agMOOCs

Diet in Kidney Disorders

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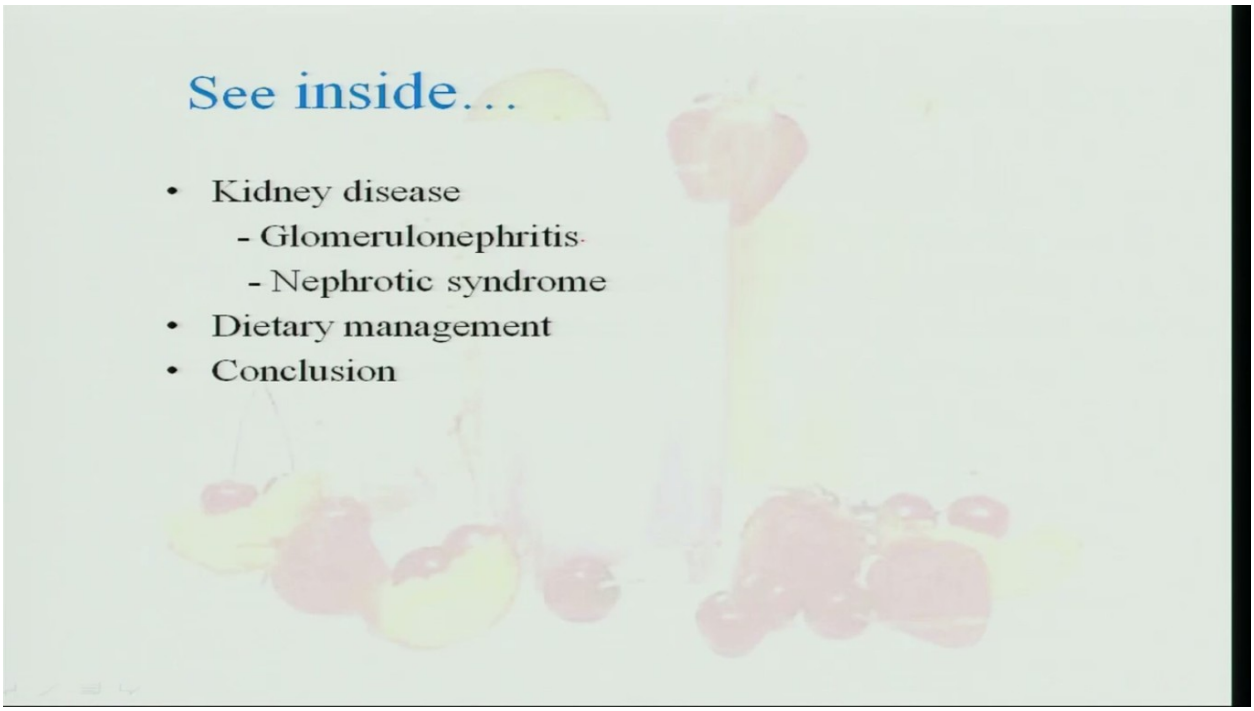
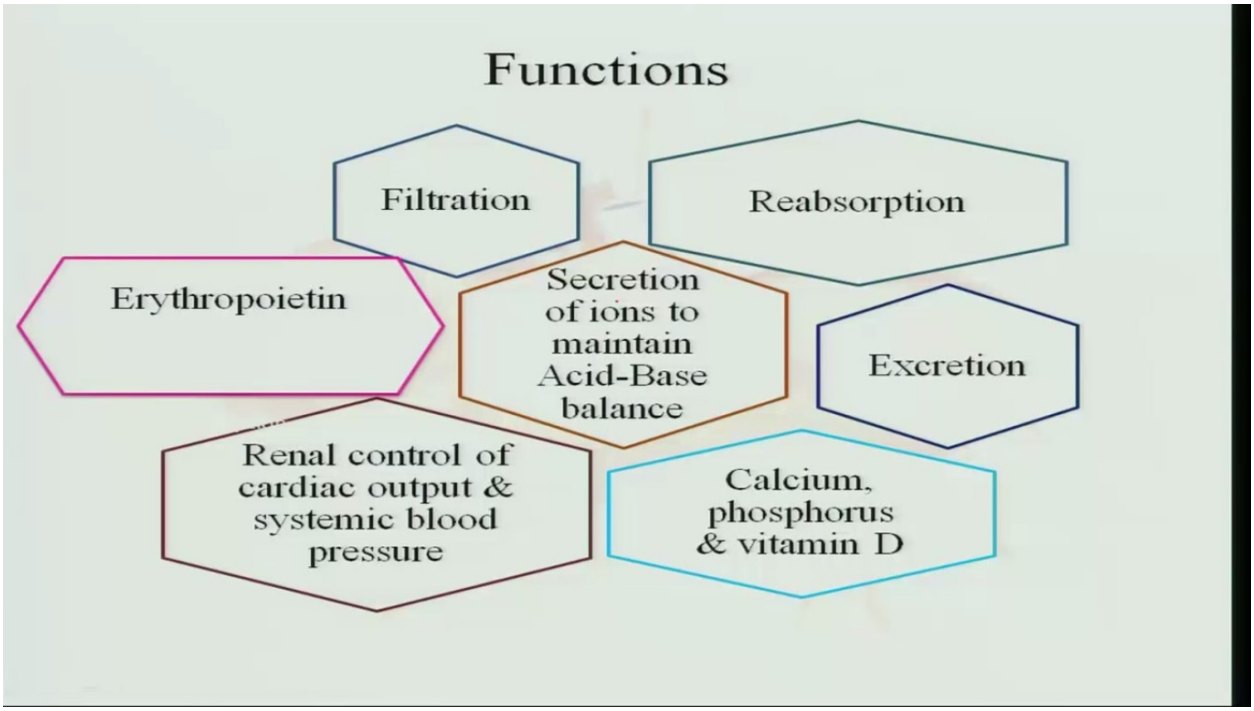
Last few classes we have been seeing about the therapeutic nutrition and we have seen how the diet has to be changed during constipation, diarrhea, then the lung diseases, liver diseases and the heart diseases. Let us now see what are the various disorders that occurs to the kidney. Kidney also is a vital organ which saves us from excreting so many waste products. So if we are not careful with our body then the kidney also has some disorders. Let us see what are those.

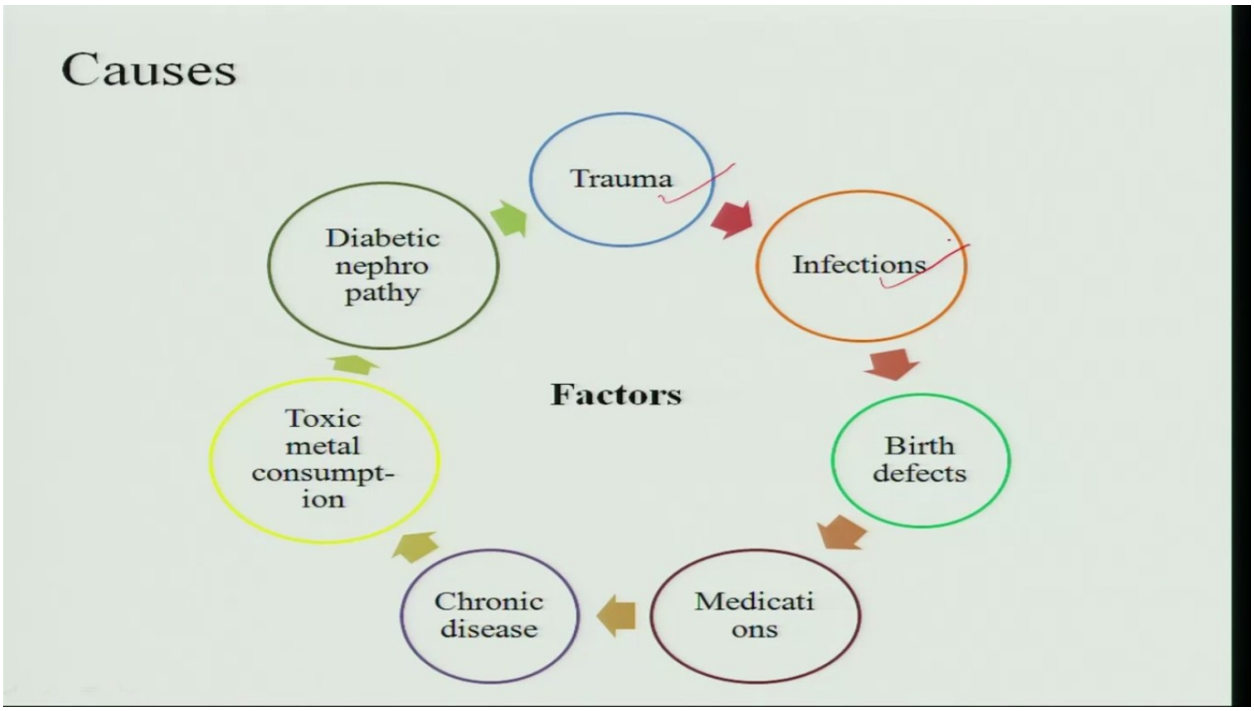


We will see there are kidney disorders like Glomerulonephritis, nephrotic syndrome, and let us see the dietary management.

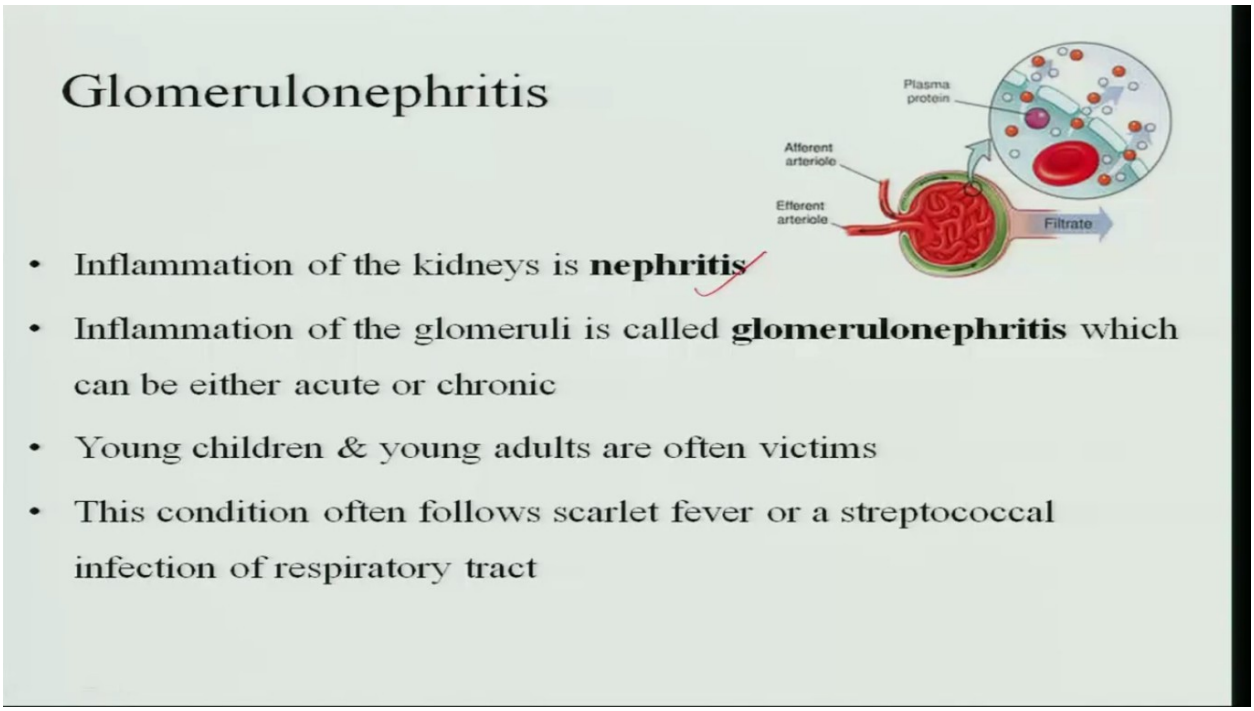


Now the functions of the kidney are it plays a vital role in actually filtering the entire substance in the body, the fluids in the body, and try to form the urine. Now the formation of urine involves filtration and then reabsorption and secretion of ions to make the osmotic balance that is the electrolyte balance and fluid balance is maintained because of these three functions of filtration, reabsorption, and secretion. The substance is moved from the lumen of the nephron into the plasma and from the plasma into the those substances which are to be excreted are pushed into the lumen of the nephron and then thereby they are excreted. And the other functions of kidneys are one is erythropoietin. Erythropoietin is production of RPCs. So whenever there is a low oxygen consumption in the body the kidneys take up 85% of the RPC production is done in the kidneys because of the production of erythropoietin. Then there is renal control of cardiac output and systemic blood pressure. So whenever the blood pressure increases the kidneys work hard to remove the excess amount of water and again maintain the blood pressure and when there is less amount of blood pressure becomes very low then the kidneys do not filter excess amount of water and it tries to retain water in the body. Therefore again the blood pressure comes back to normal. So in that way the cardiac output and the blood pressure is maintained by the kidneys. Then another important thing is as we know that vitamin D is very important for absorption of calcium and phosphorus and this vitamin D is activated in the kidney. Therefore, kidneys have a very important role in the absorption of calcium and phosphorus and this calcium and phosphorus are important for the bone and teeth formation.

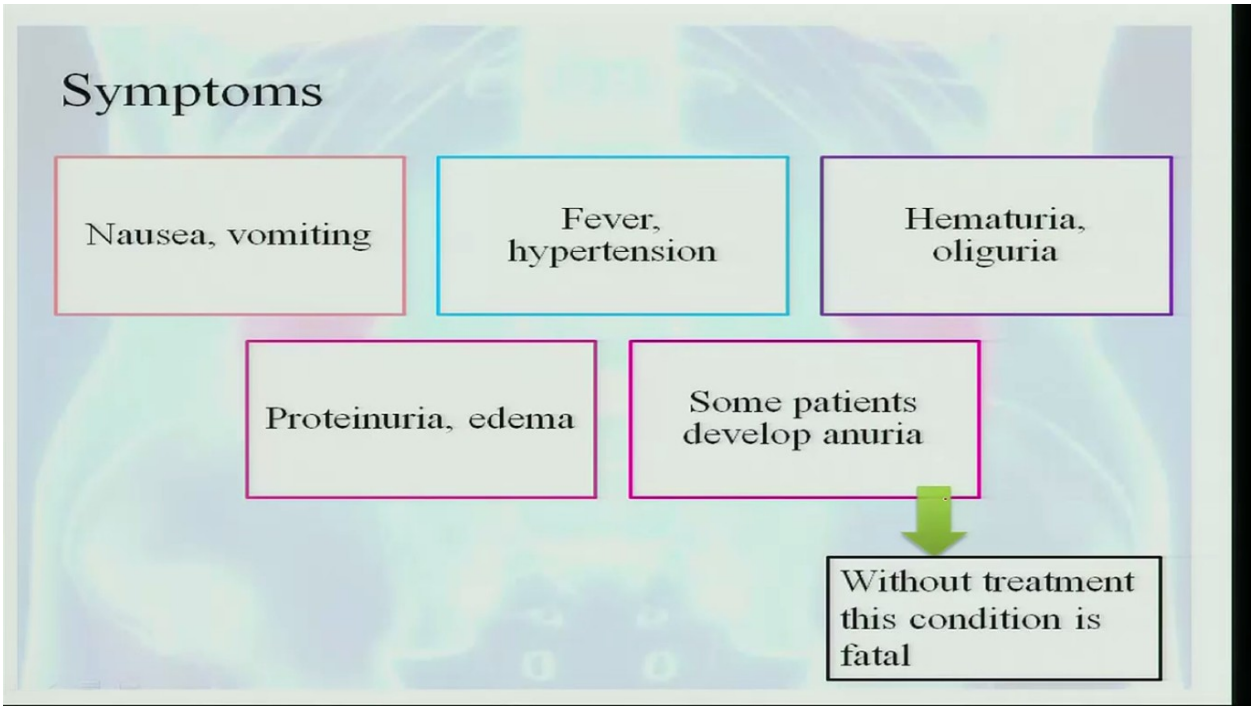
Now the kidney diseases. Our kidneys perform so many metabolic functions and therefore it has very serious consequences. Since they perform a lot of metabolic functions the kidney diseases will have a lot of serious consequences on the functions of the body.



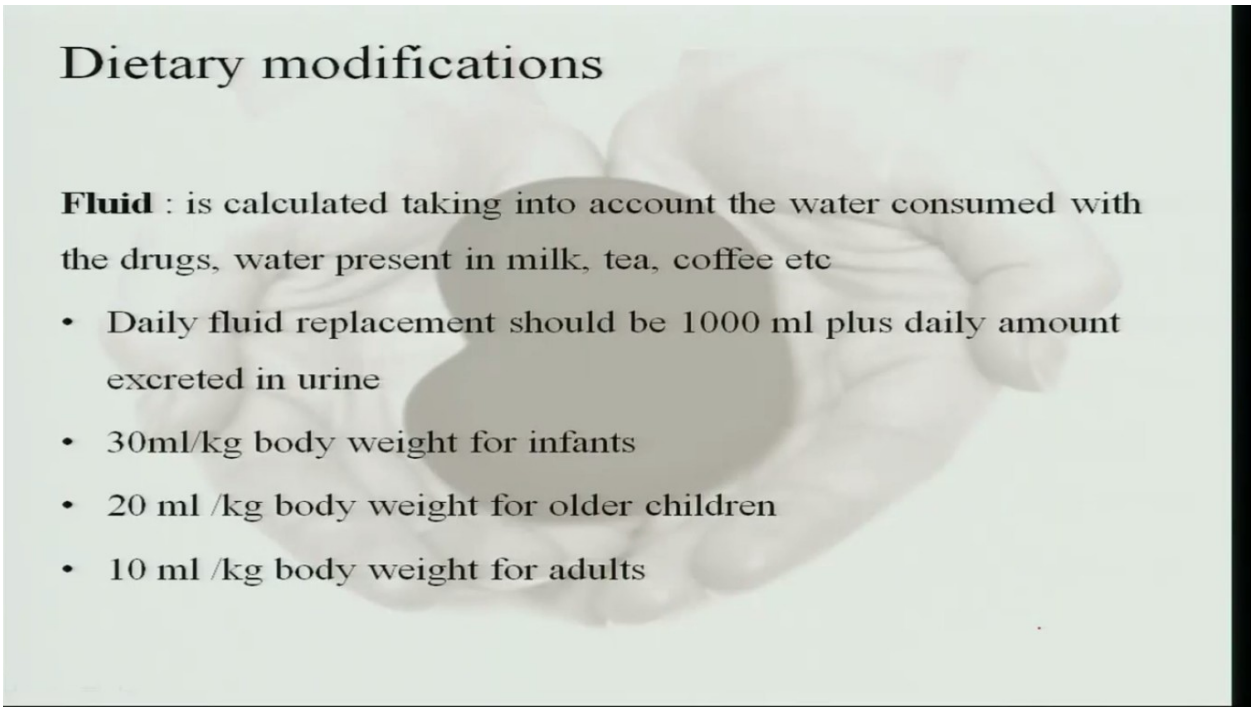
So the causes of kidney disorders are there may be a trauma, any injury to the kidney also may cause kidney disorders, or infections because of the streptococcus may cause kidney disorders and the nephrons may be damaged and there may be a kidney disorder because of the birth defect and medications sometimes, some medications which are given in overdose or which are used or abused then they may cause kidney disorder. Then chronic diseases and toxic metal consumption because the kidney is the one which has to filter and push out all the toxic substances in the meanwhile the kidney is damaged. Then diabetic nephropathy. When the there is uncontrolled diabetes. The high sugar levels that the kidney takes the load of removing the excess amount of sugar will damage the nephrons and cause diabetic nephropathy.



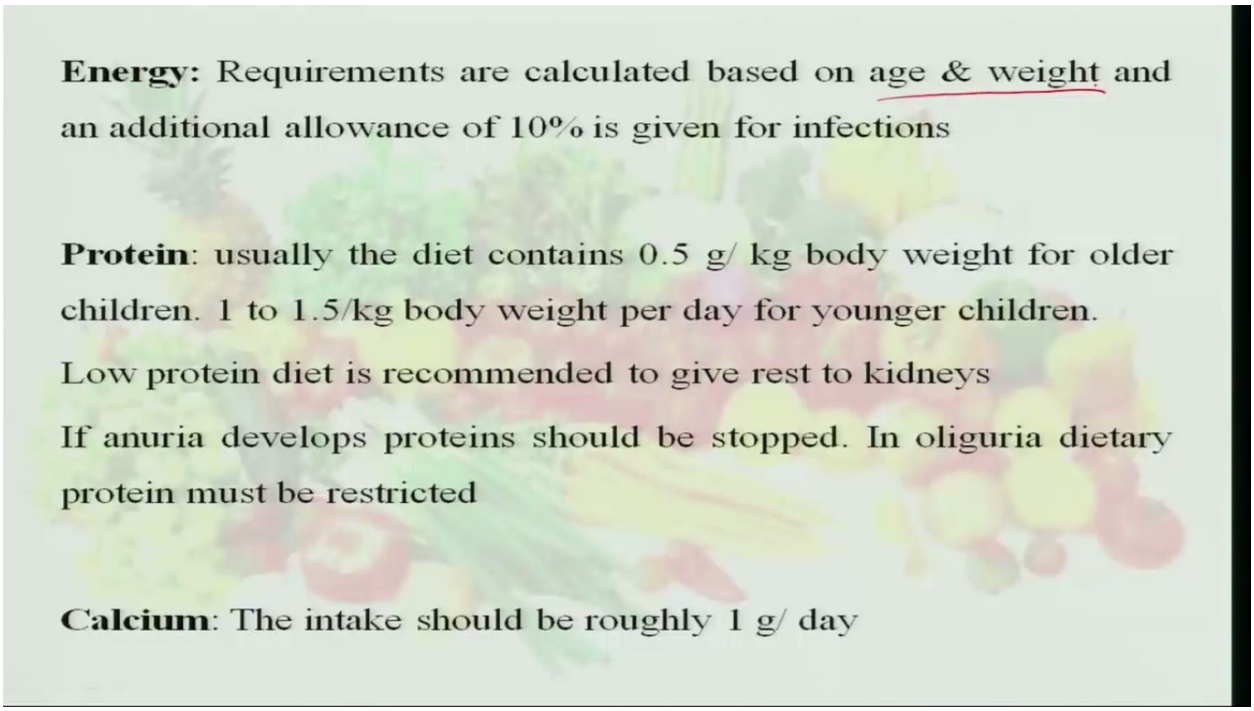
Now glomerulonephritis is the inflammation of the nephrons. So this the nephrons contain a filter called the glomerulus. So this part of the kidney gets inflamed and the wall of the glomeruli is damaged. Now you can see the enlarged part here generally the glomerular does not allow the proteins to go out of the kidneys. So it just filters and sends it back. So it filters and retains and sends it back into the blood but when the glomeruli are damaged you can see all the protein particles and the red blood cells going out of the glomeruli and they get excreted in the urine. So inflammation of glomerular is called Glomerulonephritis and this can be an acute form or chronic form. So young children and young adults are the often victims of this disorder and this generally follows the condition after scarlet fever or any streptococcal infection of the respiratory tract.



Now symptoms of this Glomerulonephritis is nausea and vomiting. Then they may have fever and hypertension because of the infection and hematuria and oliguria. Hematuria is loss of blood in the urine. This is because the mucosal wall of the glomerular is damaged and the red blood cells they just get excreted out of the kidneys and oliguria is there is decreased output of urine. The amount of urine that is normally excreted is decreased a lot. Then proteinuria is proteins are lost in the urine and they are also filtered along with the other substances and when the protein gets decreased in the body then naturally the edema condition increases and the body tissues retain more and more water resulting in edema. And some of the patients if this is not treated at this condition some of the patients develop anuria. This anuria is they cannot excrete any urine. So the entire fluid remains in the body and the condition of edema increases and without treatment of this condition the patient may go into a condition where it leads to coma and then death.



Now dietary modifications for glomerulonephritis is the fluid since the fluid is being retained you have to take into account the amount of urine that is excreted and calculate the amount of fluid that has to be given. So you have to calculate the fluid in terms of the water taken and water that is taken for having the drugs and any beverages, fruit juices, or any type of liquid that is taken to the patient the water amount is calculated as intake of water. Now daily fluid replacement should be 1000 ml plus the amount of urine that is excreted. So you take it as 30 ml per kg body weight for infants. 20 ml for per kg body weight for older children and 10 ml per kg body weight for adults. You see the amount of fluid requirement for the infant is more because there is the kidney of the infant is very small and it keeps on their urinary bladder size is very small so the amount of urine that keeps passing on is more. Therefore the amount of fluid is more. The amount of fluid in the body per kg body weight is more.



Now energy requirement is calculated based on age and weight and additional allowance of 10% is given for infection because the body has to fight against infection. There is some energy loss. Therefore to increase the energy requirement by 10% of the normal recommended allowance that is given. Then protein usually the diet contains 0.5 grams per kg body weight for older children. So the protein that has to be given to the children should be 1 to 1.5 grams per kg body weight for younger children. Low protein diet is recommended to give rest to the kidneys because the protein is getting excreted in the urine. So in order to raise the kidneys the proteins should be low in quantity and if anuria is there then the protein should be stopped. That means all the protein is blocking the glomeruli and the urine is not able to get filtered. So protein should be stopped. And in oliguria the dietary protein must be restricted. And calcium intake must be one gram per day because the calcium has to get absorbed into the body.

Then sodium. It actually varies with the degree of oliguria and hypertension. So sodium again should be restricted to 500 to 1000 milligrams per day and potassium all the renal patients should remember that too little potassium can also be dangerous. So it is restricted to one millimole per kg per day because again potassium is related to the muscle contractions in the body but these muscle contractions include the heart also and when urine formation is reduced potassium also is restricted. Then phosphorus. Phosphorus is found in almost all the foods that is widely present in different foods therefore the intakes should be restricted to 8 to 12 milligrams per kg body weight per day.

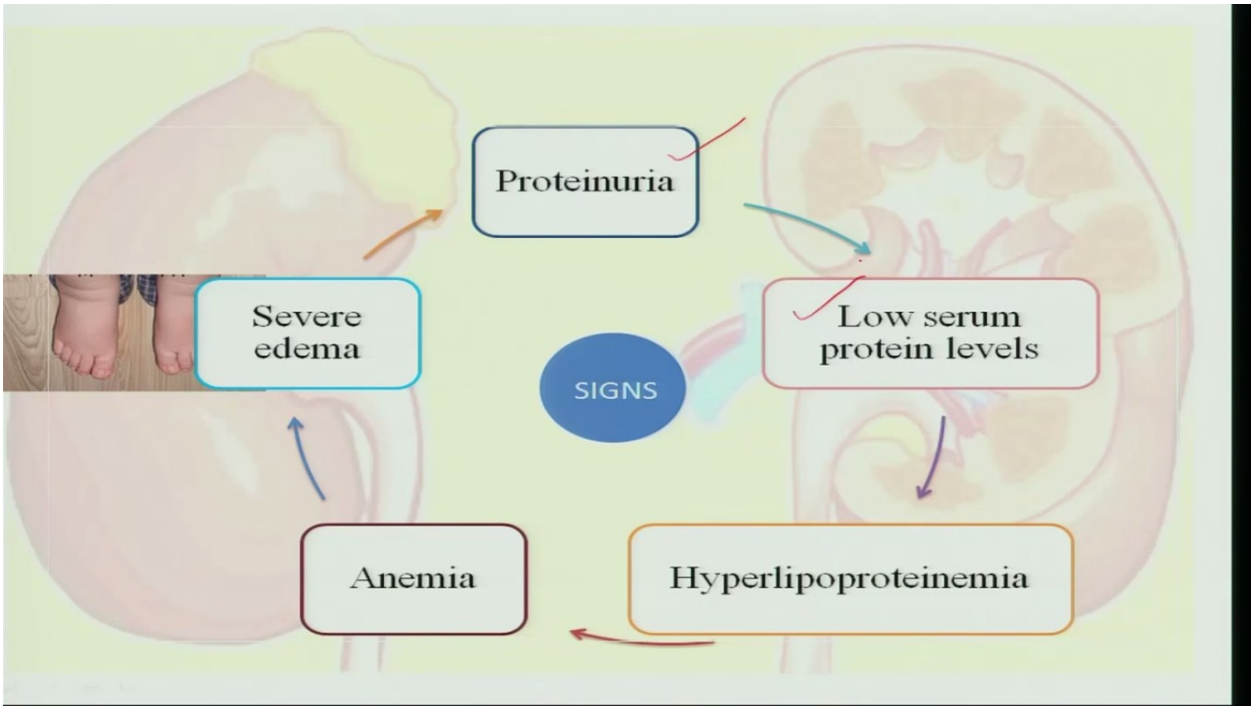
- **Sodium**: It varies with the degree of oliguria & hypertension. Sodium will be restricted to 500-1000 mg/day
- **Potassium**: All renal patients should remember that too little potassium can also be dangerous. It is restricted to 1 mmol /kg/day
- When urine formation is reduce potassium also restricted
- **Phosphorus**: found in almost all foods intake should be restricted to 8-12 mg/kg/d

The next disorder is nephrotic syndrome or nephrosis. So the result of variety of diseases that damage the glomeruli all the capillary walls of the glomeruli are damaged this is called as nephrotic syndrome or nephrosis. So disease is caused by degenerative changes in the kidney. After the kidney nephrons are damaged the degenerative changes that occur in the kidney leads to nephrotic syndrome.

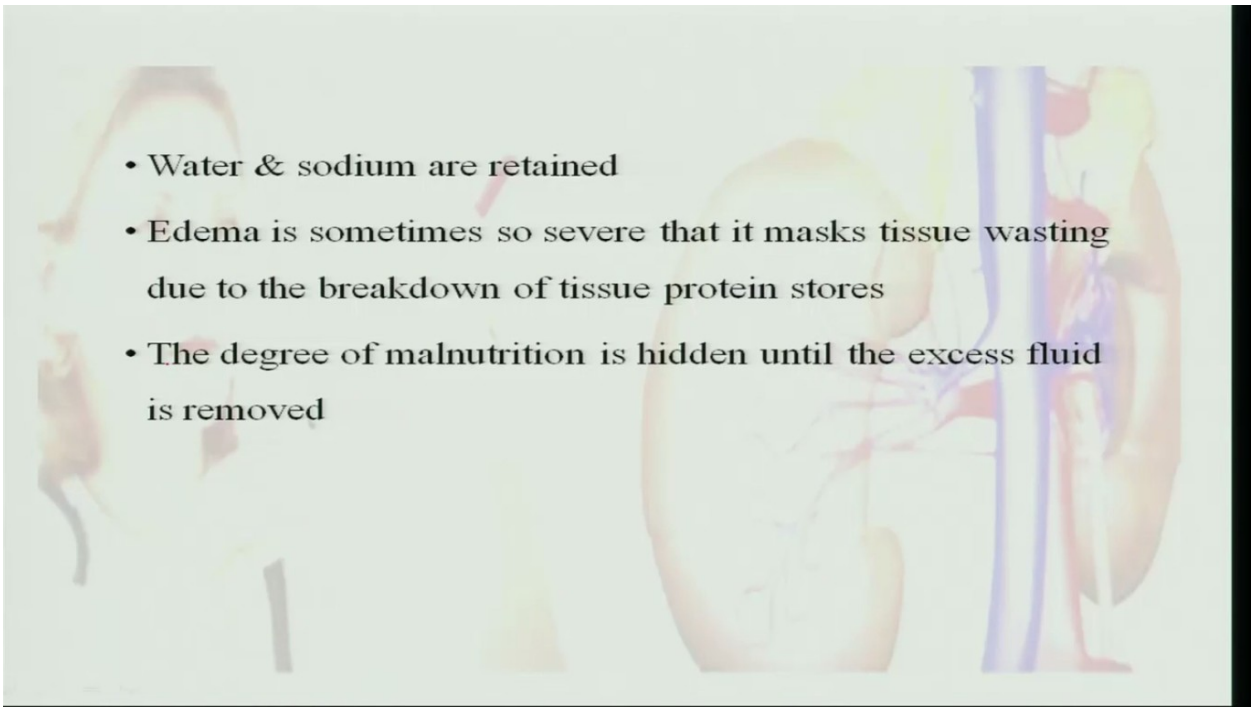
Nephrotic syndrome (nephrosis)

- The result of a variety of diseases that damage the glomeruli capillary walls is called nephrotic syndrome
- The disease is caused by degenerative changes in the kidneys' capillary walls which consequently permit the passage of albumin into the glomerular filtrate

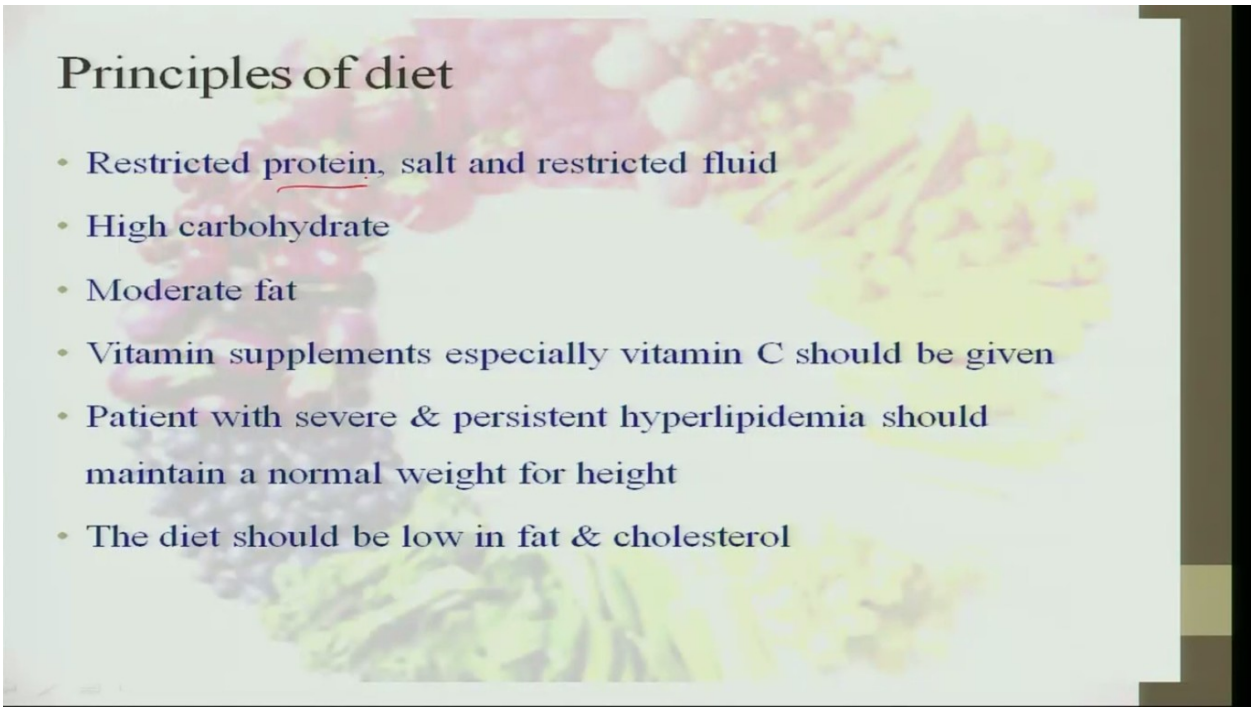
So here the signs are again there is a excretion of protein in the urine. So as a result you see the serum protein levels decrease a lot. So low serum protein levels are found and you have hyperlipoproteinemia. The protein that is with the lipid form is high and since there is no erythropoietin secretion the anemia occurs, iron deficiency anemia occurs. So the low protein and low iron in the body will lead to severe edema. You can see the picture here the edema in the leg is so high.



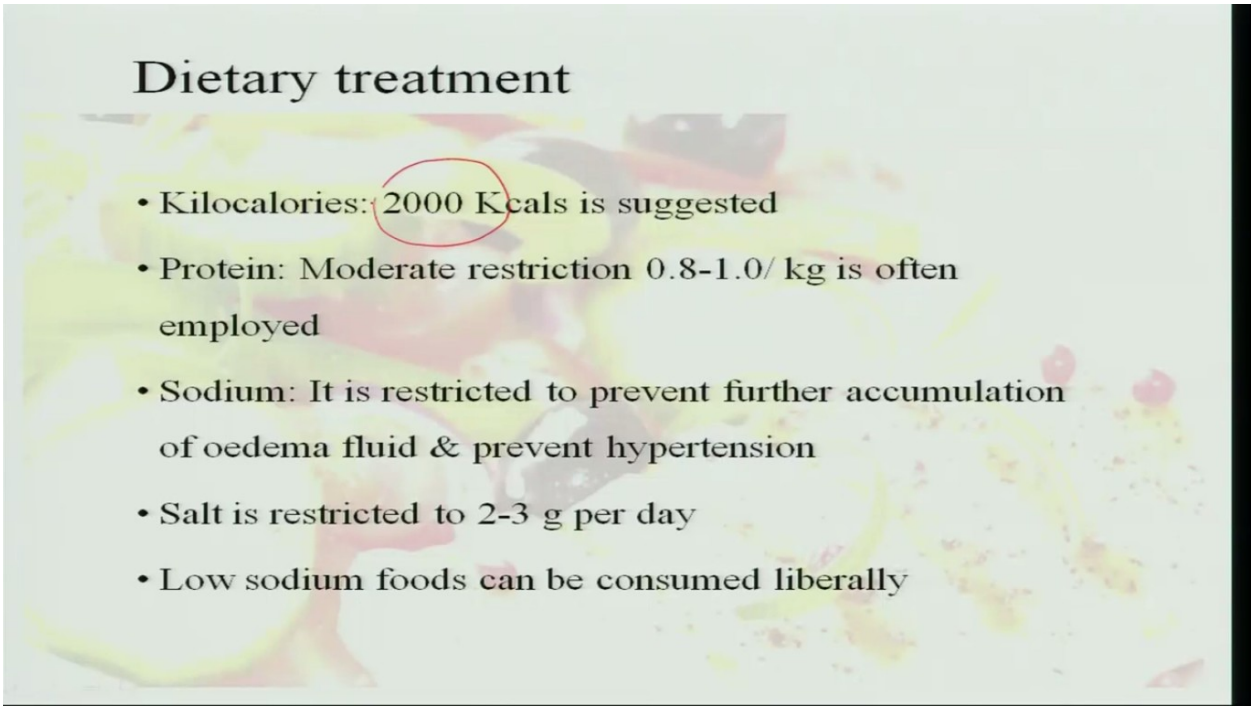
Now water and sodium are retained a lot. Edema is sometimes so severe that we cannot find the muscle wastage in the body. Actually because of loss of protein there is lot of muscle wastage and the body weight decreases but the edema masks the muscle wastage and the body weight looks normal. So the degree of malnutrition is hidden by excess fluid retention.



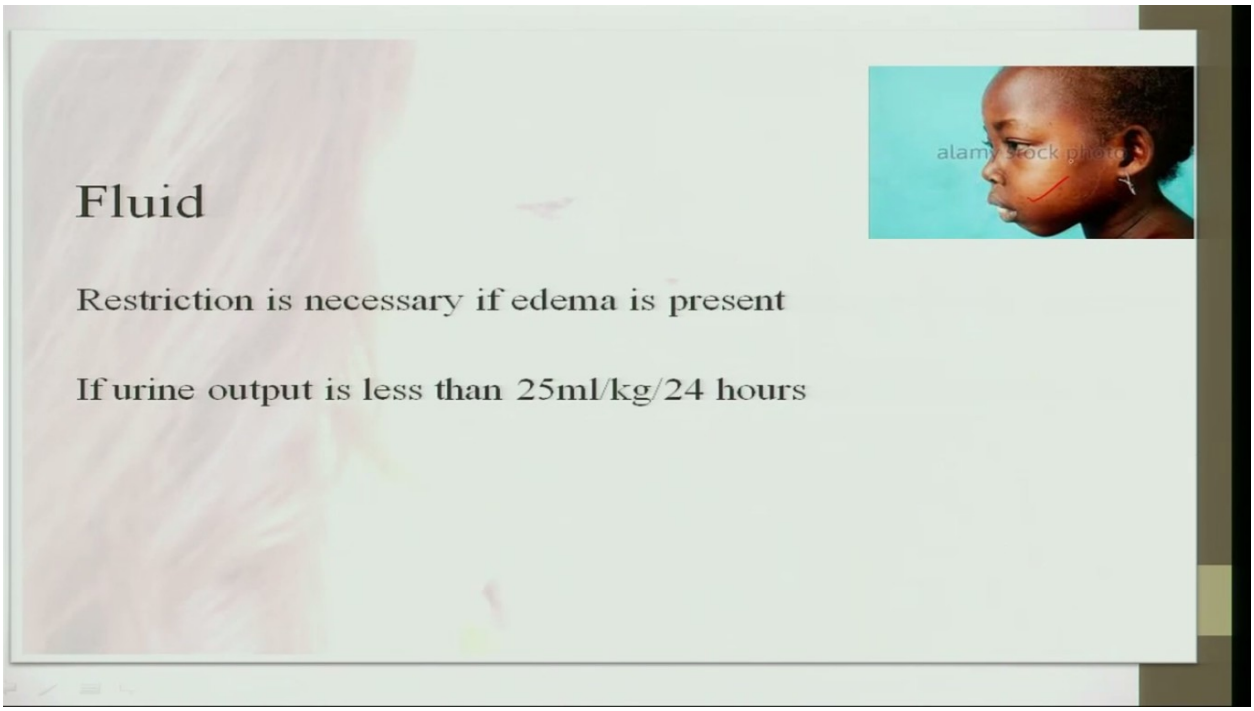
Now principles of diet. You have to restrict protein because already the protein is getting excreted. If you give more protein the kidneys are overloaded and they get further damaged. Then salt is restricted and fluid is restricted. There is edema. You restrict the fluid and since edema is there salt need to be restricted. Then you give high carbohydrate diet. Then moderate fat. Vitamin supplements especially vitamin C should be given so that they can fight against infections and patient with severe and persistent hyperlipidemia they maintain normal weight for height. So the food that is given should help them in maintaining normal weight for height. And the diet be low in fat and cholesterol.



Now the calories that should be given should be 2,000 kilo calories per day and moderate restriction of protein that is normally it is one gram per kg body weight then it can be reduced to 0.8 to 1 gram per kg body weight and sodium is restricted to further reduce the edema or the increase of edema is restricted by giving more of sodium and also to prevent hypertension. And salt is restricted to 2 to 3 grams per day and low sodium diet can be consumed liberally.



Now the fluid restriction. You can see the ID that is seen in the child. So restriction of fluid highly necessary if edema is present. So if urine output is less than 25 milliliters per kg body weight for day then you have to restrict the fluid intake a lot. Now the normal filtration rate is 125 ml per minute. So on the whole day you see if it is only 25 ml part they imagine how much fluid that is getting retained in the body. So naturally the input of fluid should be restricted.



So if all this care is taken and the degeneration of kidneys is restricted or prevented further damage of kidneys will not occur and you can save the person.

Thank you.