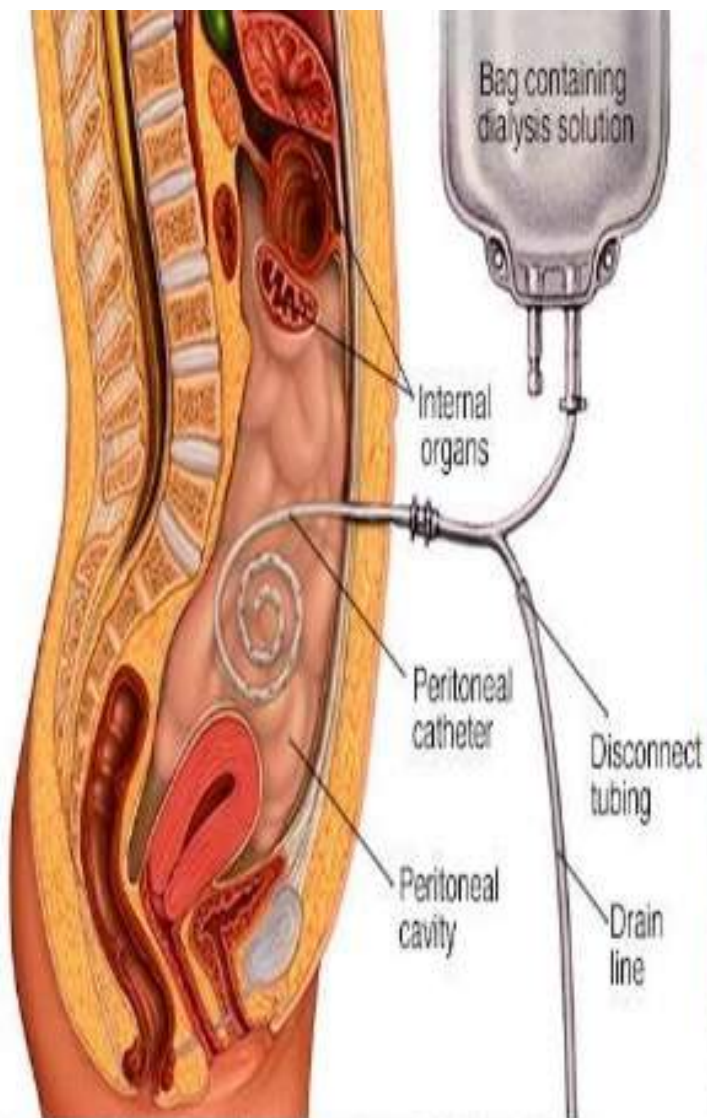
- Anemia
- Cardiovascular Disease
- Vascular Calcification
- Calciphylaxis
- Nephrogenic Systemic Fibrosis
- Nutrition
- Infection





## PERITONEAL DIALYSIS

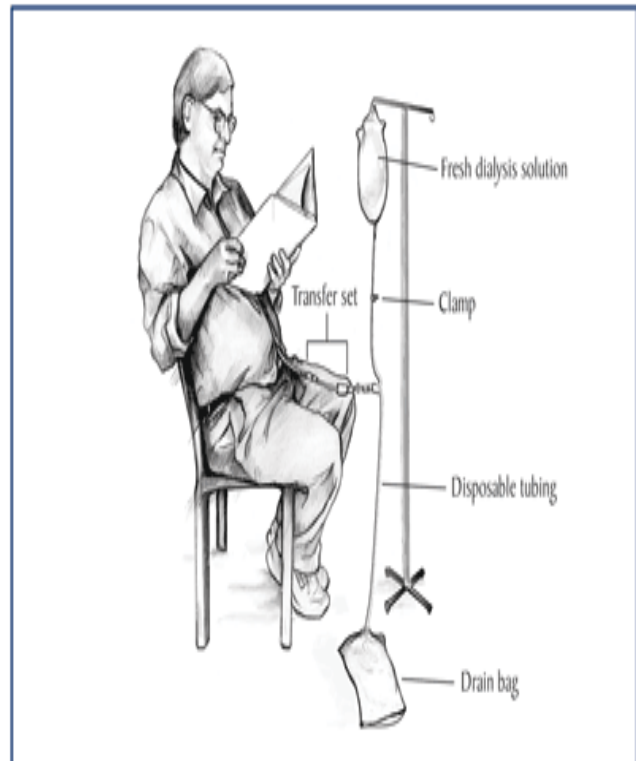
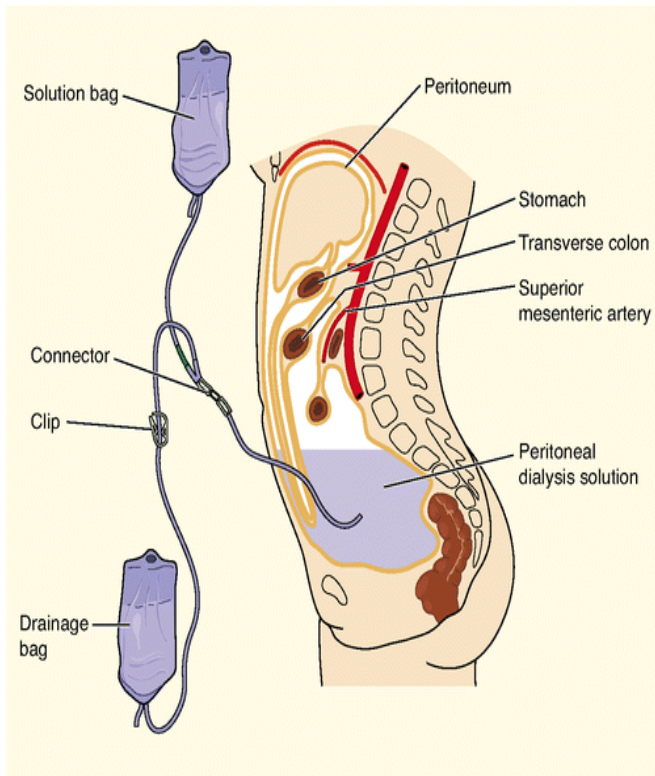
- Peritoneal dialysis (PD) is a type of dialysis that uses the peritoneum in a person's abdomen as the membrane through which fluid and dissolved substances are exchanged with the blood.
- It is used to remove toxins in those with kidney failure.
- Peritoneal dialysis has better outcomes than hemodialysis during the first couple of years.
- Other benefits include greater flexibility and better tolerability in those with significant heart disease.



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# PERITONEAL DIALYSIS





## COMPLICATIONS

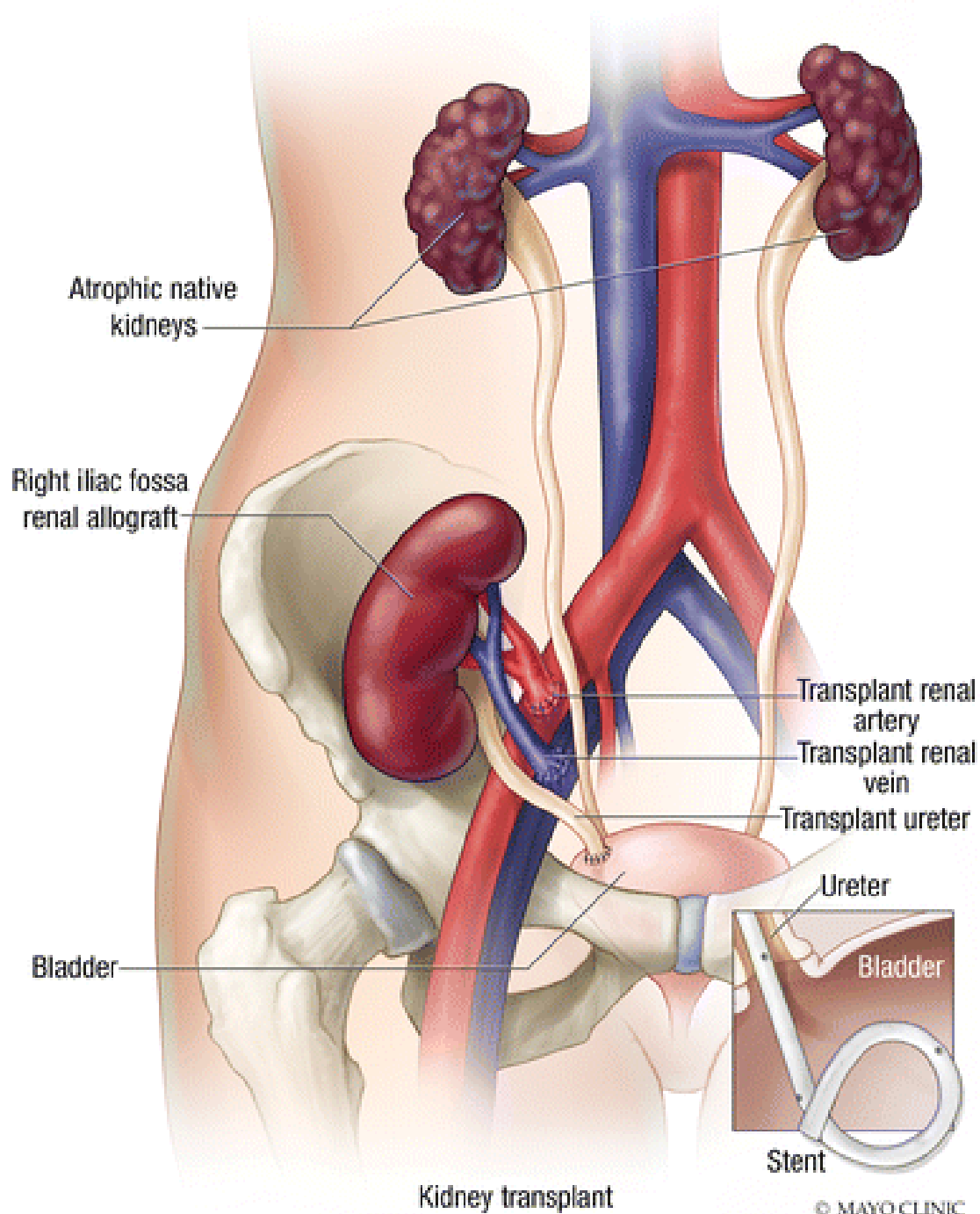
- Hypovolemic shock or hypotension
- Excessive fluid retention can result in hypertension and edema
- Perforated bowel
- Infection
- Impaired breathing
- Peritoneal sclerosis
- Peritonitis
- Malnutrition
- Hernia
- Low back pain
- Hyperlipidemia





## KIDNEY TRANSPLANTATION

- Kidney transplantation or renal transplantation is the organ transplant of a kidney into a patient who has end-stage renal disease







## SOURCE OF KIDNEY

1. Deceased donors/cadaver donation –from someone who has died. It is two type
  - Brain –dead (BD) donors
  - Donation after cardiac Death (DCD) donors.
2. Living donation –from a living person the patient knows (family/friend), an anonymous donor (altruistic), or as part of a chain in which the relative donates to another kidney patient and the original patient receives a kidney from the family of the other kidney patient (paired exchange)



## POST-OPERATION

- Living donor kidneys normally require 3-5 days to reach normal functioning levels, while cadaveric donations stretch that interval to 7-15 days. Hospital stay is typically for 4-10 days. If complications arise, additional medications (diuretics) may be administered in order to help the kidney produce urine.
- Immunosuppressant drugs are used to suppress (block) the immune system from rejecting the donor kidney.
- Tacrolimus, mycophenolate and prednisolone, cyclosporine, sirolimus or azathioprine. These medicines must be taken for the rest of the recipient's life.
- If the recipient seems to be experiencing declining renal function or proteinuria, a biopsy may be necessary to determine whether this is due to rejection, or cyclosporin or tacrolimus intoxication



- **Imaging**

Post-operatively, kidneys are periodically imaged by ultrasound, in order to assess the physiologic changes that often accompany transplant rejection. Imaging also allows anastomosed transplant artery, vein and ureter, so as to ensure they are stable in appearance

- **Diet**

Kidney transplant recipients are discouraged from consuming grapefruit, pomegranate and green tea products. These food products are known to interact with the transplant medications, specifically tacrolimus, cyclosporin and sirolimus; the blood levels of these drugs may be increased, potentially leading to an overdose



## COMPLICATIONS

- Post-operative complication, bleeding, infection, vascular, thrombosis and urinary complications.
- Infections and sepsis due to the immunosuppressant drugs that are required to decrease the risk of rejection.
- Post –transplant lymphoproliferative disorder (a form of lymphoma due to the immune suppressants)
- Imbalances in electrolytes, including calcium and phosphate, which can lead to bone problem.
- Proteinuria
- Hypertension
- Other side effects of medications including gastrointestinal inflammation and ulceration of the stomach and esophagus, hirsutism (excessive hair growth in a male-pattern distribution) with cyclosporin, hairloss with tacrolimus, obesity, acne, diabetes mellitus type 2, hypercholesterolemia and osteoporosis.



## NURSING MANAGEMENT

- Maintenance of ideal body weight without excess fluid
- Maintenance of adequate nutritional intake
- Increased knowledge about condition and related treatment
- **Assess factors contributing to fatigue :**
  - ✓ Fluid and electrolyte imbalances.
  - ✓ Retention of waste products
  - ✓ Depression
- Promote independence in self-care activities as tolerated: assist if fatigued .
- Encourage alternating activity with rest



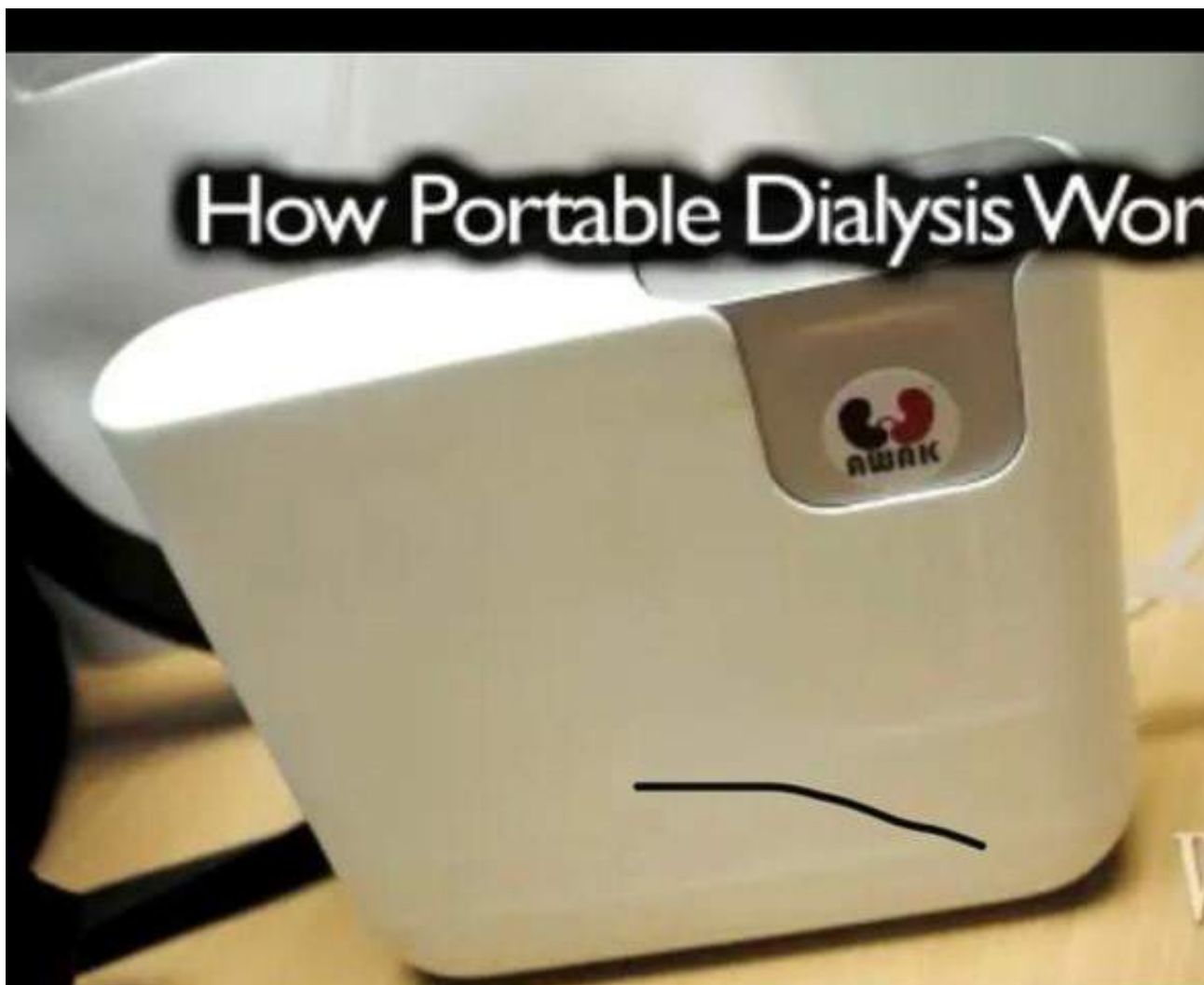
- Encourage patient to rest after dialysis treatments.
- Monitor serum potassium levels and notify physician if level greater than 5.5mEq/L
- Assess patient for muscle weakness, diarrhea, ECG changes (tall-tented T waves and widened QRS)
- Assess patient for fever, chest pain, and a pericardial friction rub (signs of pericarditis) and, if present, notify physician.
- Monitor RBC count, hemoglobin, and hematocrit prescribed, including iron and folic acid supplements, epogen, and multivitamins.
- Meeting psychosocial needs for patient on hemodialysis.
- Teaching patients about hemodialysis.



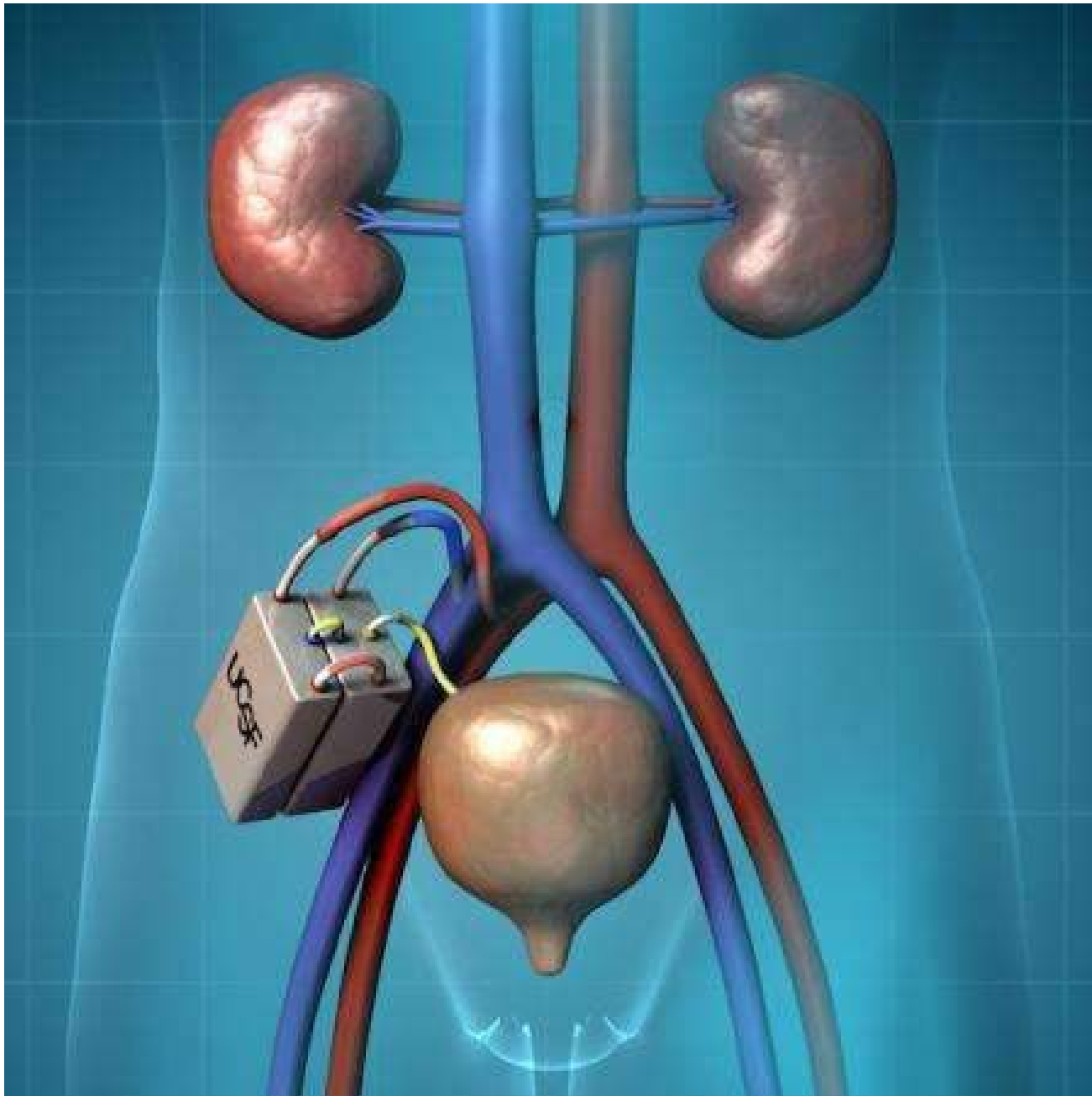
**RE-TYPE**

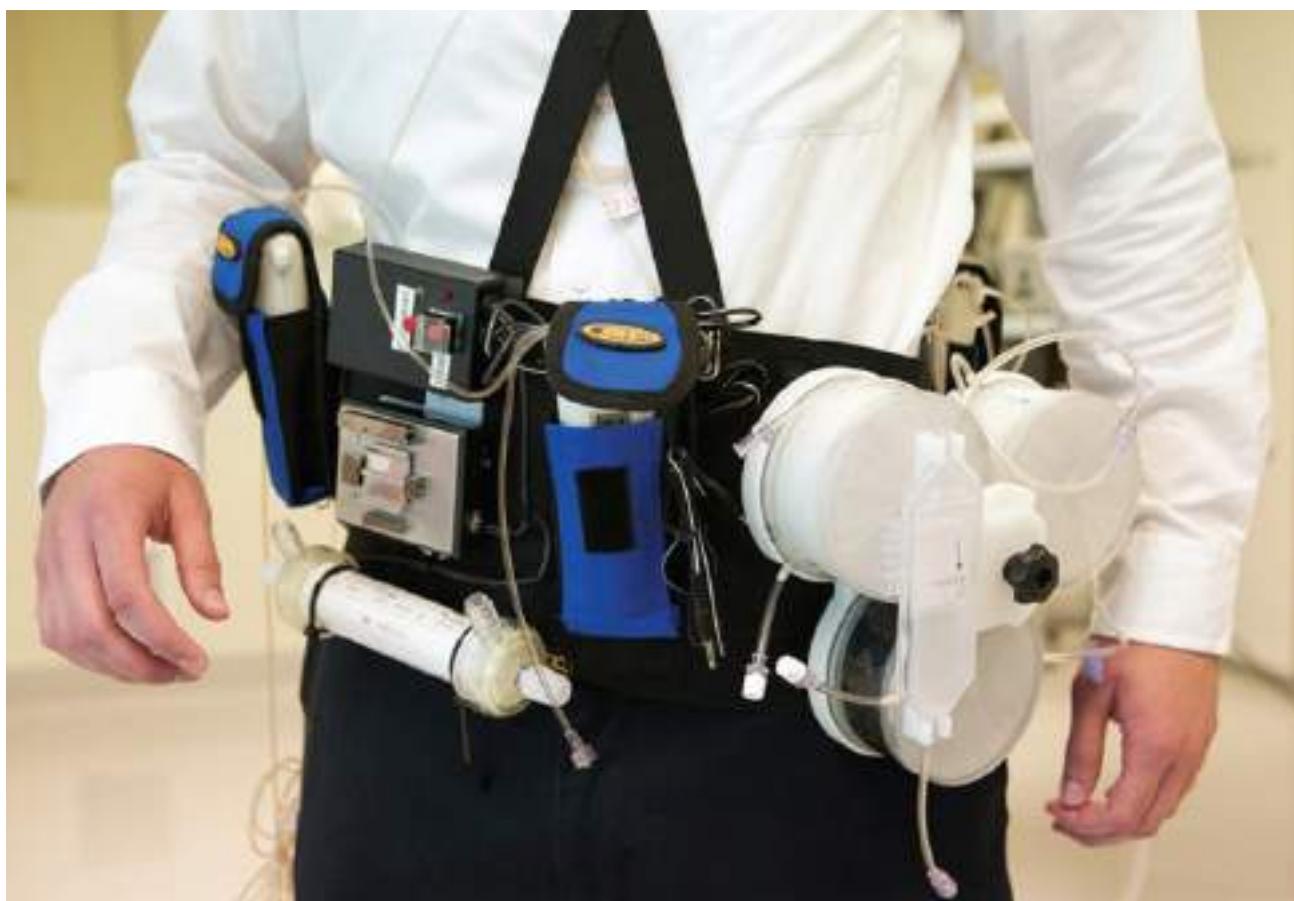
## PORTABLE AND IMPLANTABLE ARTIFICIAL KIDNEYS

	AWAK	WAK	IAK
Weight	<2 kg	<5 kg	~500 g
Power requirements	Battery operated	Battery operated	None, uses cardiovascular pressure
Fluid requirements	~2 L dialysate / treatment	6 L dialysate / treatment	No dialysate, patients drink an electrolyte-rich fluid to keep up with losses
Stage of development	Trails in human	FDA clinical trials	Animal models
Strengths	Bloodless, easily portable, high clearances	Portable, low UF rate, electrolyte balance seen in clinical use	Low burden to patient, minimal waste generation
Limitations	Frequent exchange of cartridges (every 7 h)	Clotting and bleeding issues	May require repeated invasive procedures











## BASIC KNOWLEDGE & CURRENT STATUS OF CKD IN THE COUNTRY AND EVALUATION OF RISK FACTORS WITH PARTICULAR REFERENCE TO LIFESTYLE

The second speaker of the webinar Prof.(Lt. Gen.) P P Varma talked about basic knowledge, current status, and risk factors of CKD. Quoting World Bank 2018, he said CKD was the tenth major cause of death in the world. However, in India, it is the 8th major cause of death.

Explaining the structure and functioning of a kidney, he said all healthy humans have two kidneys. But one in 200 persons is born with one kidney only, which is good enough for survival. Each kidney weighs around 135 gm. and has a large number of filters in the form of 1.2 million **Nephrons**. When proteins break down in our body, it leads to harmful by-products, such as urea, creatinine, and uric acid, which are filtered out by our kidneys and excreted through urine. Kidneys produce about 120 ml of urine per minute. Kidneys also maintain the **Acid-Base, Electrolyte-Water balance** in the body, and **concentration/dilution** of urine. Kidneys also regulate the production of blood hormone “Erythropoietin” and Vitamin D.

Talking about kidney failure Gen. Varma said, it could be either acute or chronic kidney failure. The former develops over hour-days and is usually reversible and the latter develops over months-years and is irreversible. Typically, a structural or functional abnormality of the kidney lasting for more than three months will lead to chronic kidney failure. Further, if the GFR falls below 60 ml/minute it will indicate kidney failure. He emphasized that the most important marker of kidney function is GFR and hence one should always look for the value of GFR along with serum creatinine level while undertaking laboratory investigations. He categorized kidney disease in five stages, viz., **Stage I (GFR≥90 %)**, **Stage II (GFR:60-89 %)**, **Stage III (GFR:30-59 %)**, **Stage IV (GFR:15-29 %)**, and **Stage V (GFR<15 %)**.

Explaining the current burden of CKD, Gen. Varma observed that in the Indian sub-continent 9-12 % of the people have CKD. Quoting his work done on soldiers in Agra cantonment he found that 13 % of the healthy soldiers had CKD. In yet another review done by him, several authors have reported a prevalence of CKD of 8-17 % in the country, which is a huge burden.

Gen. Varma discussed the etiology and risk factors of CKD in depth. He mentioned that diabetes and hypertension together are the main contributing factors for 72 % of the new cases of CKD globally and in India. As per an ICMR report of 2017, India with 72 million diabetics



constitutes 49 % of the world's diabetic population which is likely to rise to 134 million by 2025. The prevalence of hypertension is also increasing globally and as per WHO, 2014 estimates 40 % of the population aged  $\geq 25$  years and 71.6 % of the population aged  $\geq 65$  years suffer from hypertension. Further, one in four men and one in five women suffer from hypertension as per WHO estimates released in 2015. Studies done by many authors in the past in India have also reported a prevalence of hypertension in the range of 20-48 %. Furthermore, one in three adults with diabetes and one in five adults with hypertension may have CKD. The CKD registry data in the country have indicated that diabetic nephropathy is the commonest cause of CKD in all geographic areas. The second most frequent cause is CKD of **undetermined etiology**. Gen. Varma noted that farm laborers in Karnataka and Andhra Pradesh dealing with pesticides, people using underground water containing heavy metals, and herbal-product users have been diagnosed with CKD. He talked about a village in Karnataka wherein large numbers of cases of CKD were seen. He observed that increased life expectancy combined with epidemics of diabetes and hypertension is resulting in an increased prevalence of CKD in the country.

Gen. Varma informed that to increase awareness about Kidney diseases, “**World Kidney Day**” is observed on **March 9** every year. Talking about salt intake he mentioned WHO's recommendation of 5 gm. of salt daily and that for people with hypertension, it should be restricted to 1500 mg. He also showed an increased prevalence of hypertension in countries with increasing consumption of salt. He noted that 75 % of salt comes from processed foods including cooking sauces. Gen. Varma warned against regular use of **over-the-counter** anti-inflammatory pills or pain killers or alternative therapies. Further, if a person is aged 50 years and has diabetes/ hypertension, family history, and is a smoker, he/she should undergo BP, urine, and serum creatinine examination.

Gen. Varma ended his talk by drawing the following conclusions:

- (i) **10% of the world population has CKD. This pandemic is progressive.**
- (ii) **The majority of patients (even in the advanced stage) are unaware of the disease (< 10% in India).**
- (iii) **Diabetes and Hypertension account for 70-75% of the cases; both are preventable.**
- (iv) **Lifestyle measures e.g. regular exercise, DASH diet (rich in fruits and vegetables), Salt (<5 gm/day), and no smoking are the golden rules.**
- (v) **If one develops diabetes or hypertension yearly check for kidney functions is recommended.**



**(vi) Early diagnosis can check the progression of CKD.**

Responding to a question by Shri Deependra Rajput on normal GFR, Gen. Varma replied that according to the Western norms a GFR of 120 ml/minute is considered normal. However, since GFR depends upon the body size and protein intake, the normal value of GFR in Indians could be on the lower side.



# **BASIC KNOWLEDGE & CURRENT STATUS OF CKD IN THE COUNTRY AND EVALUATION OF RISK FACTORS WITH PARTICULAR REFERENCE TO LIFESTYLE**

**DR (LT GEN) PREM P VARMA**

AVSM, SM, VSM MD, DM, MNAMS,  
FASN, FRCP(EDIN), FAMS

PRIMUS SUPER SPECIALITY HOSPITAL  
N DELHI 110021





# **INTRODUCTION TO KIDNEY DISEASE**

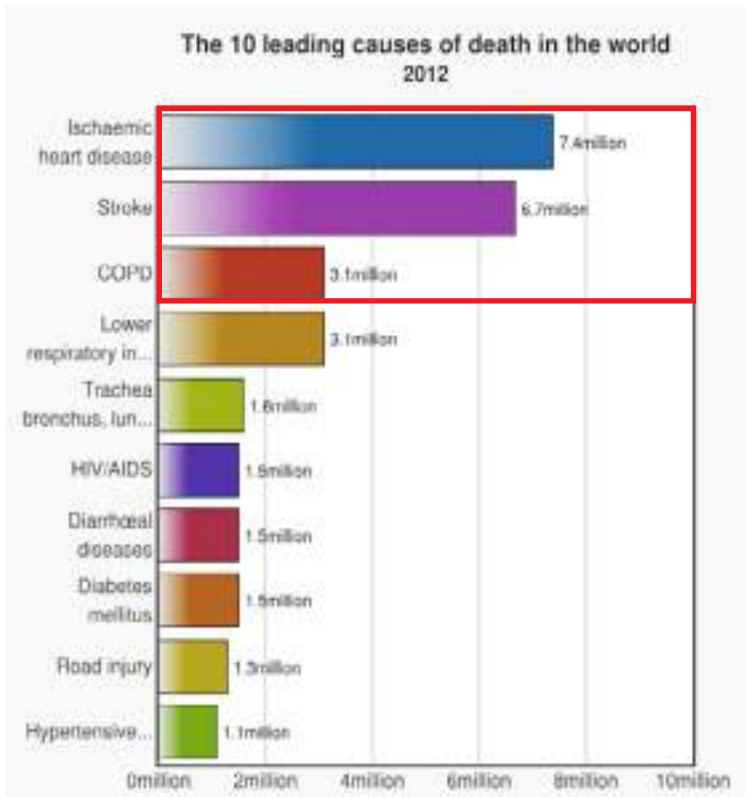




## 1990- LEADING CAUSES OF DEATH

- **Tuberculosis**
- **Pneumonia**
- Ischemic Heart Disease
- **Diarrheal Diseases**
- Chronic Obstructive Respiratory Disease

RANKING		
1990	2013	
3	1	Ischemic heart disease
5	2	Chronic obstructive pulmonary disease
7	3	Stroke
1	4	Tuberculosis
4	5	Diarrheal diseases
2	6	Pneumonia
NA	7	Suicide
NA	8	Road injuries
NA	9	Hypertensive heart disease
NA	10	Diabetes



**Leading causes of death in India and the number of lives lost**

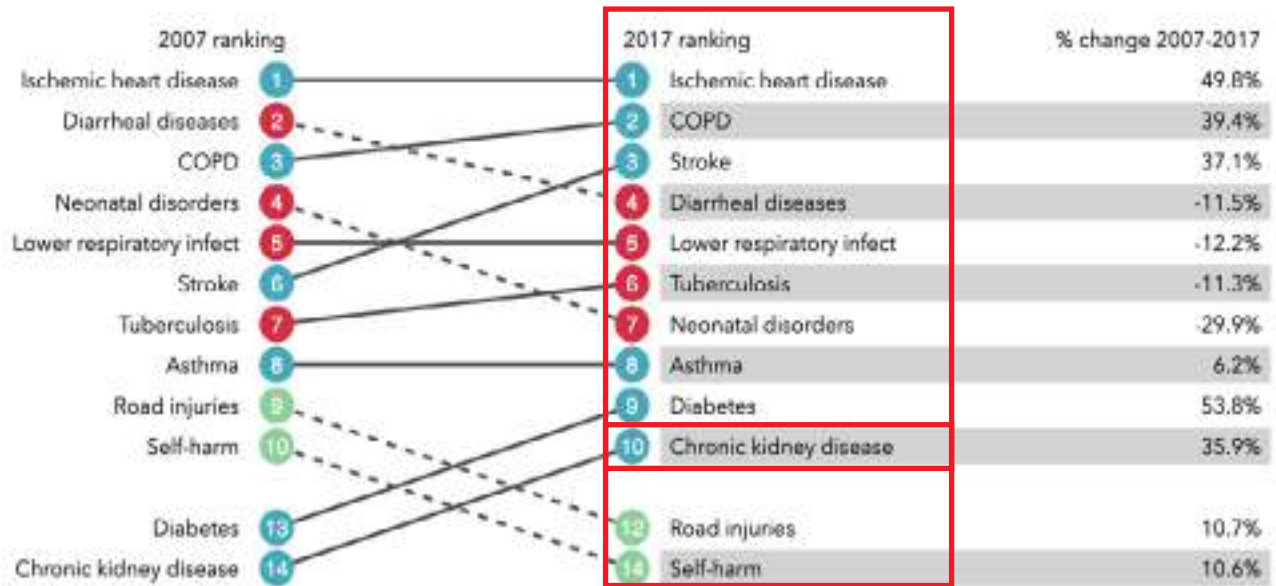
<b>1</b>	Ischemic heart disease	<b>15.87</b>
<b>2</b>	Chronic obstructive pulmonary disease	<b>7.58</b>
<b>3</b>	Stroke	<b>7.14</b>
<b>4</b>	Tuberculosis	<b>5.46</b>
<b>5</b>	Diarrheal diseases	<b>4.13</b>
<b>6</b>	Pneumonia	<b>4.04</b>
<b>7</b>	Suicide	<b>2.65</b>
<b>8</b>	Road injuries	<b>2.64</b>
<b>9</b>	Hypertensive heart disease	<b>2.62</b>
<b>10</b>	Diabetes	<b>2.38</b>

Like in developed world, in India too, NCDs are the leading cause of death.



## WHO FACT SHEET – NON COMMUNICABLE DISEASE 2021

- Noncommunicable diseases (NCDs) kill 41 million people each year, equivalent to 71% of all deaths globally.
- Each year, more than 15 million people die from a NCD between the ages of 30 and 69 years; 85% of these “premature” deaths occur in low- and middle-income countries.
- 77% of all NCD deaths are in low- and middle-income countries.
- Cardiovascular diseases account for most NCD deaths, or 17.9 million people annually, followed by cancers (9.3 million), respiratory diseases (4.1 million), and diabetes (1.5 million).
- These four groups of diseases account for over 80% of all premature NCD deaths.
- Tobacco use, physical inactivity, the harmful use of alcohol and unhealthy diets all increase the risk of dying from a NCD.
- Detection, screening and treatment of NCDs, as well as palliative care, are key components of the response to NCDs.



Top 10 causes of death in 2017 and percent change, 2007-2017, all ages, number



## TOP 10 CAUSES OF DEATH

- Ischemic heart disease
- Chronic obstructive pulmonary disease
- Stroke
- Diarrheal diseases
- Lower respiratory infections
- Tuberculosis
- Neonatal disorders
- Asthma
- Diabetes
- Chronic kidney disease

World Bank 2018



### LEADING CAUSES OF DEATH INDIA

Click each link to see data

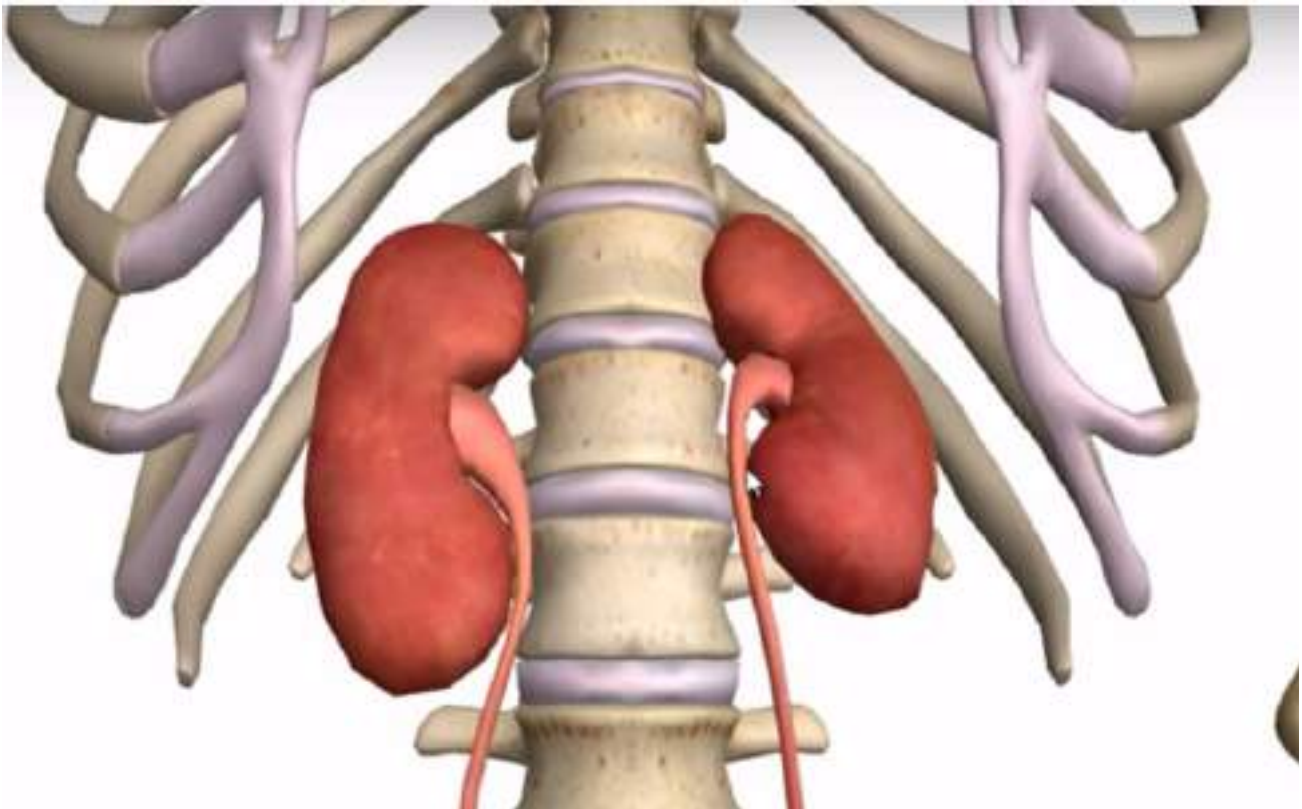
● Life Expectancy

- |  |   |  |  |
|--|---|--|--|
| 1. <a href="#">Coronary Heart Disease</a>  | 14. <a href="#">Suicide</a>                 | 27. <a href="#">HIV/AIDS</a>             | 40. <a href="#">Measles</a>              |
| 2. <a href="#">Lung Disease</a>            | 15. <a href="#">Alzheimers/Dementia</a>     | 28. <a href="#">Colon-Rectum Cancers</a> | 41. <a href="#">Liver Cancer</a>         |
| 3. <a href="#">Stroke</a>                  | 16. <a href="#">Breast Cancer</a>           | 29. <a href="#">Malnutrition</a>         | 42. <a href="#">Lymphomas</a>            |
| 4. <a href="#">Influenza and Pneumonia</a> | 17. <a href="#">Cervical Cancer</a>         | 30. <a href="#">Drownings</a>            | 43. <a href="#">Epilepsy</a>             |
| 5. <a href="#">Tuberculosis</a>            | 18. <a href="#">Asthma</a>                  | 31. <a href="#">Violence</a>             | 44. <a href="#">Endocrine Disorders</a>  |
| 6. <a href="#">Diarrhoeal diseases</a>     | 19. <a href="#">Other Injuries</a>          | 32. <a href="#">Fires</a>                | 45. <a href="#">Leukemia</a>             |
| 7. <a href="#">Diabetes Mellitus</a>       | 20. <a href="#">Rheumatic Heart Disease</a> | 33. <a href="#">Oesophagus Cancer</a>    | 46. <a href="#">Rheumatoid Arthritis</a> |
| 8. <a href="#">Kidney Disease</a>          | 21. <a href="#">Birth Trauma</a>            | 34. <a href="#">Hepatitis B</a>          | 47. <a href="#">Poisonings</a>           |
| 9. <a href="#">Low Birth Weight</a>        | 22. <a href="#">Oral Cancer</a>             | 35. <a href="#">Ovary Cancer</a>         | 48. <a href="#">Malaria</a>              |
| 10. <a href="#">Liver Disease</a>          | 23. <a href="#">Congenital Anomalies</a>    | 36. <a href="#">Meningitis</a>           | 49. <a href="#">Dengue</a>               |
| 11. <a href="#">Road Traffic Accidents</a> | 24. <a href="#">Lung Cancers</a>            | 37. <a href="#">Encephalitis</a>         | 50. <a href="#">Pancreas Cancer</a>      |
| 12. <a href="#">Falls</a>                  | 25. <a href="#">Peptic Ulcer Disease</a>    | 38. <a href="#">Maternal Conditions</a>  |  |

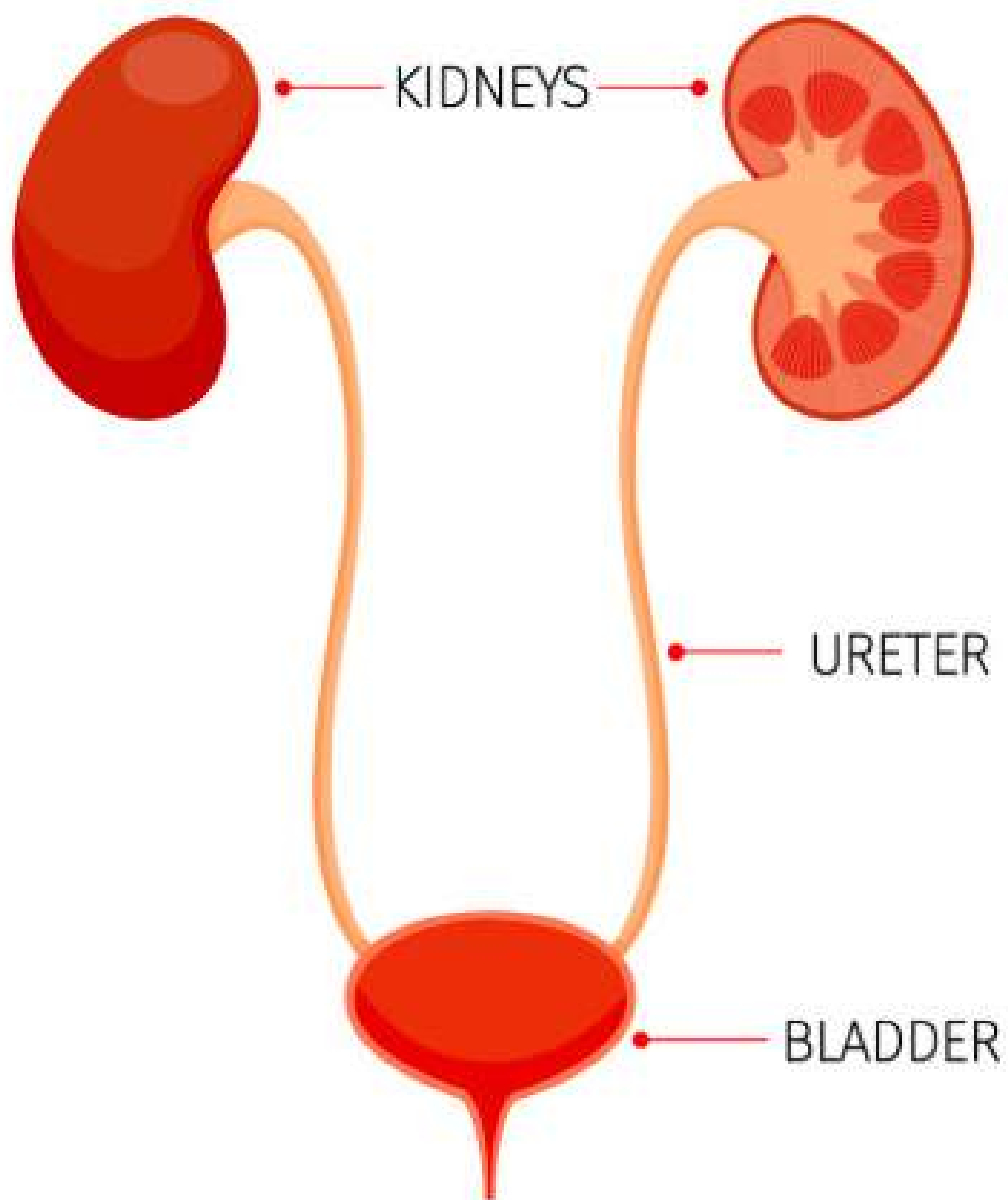


# **BASIC KNOWLEDGE OF CKD**





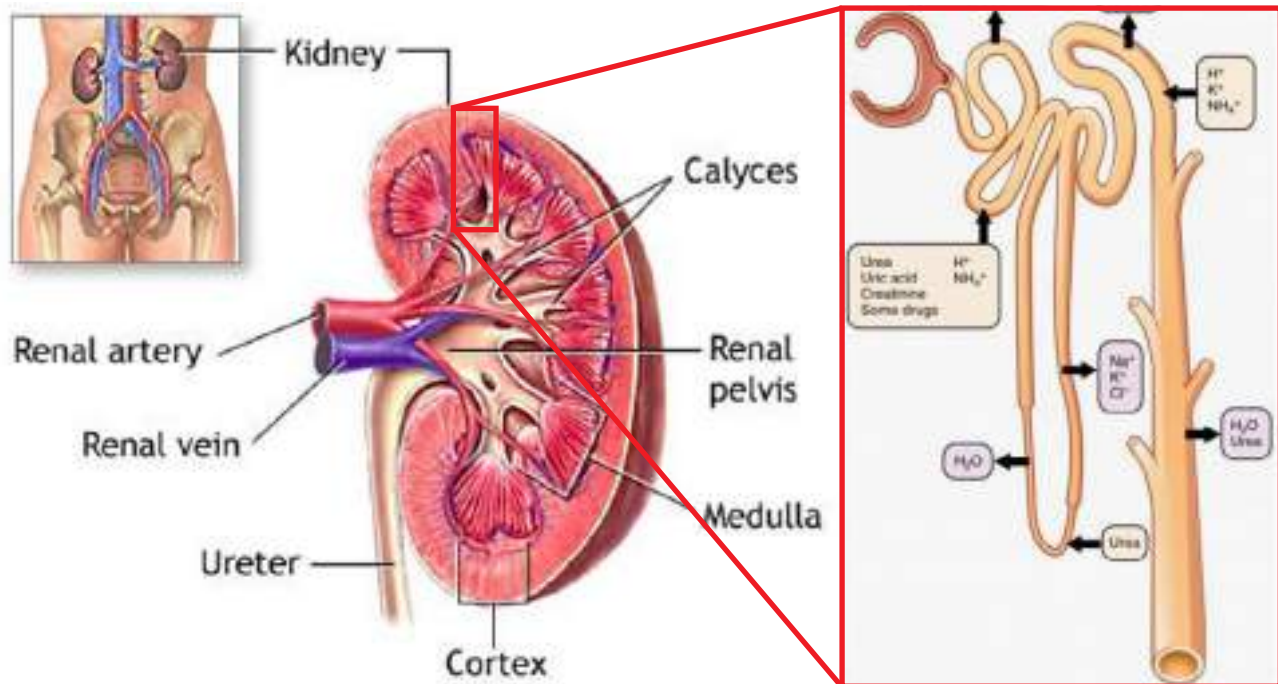
Each kidney weighs ~135 gm

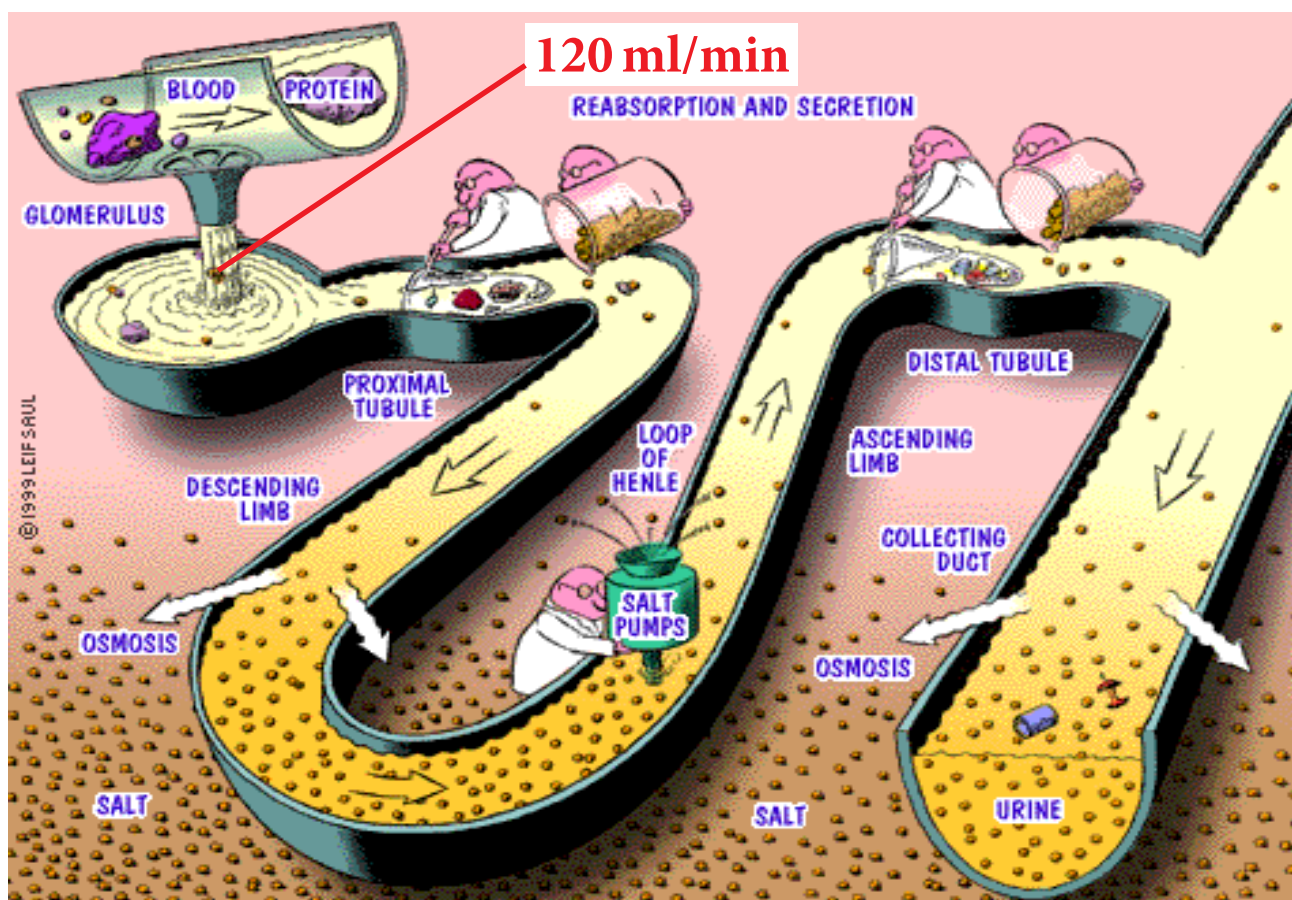




## INTRODUCTION

- All healthy humans have 2 kidneys
- Each Kidney  $\approx$  1.2 million Nephrons





**Glomerular Filtration Rate (GFR) = 120 ml/min X 1440 = 172 L**



## FUNCTIONS OF KIDNEY

- 1. Excretion of Waste Products- Protein breakdown**  
(Urea/ Creatinine/Uric acid)
2. Maintenance of Acid Base Balance
3. Maintenance of electrolyte and water balance
4. Concentration or Dilution of Urine
- 5. Hormonal- Erythropoietin and Vitamin D**  
(for Blood and Bones)





## KIDNEY FAILURE

- Acute- Deterioration of kidney Functions developing over **hours –days** / usually reversible
- Chronic- slowly progressive over **months-years** / irreversible (minimum 3 months)



## NKF- DOQI (DIALYSIS OUTCOME QUALITY INITIATIVE) 2002

- Structural or functional abnormality in the kidney **lasting for more than 3 months** with normal or low GFR.

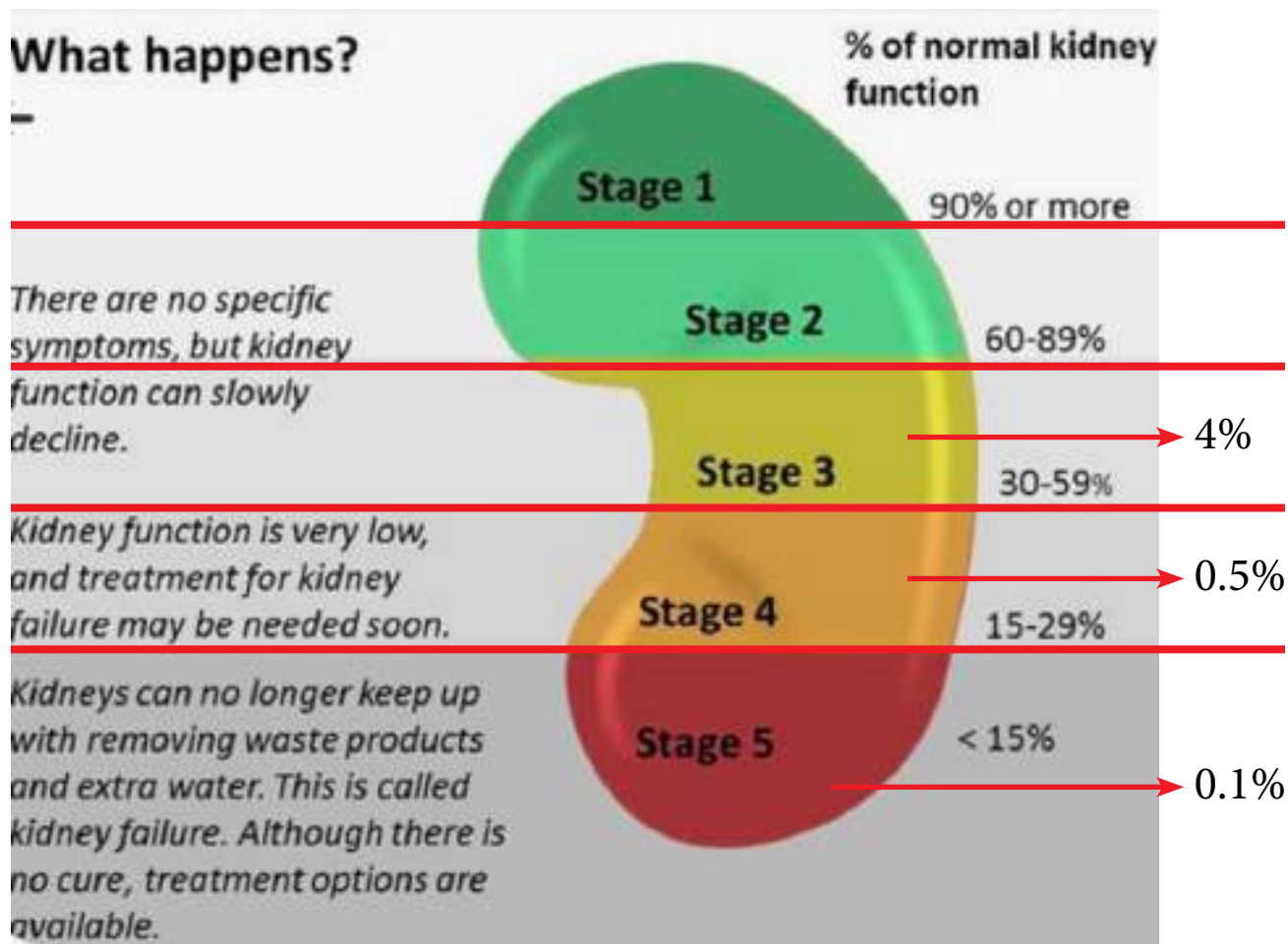
(Progressive/ irreversible deterioration of renal functions)

(manifested as scar, cysts, stone, proteinuria, hematuria etc.)

or

- **GFR < 60ml/min**



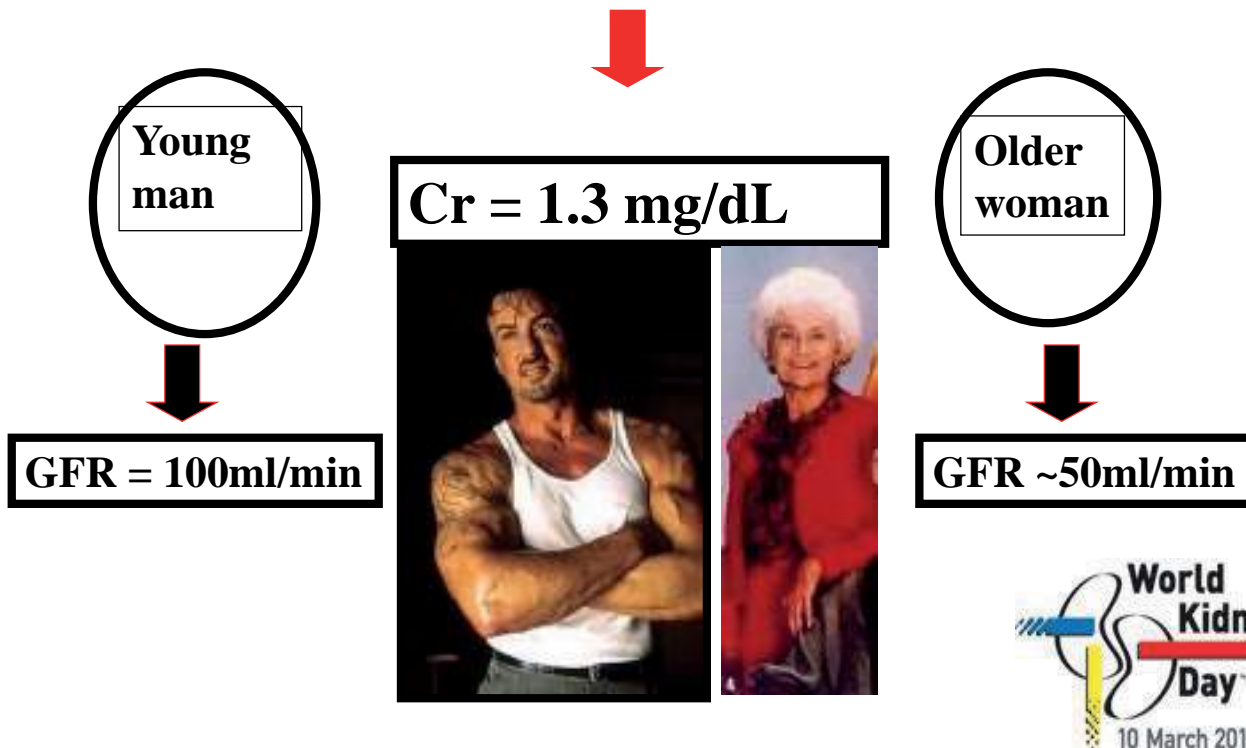


DIALYSIS/  
TRANSPLANT



## SERUM CREATININE VS GFR !!!!

Differences in muscular mass





## MARKER OF KIDNEY FUNCTION.... S CREATININE VS GFR

**Don't use creatinine as a marker of Kidney Function,  
use only and only ....GFR**

- Creatinine = 1.2 mg/dl
- Cockroft's Gault formula =  $\frac{140 - \text{age} \times \text{wt} \dots \times .85 \text{ (females)}}{72 \times \text{s creatinine}}$

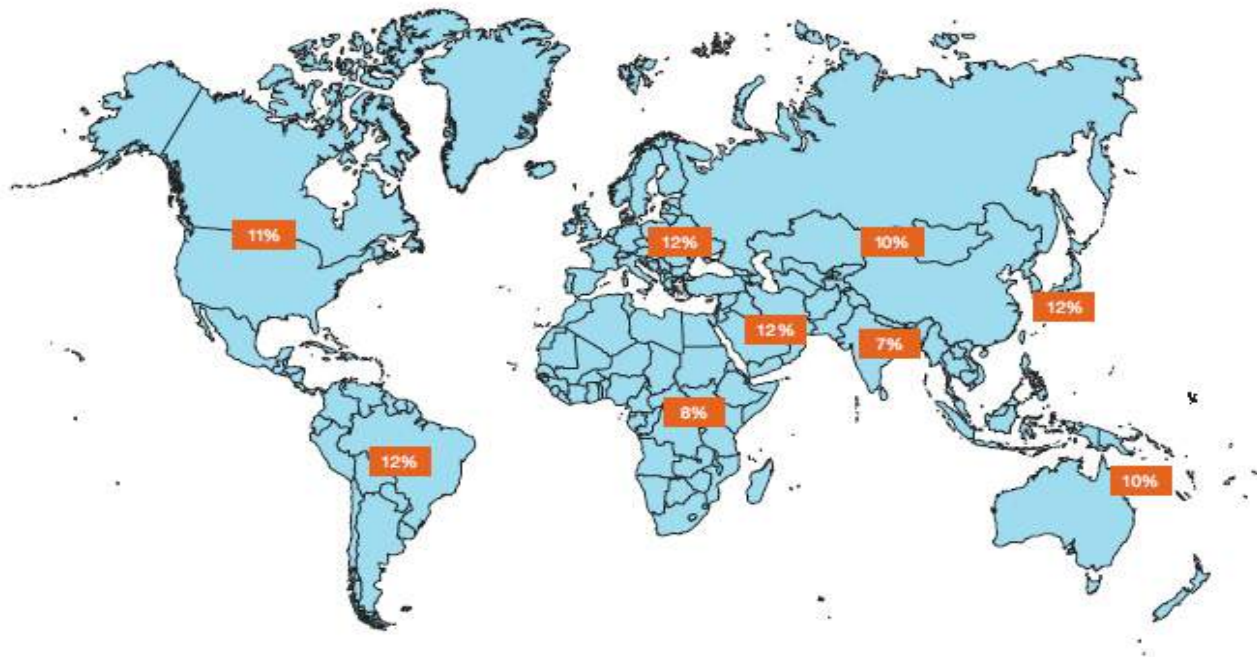
- 20 yrs → 30 yrs → 60 yrs → 85 yrs
- 70 kg                  60 kg                  55 kg                  48 kg
- GFR 97 ml (1) → 76 ml (2) → 51 ml (3) → 30 ml (4)



# **CURRENT STATUS IN COUNTRY**



Map 3.6 | Estimated global prevalence of CKD



Geographic regional structure not based on ICD regional framework  
Source: Hill et al., Global prevalence of chronic kidney disease – a systematic review and meta-analysis<sup>10</sup>.

**In 2019- 850 million have CKD**



## GLOBAL PREVALENCE

• UK	- 8.5%
• Australia	- 10%
• Nepal	- 10.6%
• Taiwan	- 11.9%
• Japan	- 13%
• US	- 14.5%
• SEEK-Thiland	- 17.5

**(CKD Prevalence 8-17%)**





## National Chronic Kidney Disease Fact Sheet, 2017

Chronic kidney disease (CKD) is a condition in which the kidneys are damaged or cannot filter blood as well as healthy kidneys. Because of this, excess fluid and waste from the blood remain in the body and may cause other health problems.

### CKD Is Common Among Adults in the United States

#### Fast Stats

- 30 million people or 15% of US adults are estimated to have CKD.\*
- 48% of those with severely reduced kidney function but not on dialysis are not aware of having CKD.
- Most (96%) people with kidney damage or mildly reduced kidney function are not aware of having CKD.



#### Risk Factors for Developing CKD

Adults with diabetes, high blood pressure, or both have a higher risk of developing CKD than those without these diseases. Other risk factors for CKD include heart disease, obesity, and a family history of CKD.



**Keep your kidneys healthy by controlling your blood sugar and blood pressure.**





Nephrol Dial Transplant (2010) 1 of 6  
doi: 10.1093/ndt/gfq131



Original Article

Ur alb/cr, s creatinine, CKD-EPI

## Prevalence of early stages of chronic kidney disease in apparently healthy central government employees in India

Prem P. Varma<sup>1</sup>, Deep Kumar Raman<sup>2</sup>, T.S. Ramakrishnan<sup>3</sup>, Pragnya Singh<sup>2</sup> and Ankur Varma<sup>4</sup>

<sup>1</sup>Dep... **3398 soldiers/ families/ civilians screened** ...ase Hospital Delhi ...duate Institute of

Correspondence and offprint requests to: Deep Kumar Raman; E-mail: deepkraman@gmail.com

9.74% had microalbuminuria

### Abstract

**Background.** Chronic kidney disease (CKD) is associated with significant morbidity and mortality. US data show that 11–15.6% of population has CKD, but there is no data from India on early stages of CKD. The aim of this study was to estimate the prevalence of early stages of CKD using the Kidney Disease Quality Outcomes Initiative (KDOQI) guidelines in an Indian population.

### Introduction

**Conclusions.** Of the apparently healthy adult Indian central government employees, 15.04% and 13.12% were found to have early stages of CKD using the MDRD and CKD-EPI criteria for GFR, respectively.

...oning countries like India. It is estimated that 80% of



HEALTH LECTURES for Station tps on Diabetes, Obesity, Heart Diseases, Smoking, CKD









## Comprehensive Health Survey Pgme

















## VARMA PP ET AL. NDT 2010; 25:3011-17

- 3398 soldiers/ families/ civilians screened
- Tested for **microalbuminuria**/ eGFR < 60 ml/min (**CKD-EPI**)
- 9.96% had proteinuria
- 13.12 (CKD-EPI)- 15.04 % (MDRD) had CKD (stage 1-3) **stage 3- 3.02%**
- **Drawbacks: Malb not tested second time**

**Diversity. Urban + Rural population- stage 1-3**





Varma PP. IJN 2015

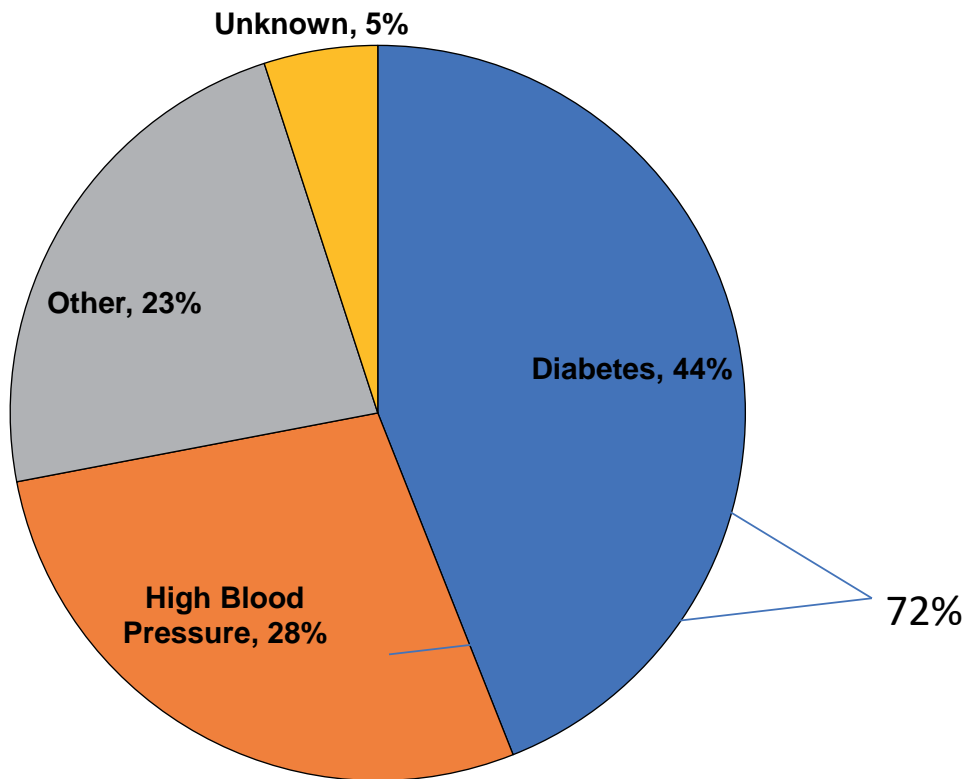
Authors	Subjects	DM	HT	CKD stage 3	CKD-Total	
Agarwal SK	4712	10.7%	22%	0.785%		Urban
Singh NP	5252	7.3%	15%	4.2%		Semiurban
Varma PP	3398	1.53%	15%	3%	13.1%	Mixed
Singh AK	5588	18.8%	43.1%	4.3%	17.3%	Urban
Anand S	12271	19%	32.5%		8.7%	Urban
Anupama S	2091	3.82%	33.62%	6.3%		Rural



# **ETIOLOGY AND RISK FACTORS**



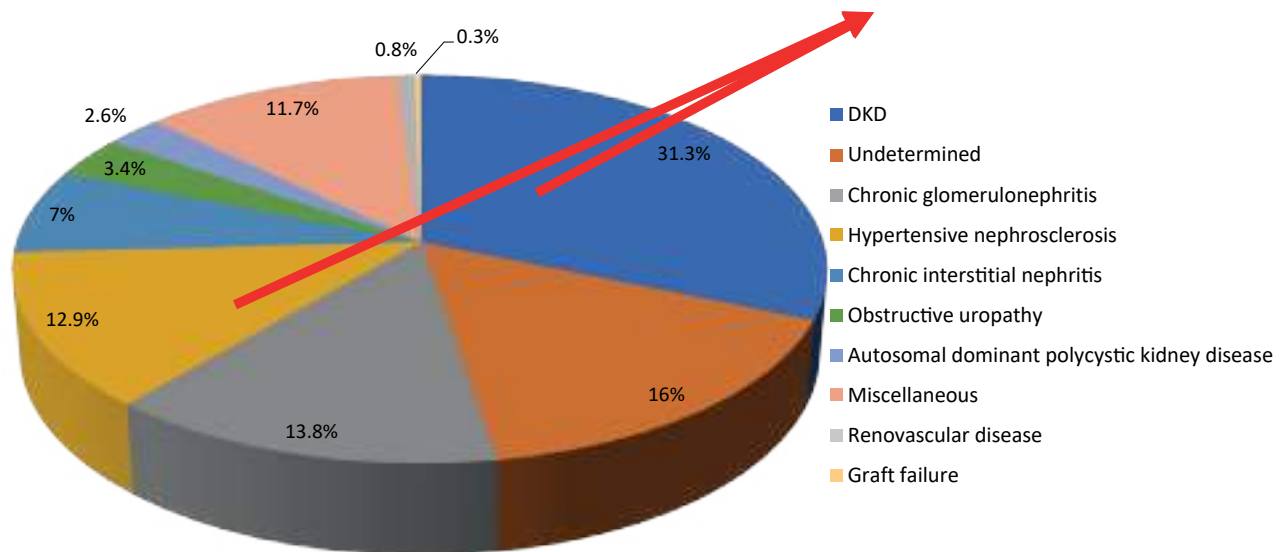
## NEW CASES OF KIDNEY FAILURE BY PRIMARY DIAGNOSIS







## CAUSES OF CKD IN INDIAN SUBJECTS [RENAL BIOPSY 2%]



Rajapurkar MM et al. BMC Nephrology 2012, 13:10



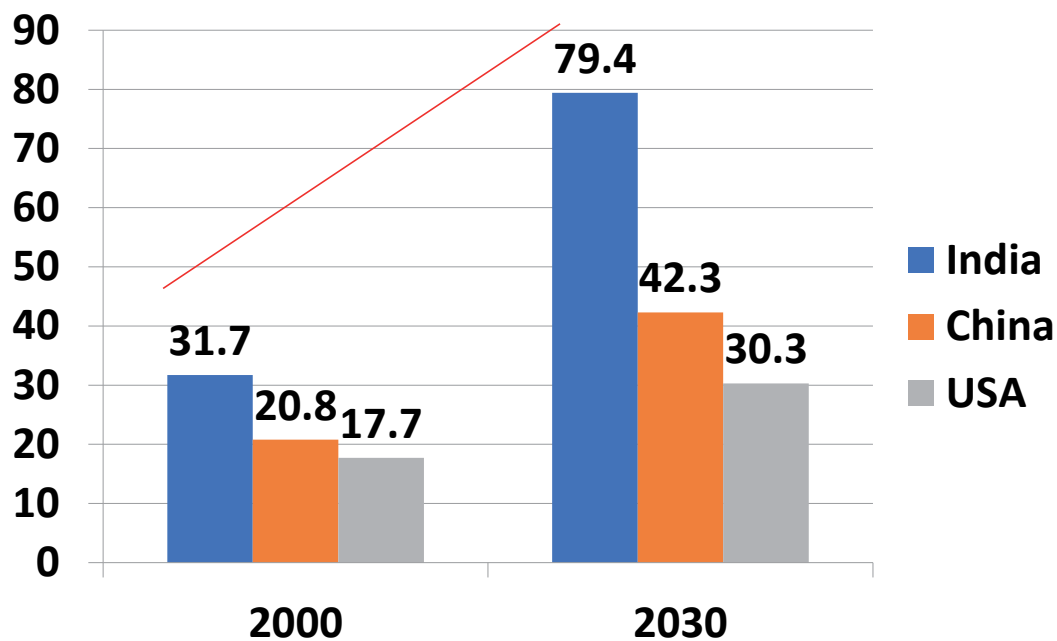
## Indian Diabetes

Year	Author	Place	Prevalence urban	rural
1972	Ahuja et al.	N Delhi	2.3	
1988	Ramachandren et al.	Kudremukh	5.0	
2001	Ramachandran et al.	6 Metro	12.1	
2001	Misra et al.	Delhi	11.2	
2001	Mohan et al.	Chennai	12.1	
2011	Indiab, Anjana et al	Maharashtra Jharkhand	10.9 13.5	6.5 3.0
2012	Singh et al >60 yrs slum	Delhi	18	
2013	Shah et	Manipur muslims only		15
2014	Zaman et al.	Arunachal Prad		19.8



## PREVALENCE OF DIABETES

72 million ICMR 2017 report  
49% of world diabetic population  
134 million by 2025



Australas Med J 2014;7:45-48



## PREVALENCE OF HT

NHANES data- (2007-2010)),  $\geq 18$  yrs = 29.6%

CDC 2013

Globally, adults aged

>25 yrs = 40%

WHO 2014

$\geq 65$  yrs = 71.6%

HT with Diabetes/obesity and other disabilities, all three groups had higher rates of blood pressure but control was better in 2007–2010 (63.6%, 54.0%, and 59.3% versus 45.4%, 41.4%, and 45.0% )



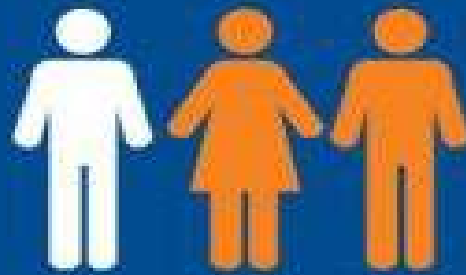
## PREVALENCE OF HYPERTENSION IN INDIA

FIRST AUTHOR	YEAR	PLACE	AGE (yr)	SAMPLE SIZE	PREVALENCE (%)
<b>URBAN POPULATION</b>					
ANAND MP	2000	Mumbai	30-60	1662	34.0
GUPTA PC	2004	Mumbai	≥ 35	88653	47.9
PRABHAKARAN D	2005	Delhi	20-59	2935	30.0
REDDY KS	2006	National	20-69	19973	27.2
MOHAN V	2007	Chennai	≥ 20	2350	20.0
KAUR P	2007	Chennai	18-69	2262	27.2
YADAV S	2008	Lucknow	≥ 30	1746	32.2
<b>RURAL POPULATION</b>					
HAZARIKA	2004	Assam	> 30	3180	33.3
THANKAPPAN	2006	Kerala	> 30	2159	36
KRISHNAN A	2008	Haryana	15-64	2828	9.3
TODKAR SS	2009	Maharashtra	≥ 20	1297	7.2
VIJAYKUMAR G	2009	Kerala	≥ 18	1990	36.1
BHARDWAJ R	2010	Himachal	≥ 18	1092	35.9
KINRA S	2010	National	20-69	1983	20.0



## WHO- HYPERTENSION

- Hypertension – or elevated blood pressure – is a serious medical condition that significantly increases the risks of heart, brain, kidney and other diseases.
- An estimated 1.13 billion people worldwide have hypertension, most (two-thirds) living in low- and middle-income countries.
- In 2015, 1 in 4 men and 1 in 5 women had hypertension.
- Fewer than 1 in 5 people with hypertension have the problem under control.
- Hypertension is a major cause of premature death worldwide.
- One of the global targets for noncommunicable diseases is to reduce the prevalence of hypertension by 25% between 2010 and 2025.



**1** in **3**

Approximately 1 in 3 adults with diabetes (and 1 in 5 adults with high blood pressure) may have chronic kidney disease.







## CKD REGISTRY DATA

- 52,273 adult CKD patients were analyzed.
- Age -  $50.1 \pm 14.6$  yrs.
- females with CKD were two and half years younger than males.
- Diabetic nephropathy was the commonest cause of CKD in all geographic areas.
- The second most frequent cause was CKD of undetermined etiology
- Followed in almost equal frequency by chronic glomerulonephritis and hypertensive nephrosclerosis.

Rajapurkar et al. BMC Nephrology 2012, 13:10



## CKDU- COASTAL BELT OF KARNATKA, ANDHRA PRADESH, SRI LANKA, MEN (USA)





## WATER QUALITY CONTROL

Heavy metal and Pesticide contamination





## ALTERNATE THERAPIES.....







# UNIQUE CAUSES OF CKD AROUND THE WORLD

## Herbal Therapy Is Associated With the Risk of CKD in Adults Not Using Analgesics in Taiwan

Jinn-Yuh Guh, MD,<sup>1</sup> Hung-Chun Chen, MD,<sup>1</sup> Jung-Fa Tsai, MD,<sup>1</sup> and Lea-Yea Chuang, PhD<sup>2</sup>

Transactions of the Royal Society of Tropical Medicine and Hygiene (2007) 101, 1013–1017

available at [www.sciencedirect.com](http://www.sciencedirect.com)





Journal homepage: [www.elsevier.com/locate/trstmh](http://www.elsevier.com/locate/trstmh)

Chronic  
Sri Lanka  
Kamani  
Rajitha

### 'Cursed' Uddanam

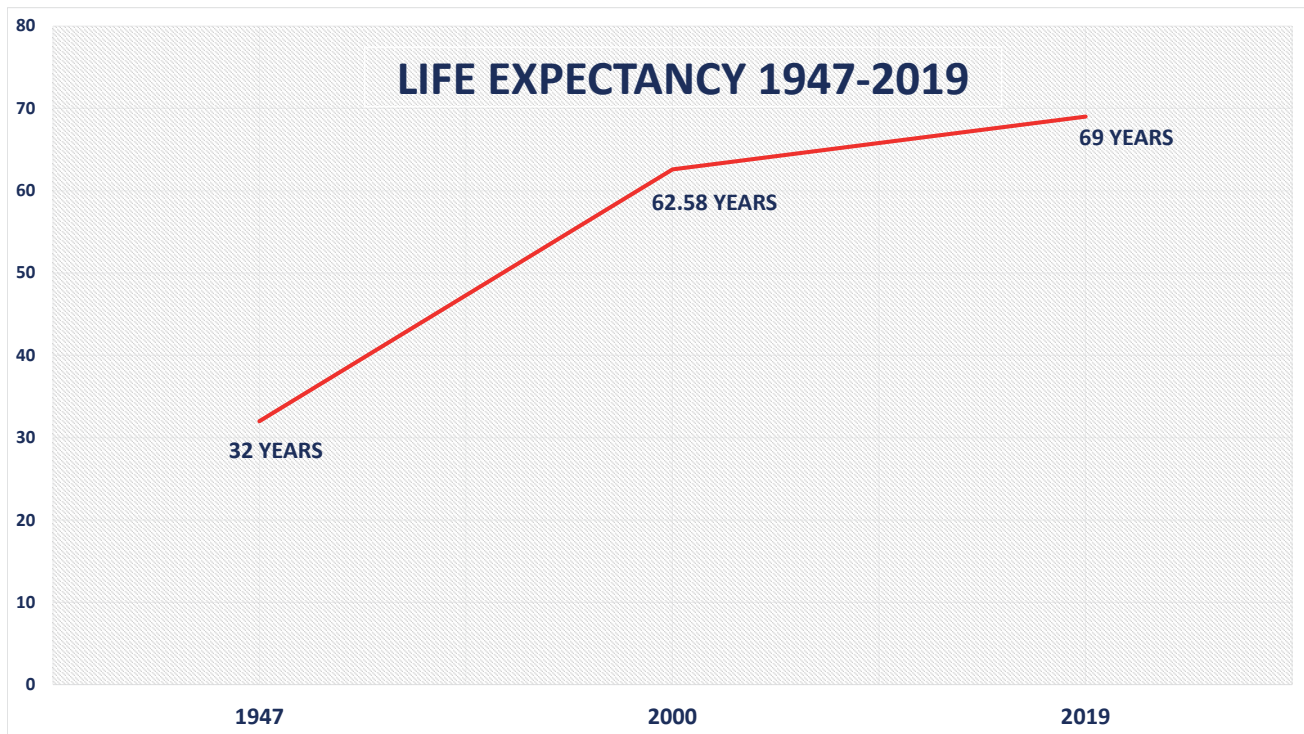
Siva G, TNN Aug 09, 2009, 05:06am IST

UDDANAM (Srikakulam): Filled with coconut plantations and palm trees, Uddanam is a small town in the coastal region of Andhra Pradesh. For the people of Uddanam and the surrounding Iechapuram mandals believe in a curse. They even fear to visit these mandals.

The reason? A staggering 3,200 deaths in the last eight years in these mandals. Not only that, but many families have abandoned the area because of the government's apathy.



Uddanam district doesn't end at the border of Iechapuram and Uddanam mandals. Villagers in the last eight years have lost blood and money thanks to the government's apathy.

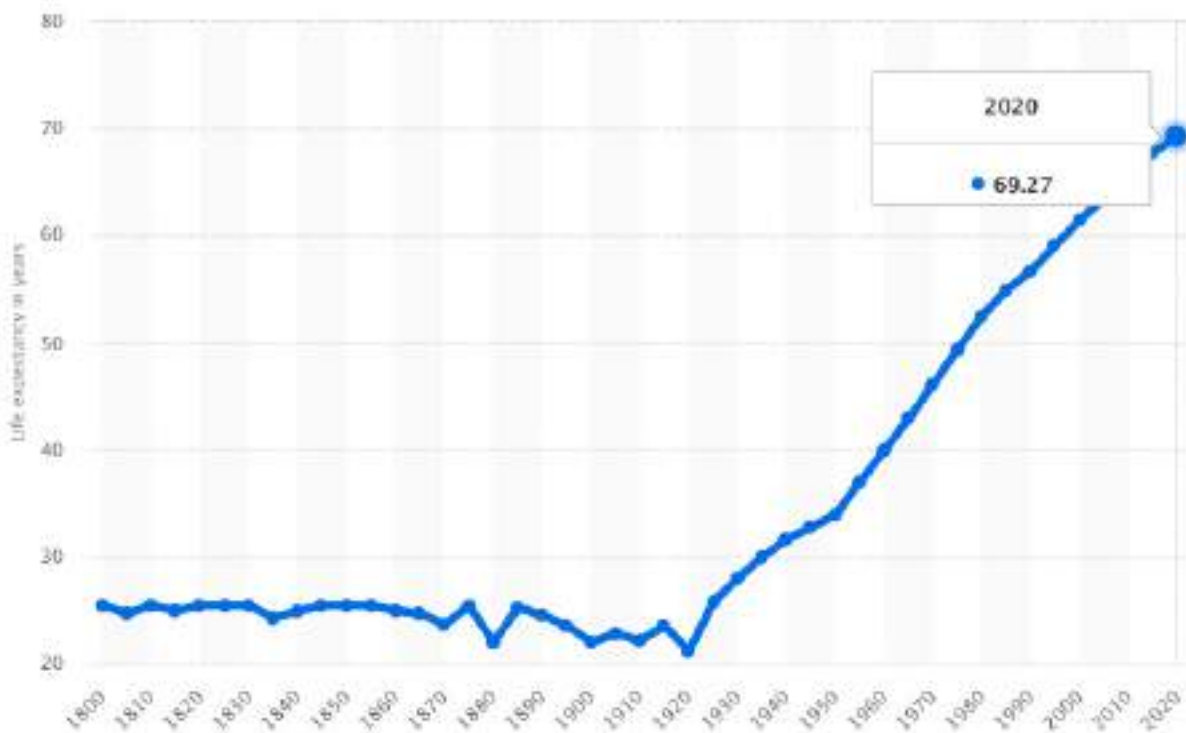




South Asia	40.5 (36.0 to 46.0)	-4.6% (-6.0 to -3.0)	0.14 (0.12 to 0.16)	0.19 (0.16 to 0.22)	71.7 (70.1 to 73.4)	69.1 (67.3 to 71.0)	70.4 (69.2 to 71.7)	60.7 (57.7 to 63.5)	11939.1 (10903.9 to 13016.7)	1357.5 (1143.5 to 1612.4)
Bangladesh	29.2 (24.9 to 34.2)	-6.5% (-8.1 to -4.9)	0.10 (0.08 to 0.12)	0.13 (0.11 to 0.16)	75.9 (73.9 to 77.9)	73.4 (71.1 to 75.6)	74.6 (72.4 to 76.7)	64.4 (61.2 to 67.3)	849.6 (712.9 to 1005.6)	77.9 (63.0 to 94.0)
Bhutan	31.5 (26.7 to 36.9)	-4.7% (-6.4 to -2.8)	0.10 (0.08 to 0.12)	0.13 (0.10 to 0.17)	74.3 (72.3 to 76.4)	72.2 (69.7 to 74.8)	73.2 (70.9 to 75.6)	63.1 (59.8 to 66.2)	4.3 (3.5 to 5.0)	0.4 (0.3 to 0.6)
India	35.8 (30.2 to 43.0)	-5.4% (-7.5 to -3.3)	0.14 (0.11 to 0.16)	0.19 (0.16 to 0.23)	72.1 (70.2 to 74.0)	69.5 (67.3 to 71.8)	70.8 (69.3 to 72.2)	60.5 (57.4 to 63.3)	9392.1 (8430.3 to 10426.1)	840.9 (690.3 to 1037.9)

(Table 2 continues on next page)

www.thelancet.com Vol 396 October 17, 2020

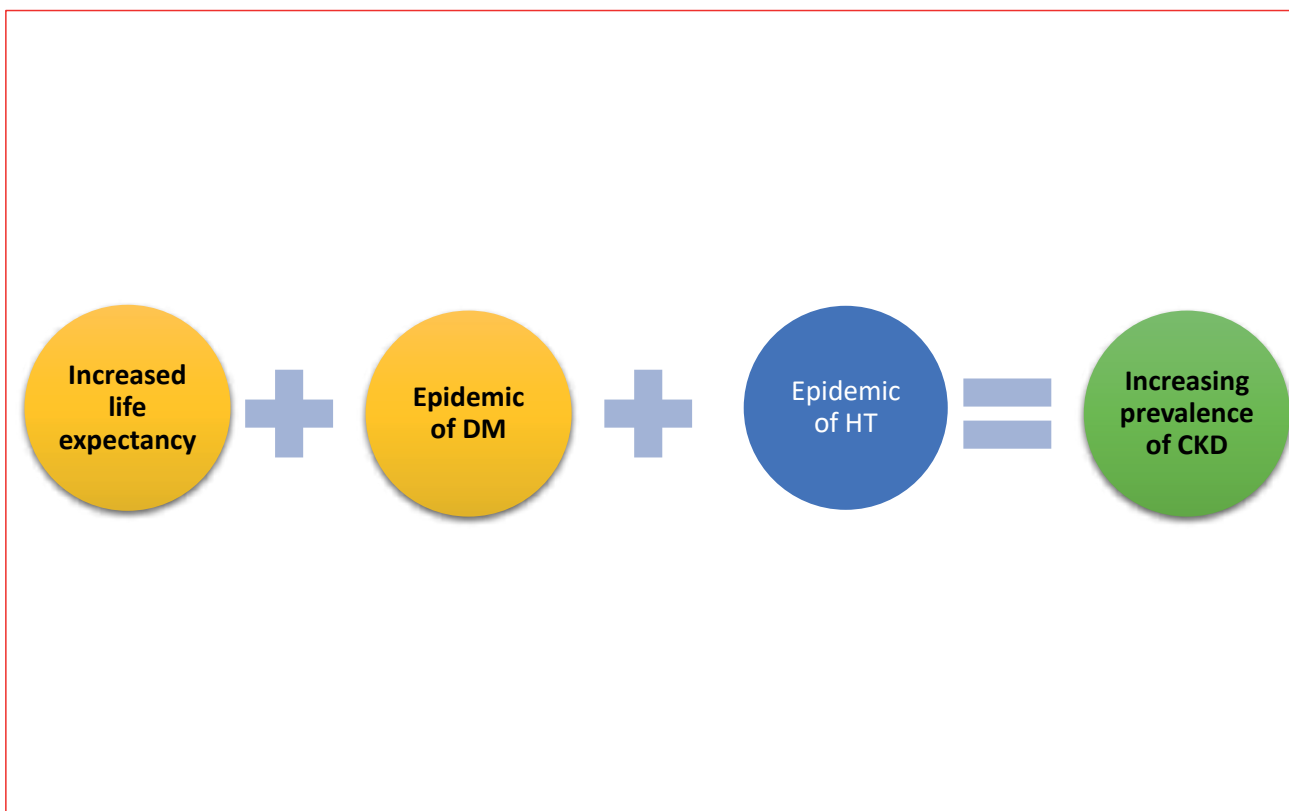


© Statista 20





## LOGIC DICTATES.....





## The Future Burden of CKD in the United States: A Simulation Model for the CDC CKD Initiative

[Thomas J. Hoerger, PhD](#), [Sean A. Simpson, MA](#), [Benjamin O. Yarnoff, PhD](#), [Meda E. Pavkov, MD, PhD](#), [Nika Rios Burrows, MPH, MT](#), [Sharon H. Saydah, PhD](#), [Desmond E. Williams, MD, PhD](#), [Xiaohui Zhuo, PhD](#)

Life time risk of Developing CKD is 54%, 52% and 42% in age group 30-49 years, 50-64 and over 65 years. Prevalence of CKD is projected to increase from 13.2%-----14.4%-----16.7% by 2020 and 2030 respectively

**Am J Kid Dis 2015;65:403-411**

### Outcomes

Residual lifetime incidence represents the projected percentage of persons who will develop new CKD during their lifetimes. Future prevalence is projected for 2020 and 2030.

### Measurements

Development and progression of CKD are based on annual decrements in estimated glomerular filtration rates that depend on age and risk factors.

### Results

For US adults aged 30 to 49, 50 to 64, and 65 years or older with no CKD at baseline, the residual lifetime incidences of CKD are 54%, 52%, and 42%, respectively. The prevalence of CKD in adults 30 years or older is projected to increase from 13.2% currently to 14.4% in 2020 and 16.7% in 2030.



Int J Nephrol. 2018; 2018: 5196285.

PMCID: PMC6077589

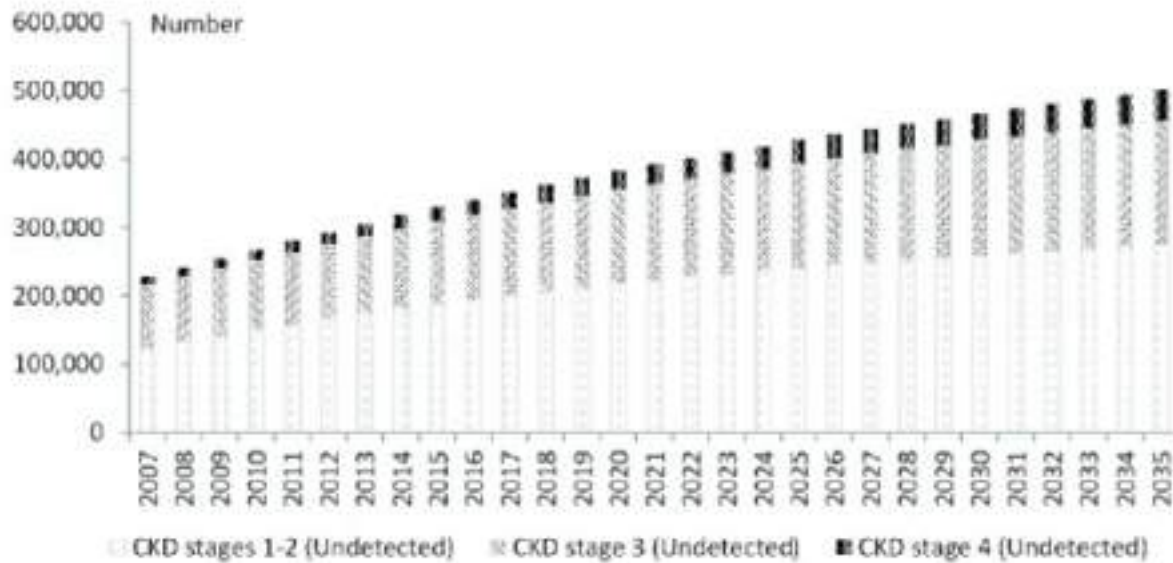
Published online 2018 Jul 4. doi: [10.1155/2018/5196285](https://doi.org/10.1155/2018/5196285)

Singapore 2018

PMID: [30112209](https://pubmed.ncbi.nlm.nih.gov/30112209/)

## Projecting the Burden of Chronic Kidney Disease in a Developed Country and Its Implications on Public Health

L. Y. Wong,<sup>1</sup> A. S. T. Liew,<sup>2</sup> W. T. Weng,<sup>2</sup> C. K. Lim,<sup>3</sup> A. Vathsala,<sup>4</sup> and M. P. H. S. Toh<sup>1, 5</sup>



### Results

From 2007 to 2035, the number of residents with CKD is projected to increase from 316,521 to 887,870 and the prevalence from 12.2% to 24.3%. Patients with CKD stages 1-2 constituted the largest proportion. The proportion of undiagnosed cases will decline from 72.1% to 56.4%, resulting from faster progression to higher CKD stages and its eventual detection.



## FIRST WORLD KIDNEY DAY





## SUMMARY OF INDIAN DATA

authors	subjects	age	DM	HT %	Criteria of CKD	prevalence	limitations
Agarwal SK et al	4712	42 + 13	10.7%	22.1	Cr > 1.8mg/dl	0.785%	Cut off- high Proteinuria- not included
Singh NP et al	5252	54	7.3%	15	MDRD	4.2% stage 3 & above	Proteinuria- only once
Singh AK et al	5588	45.2 + 15.2	18.8%	43.1	CKD-EPI	17.2%, stage 3- 4.3%	Not true representative
Varma PP et al	3398	35.65 + 8.72	1.53%	15	CKD-EPI	13.1% Stage1-3, stage 3- 3%	albuminuria only once
Anand S et al	12271				CKD-EPI	8.7% Albuminuria -7.1%	

In India-

150,000– 200,000 fresh cases develop ESKD who need dialysis/ Transplant



**Less than 5 % get Renal Transplants**





## SALT



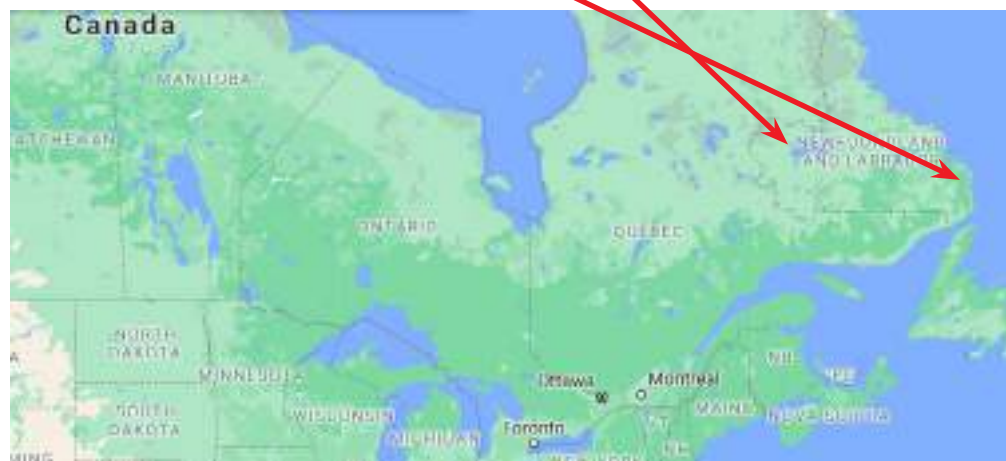
**WHO recommends - 5 gm salt intake (1 teaspoonful) of salt /day.  
For hypertensives it should be 1500 mg.**

**Indians take 10.98 gm salt/day**



## SALT INTAKE AND HYPERTENSION- EPIDEMIOLOGICAL DATA

- 3398 soldiers/ families/ civilians screene
- Solomon Islanders. salt intake **< 2 g/day**, Hypertension- **1%**
- In two tribes with salt intakes, **3 g/day** - Hypertension **3%**
- Newfoundland area county-  
in the center of the island between **6.7 and 7.3 g/day**-  
Hypertension – **15%**.
- In coastal community the salt
- **8.4 and 8.8 g/day.**
- Hypertension **27%**







## ANIMAL DATA

Nat Med, 1995 Oct;1(10):1009-16.

### **The effect of increased salt intake on blood pressure of chimpanzees.**

Denton D<sup>1</sup>, Weisinger R, Mundy NI, Wickings EJ, Dixson A, Moisson P, Pingard AM, Shade R, Carey D, Ardallou R, et al.

- Chimpanzees are phylogenetically close to humans and consume diet rich in potassium and low in sodium (fruits & Vegetables)
- In 26 chimpanzees - addition of salt (5, 10, and then 15 g/d) for 20 months
- After 84 weeks, relative to baseline values and a control group, mean systolic and diastolic BP increased by 33 mm Hg and 10 mm Hg.
- This increase was completely reversed within 6 months of cessation of the high NaCl intake.



J Hum Hypertens. 1989 Oct;3(5):309-14.

### **Blood pressure and electrolyte excretion in the Yanomamo Indians, an isolated population.**

Mancilha-Carvalho JJ<sup>1</sup>, de Oliveira R, Esposito RJ.

- 195 Yanomamo Indians from the Brazilian Amazon.
- Sodium was lower than 1 mmol/24 hr in 84% of participants.
- Mean blood pressure was 96.0/60.6 mmHg (range 78/37 to 128/86).
- Systolic and diastolic blood pressure were not higher at older than at younger ages in men.
- Data shows that there was Low blood pressure, No HT and no positive slope of blood pressure with age in a population with very low salt intake.



# 75%

of our salt comes from  
**processed foods**  
including **cooking**  
**sauces**

PIZZA, PASTA, BURGERS, FRIES, MEAT etc.



**EK CHUTKI KUM**

**Don't take TATA LITE, SENDHA NAMAK**



## Don't take over-the-counter anti-inflammatory/ pain-killer pills or alternative therapies regularly





**Screening for CKD if you have any ‘high risk’ factor Diabetes, Hypertension, Age over 50 years, family History, smokerBP, Urine exam, s creatinine**







## CONCLUSIONS

- 10% of world population has CKD. This pandemic is progressive.
- Majority of patients (even in advanced stage) are unaware of the disease (< 10% in India).
- Diabetes and Hypertension account for 70-75% of the cases ; both are preventable.
- Life style measures e.g. regular exercise, DASH diet ( rich in fruits and vegetables), Salt ( <5 gm/day) and no smoking are the golden rules.
- If one develops DM or HT yearly check for kidney functions is recommended.
- Early diagnosis can check the progression of CKD.



## GOLDEN RULES FOR PREVENTION OF CKD

- Healthy Diet- rich in Fruits and Vegetables
- Regular Exercise----- maintain Ideal weight
- Low Salt diet <5 gm /day
- Avoid over the counter medication
- No Smoking
- Regular check/ screening if you have a risk factor.
- If already have DM/Hypertension- regular check ups and control.



## KEEP FIT, BE ACTIVE





## REGULAR EXERCISE. 150 MINUTES/WEEK



## DAILY ACTIVITY

- Aerobic activity. **Get at least 150 minutes of moderate or 75 minutes of vigorous aerobic activity a week**, or a combination.
- Strength training. **Do strength training exercises for all major muscle groups at least two times a week.** Aim to do a single set of each exercise, using a weight or resistance level heavy enough to tire your muscles after about 12 to 15 repetitions.







## AMERICAN HEART ASSOCIATION

- | Moderate Activity   | Vigorous Activity  |
|---|--|
| <ul style="list-style-type: none"><li>• <b>Brisk walking (at least 4 km/hour)</b></li><li>• Water aerobics</li><li>• Dancing (ballroom or social)</li><li>• Gardening</li><li>• Tennis (doubles)</li><li>• <b>Biking slower than 16 km per hour</b></li></ul> | <ul style="list-style-type: none"><li>• Hiking uphill</li><li>• Running</li><li>• Swimming laps</li><li>• Aerobic dancing</li><li>• Tennis (singles)</li><li>• Cycling 16 km/hour or faster</li><li>• Jumping rope</li></ul> |



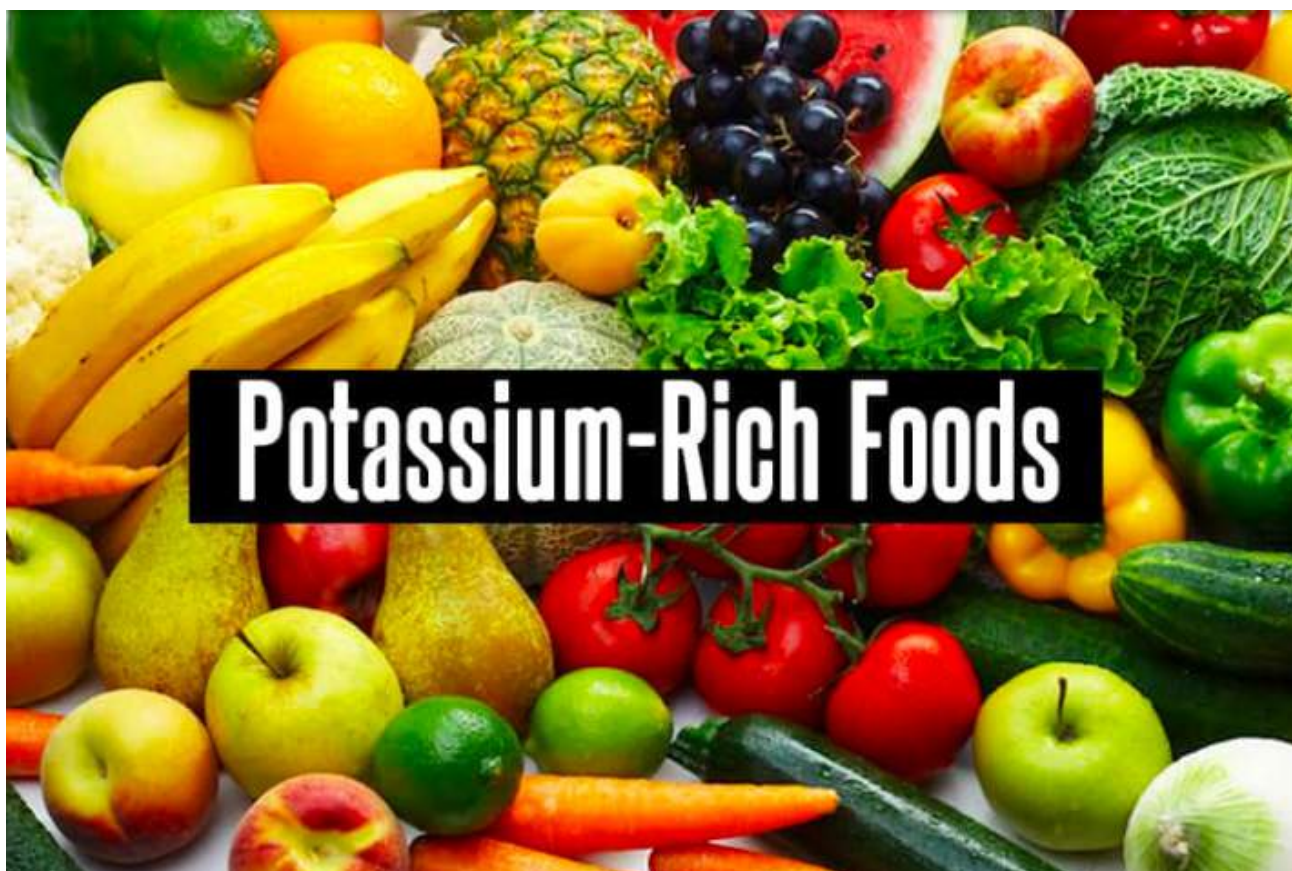


## EAT A HEALTHY DIET





**Healthy Diet, Less Salt. More fruits & Vegetables**





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# The New England Journal of Medicine

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NUMBER 1

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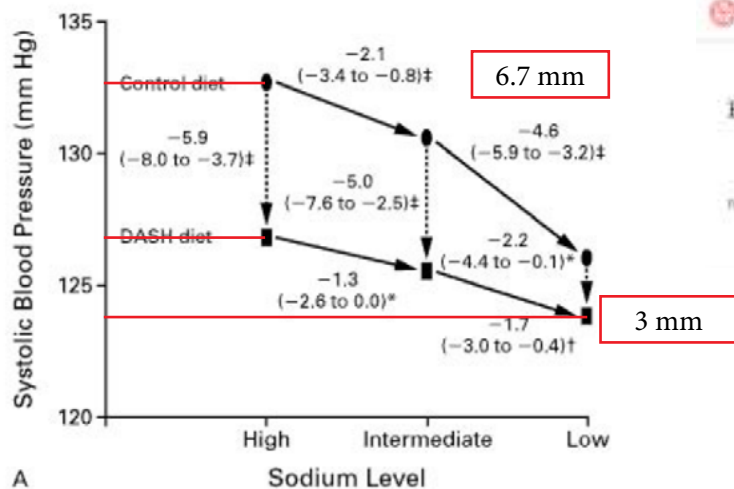


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## EFFECTS ON BLOOD PRESSURE OF REDUCED DIETARY SODIUM AND THE DIETARY APPROACHES TO STOP HYPERTENSION (DASH) DIET

FRANK M. SACKS, M.D., LAURA P. SVETKEY, M.D., WILLIAM M. VOLLMER, PH.D., LAWRENCE J. APPEL, M.D.,  
GEORGE A. BRAY, M.D., DAVID HARSHA, PH.D., EVA OBARZANEK, PH.D., PAUL R. CONLIN, M.D.,  
EDGAR R. MILLER III, M.D., PH.D., DENISE G. SIMONS-MORTON, M.D., PH.D., NJERI KARANJA, PH.D., AND PAO-HWA LIN, PH.D.,  
FOR THE DASH-SODIUM COLLABORATIVE RESEARCH GROUP



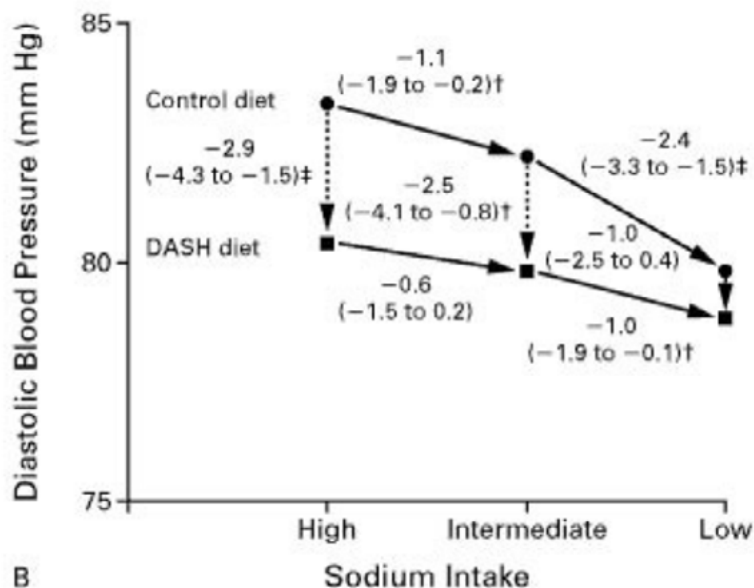


142                      107                      65 meq

The DASH diet was associated with a significantly lower systolic blood pressure at each sodium level; and the difference was greater with high sodium levels than with low ones.

As compared with the control diet with a high sodium level, the DASH diet with a low sodium level led to a mean systolic blood pressure that was 7.1 mm Hg lower in participants without hypertension, and 11.5 mm Hg lower in participants with hypertension.

The effects of sodium were observed in participants with and in those without hypertension, blacks and those of other races, and women and men.





## CHECK AND CONTROL YOUR BLOOD PRESSURE



BP= 120/80 mm Hg

120-140/80-90 mm- borderline/pre-Hypertension

>140/90 mm Hg- need treatment





## CHECK AND CONTROL YOUR BLOOD SUGAR





## TAKE APPROPRIATE FLUID INTAKE





## DON'T SMOKE



**Tobacco accounts for over 7.2 million deaths every year (including from the effects of exposure to second-hand smoke), and is projected to increase markedly over the coming years**



## PREVENTION AND CONTROL STRATEGIES FOR CKD WITH PARTICULAR REFERENCE TO THE ROLE OF DIET, LIFESTYLE, AND OTHER FACTORS

Prof. V. Sakhuja the last speaker of the webinar discussed the prevention and control strategies of CKD during his talk on “**Prevention and control of Chronic Kidney Diseases: Diet, Lifestyle & other factors**”. He said people with diabetes, high blood pressure, heart disease, kidney stones, family history of CKD, and obesity are more likely to develop CKD. These account for 70 % of all CKDs. He emphasized on early detection of CKD for its better management. There are no symptoms in the early stages of the disease and hence it is important to check blood pressure and blood sugar at regular intervals and also to get urine and serum creatinine examined. In case of abnormal findings, consult a **Nephrologist**.

Describing the type of diet to be eaten, Prof. Sakhuja said food should be such that it is good for the whole body. Our food should include fresh fruits & vegetables, whole grains, and low-fat dairy products. Only 10 % of calories should come from sugar or carbohydrates. The rest can come from proteins and fats. Restrict consumption of salt to 5 gm. / day. A salt-free diet is not recommended. Reduce intake of fried foods. He advised reading labels mentioning the amount of fat, sodium & sugar before buying a packaged food product.

For obese and overweight people, Prof. Sakhuja laid a lot of emphasis on reducing body weight gradually and bringing it down to an ideal level for controlling high blood pressure. It is very important to do physical activity including a brisk walk of more than 30 minutes duration, a minimum of five days a week.

It is very important to maintain adequate fluid intake. A fluid intake of 1.5-2.5 L/ day depending on weather and occupation is essential. People detected with kidney stones must drink 2.5 L of fluid per day. It is advisable to increase fluid intake during diarrhea, fever, and urinary infections.

Talking about lifestyle factors, Prof. Sakhuja advised quitting smoking by using other alternative substances such as NICOTEX and Chewing gum. Restrict the use of alcohol. He emphasized reducing stress by doing Yoga and Meditation. Keep blood pressure <140/90 mm/Hg. For the diabetics, he advised controlling blood sugar between 100-180 mg/dl and regular monitoring of blood sugar using a glucometer. Medicines such as NSAIDS (painkillers), combiflam, and aceclofenac should be avoided. If needed, take paracetamol or Ultracet. He also advised against using PPIs (Proton Pump Inhibitors) and ayurvedic drugs for these could



contain heavy metals. People with diabetes and heart disease should keep LDL cholesterol levels below 100 mg/ dL.

Prof. Sukheja mentioned that 5-10 % of all kidney failures happen due to **kidney stones**. Kidneys get damaged when stones obstruct the ureter. He advised periodic ultrasound examination of the kidney to rule out kidney stones even when not symptomatic. He noted that people visit a doctor only when they have pain. Swelling of feet, a decline in urine output, loss of appetite, and vomiting were some of the initial symptoms mentioned by him.

Replying to a question on maintaining good kidney health, Prof. Sakhuja said eating protein supplements in itself doesn't cause any problem to the kidneys. However, in the case of CKD, the protein consumption should be restricted to 0.8 gm/kg of body weight per day. Answering another question raised by Dr. Rohit, Prof. Sakhuja clarified that PPI should be avoided in the case of CKD. As an alternative, he suggested the use of the drug "Ranitidin".



# PREVENTION & CONTROL OF CHRONIC KIDNEY DISEASE : DIET, LIFESTYLE & OTHER FACTORS

**PROF. V. SAKHUJA**

EMERITUS PROFESSOR  
PGIMER, CHANDIGARH





## WHO IS AT RISK ?

More likely to develop **Chronic kidney disease** if you have :

- Diabetes mellitus
- High blood pressure
- Heart disease
- Kidney stones
- Family history of Chronic kidney disease
- Obesity

These account for **70%** of all CKD



## DETECTION

- Need to detect kidney disease EARLY
- No symptoms in early stages
- Get blood pressure checked – marker of kidney disease
- Get urine tested; get serum creatinine done
- Get blood glucose checked
- If abnormal, see a NEPHROLOGIST (not just a general physician)



## DIET

- Choose foods that are good for the whole body : fresh fruits & vegetables, whole grains, low fat dairy products.
- Only 10% calories from sugar , upto 5 gm salt / day.
- Reduce fried foods.
- Read food labels : Fats, Na & sugar.
- If overweight , reduce to ideal weight gradually.
- Physical activity > 30 minutes daily (brisk walking).



## FLUID INTAKE

- Some persons have a habit of drinking very little water.
- Fluid intake of 1.5 -2.5 L /day, depending on weather & occupation
- Kidney stones : 2.5 L fluid / day
- Increase fluid intake during diarrhoea, fever, urinary infections.



## LIFESTYLE

- Stop smoking; use NICOTEX chewing gum.
- Limit alcohol intake.
- Reduce stress with meditation, yoga.
- Keep BP at  $< 140/90$ .
- Keep blood sugar under control ( 100- 180 mg/dl) ; check blood sugar with glucometer daily.
- Avoid NSAIDS (painkillers): combiflam, aceclofenac. Take paracetamol /ultracet instead; avoid PPIs, ayurvedic drugs
- Lower LDL cholesterol levels  $< 100$  if diabetic or heart disease.



## KIDNEY STONES

- 5 -10 % of all kidney failure is due to this.
- Patients themselves to blame for this; go to a doctor only when **pain** occurs. Ignore the problem when there is no pain.
- Kidneys get damaged only when stones **obstruct the ureter**.
- Periodic ultrasound examination even when NOT symptomatic.





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