Indian Academy of Pediatrics (IAP)

GUIDELINES FOR PARENTS

Care of a Child with Nephrotic Syndrome

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10 FAQs ON NEPHROTIC SYNDROME

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Care of a Child with Nephrotic Syndrome

Q1

My child has been recently diagnosed with nephrotic syndrome. What is nephrotic syndrome and what are the causes of this disease?

Nephrotic syndrome is one of the most common kidney diseases in childhood. It affects the sieve-like pores in the kidneys wherein due to abnormalities in immunity, large amounts of protein leaks into the urine. As a result, the level of protein (albumin) in the blood falls causing swelling over the body. The low blood protein levels stimulate production of cholesterol by the liver causing high blood cholesterol levels. Nephrotic syndrome thus has the following three characteristic findings: (1) Swelling which appears initially around the eye (and subsequently whole body); (2) High levels of protein in the urine with low levels of protein (albumin) in the blood, and (3) High blood cholesterol levels.

In a majority of children, there is no identifiable cause for the disease, and it is believed to be due to an abnormality in the body's immune system, often triggered by mild infections such as common cold.

Q2

What are the symptoms and complications of nephrotic syndrome?

Symptoms of nephrotic syndrome include swelling that appears initially around the eyes. If untreated, this swelling can spread to other parts of the body, including abdomen and feet. This is often accompanied by slightly reduced amount of urine passed per day. The swelling is often triggered by mild infections such as common cold. Sometimes, the swelling may be excessive leading to fullness of the abdomen (leading to breathing difficulty) as well as genital swelling.

Complications of nephrotic syndrome include infections (e.g., chest infections and infection of the fluid in the abdomen), low blood pressure, and a tendency of the blood to clot in excess of normal (leading to clot formation in the vessels of the kidney, brain, or limbs). Symptoms such as fever, breathing difficulty, abdominal pain, headache, convulsions, loose stools, and red-colored urine could be pointers towards these complications.

Q3

What tests should be done for my child with nephrotic syndrome?

Nephrotic syndrome is said to occur when swelling over the body is accompanied by large amounts of protein (albumin) loss in the urine (graded as 3+ or 4+), along with low blood levels of albumin and high levels of blood cholesterol. Accordingly, the basic investigations in these children include urine protein estimation and low blood levels of albumin (less than 3 g/dL) and high blood levels of cholesterol (more than 200 mg/dL).

Urine protein estimation can be easily learned by the parents; it is performed by dipping a special strip, known as dipstick, in the first morning sample of urine or addition of a few drops of sulfosalicylic acid to the urine. If protein is present in the urine, the color of the strip changes (**Fig. 1**). Alternatively, the urine turns milky or curdy after addition of sulfosalicylic acid (**Fig. 2**). The urine protein loss in nephrotic syndrome is very high, and is described as 3+ or 4+. This test is not reliable if patient has taken medicines to increase urine output, e.g., furosemide.

Other investigations done in first episode of nephrotic syndrome include blood levels of urea, creatinine (to assess kidney function), sodium, potassium, hemoglobin, white blood cell count, and platelet count. A Mantoux test (to detect any latent tuberculosis infection) is also done during the first episode.

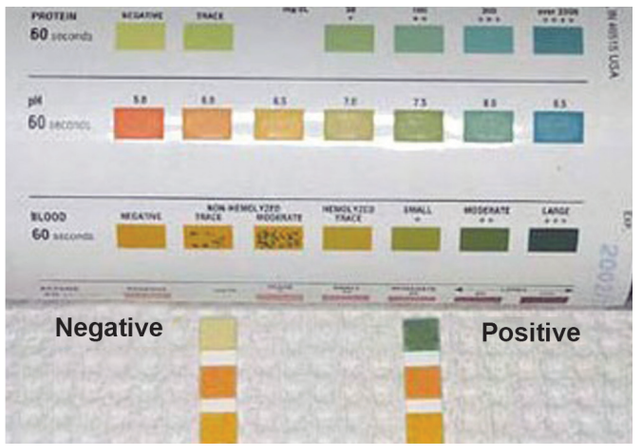

Fig. 1: Urine protein estimation by dipstick (top panel indicating albumin grading as 1+, 2+, 3+, and 4+; and the result by dipstick indicated in the last row).

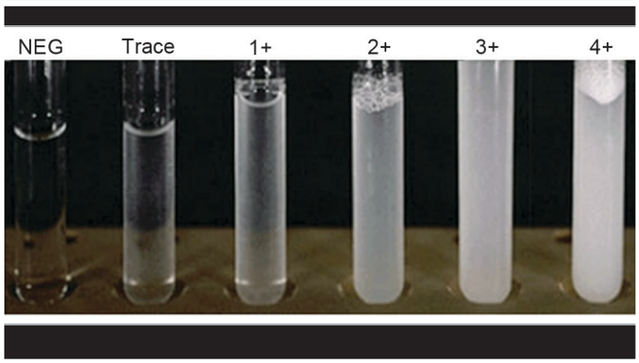

Fig. 2: Urine protein estimation by sulfosalicylic acid (graded as 1+, 2+, 3+, and 4+)

Q4

Are there different types of nephrotic syndrome in children? If so, how do they differ from each other?

Yes, there are different types of nephrotic syndrome.

In about 90% of cases of nephrotic syndrome, the disease begins between 2 and 6 years of age. In most of these cases, it is termed as "minimal change disease (MCD)". This means that these children do not have major changes on microscopic examination of the kidney biopsy tissue. Pediatricians can diagnose MCD based on: (1) absence of red blood cells in urine, (2) normal blood pressure, and (3) normal blood urea and creatinine. Once a child is diagnosed as possible MCD, he or she is started on drugs known as steroids (prednisolone). After starting prednisolone, the urine protein (albumin) usually disappears and body swelling subsides within 2 weeks in the majority and by 3–4 weeks in a minority. Blood levels of albumin and cholesterol also improve to normal. Such cases usually do well in the future; although, they often continue to have repeated episodes of swelling (known as relapses) till adolescence.

If the age of onset of nephrotic syndrome is below 1 year or more than 10 years; if the urine protein does not become negative or trace within 4–6 weeks of starting prednisolone; or if there is blood in the urine, such cases are not considered as MCD. In such cases, treatment with prednisolone may not work. These cases often require further tests, and treatment with other medicines. Such cases of nephrotic syndrome are more difficult to treat and prolonged treatment is needed.

Q5

Is a kidney biopsy required in children with nephrotic syndrome routinely?

A kidney biopsy is not required in majority of cases of nephrotic syndrome because the usual cause of nephrotic syndrome is MCD which is expected to respond well to steroids.

However, a kidney biopsy may be required in the following situations (when MCD is not likely): (1) Age of onset <1 year or >15 years, (2) the urine albumin does not subside within 4–6 weeks of starting prednisolone, (3) blood in the urine, (4) persistently high blood pressure, (5) blood urea or creatinine that is severely abnormal, (6) other abnormalities such as joint swelling, rash, and very low hemoglobin, and (7) before starting some other medicines (when prednisolone does not work).

In such cases, based on the severity of kidney biopsy findings, other medicines to control nephrotic syndrome may be required. Your pediatrician or a pediatric nephrologist will decide which medicines are needed in such cases, and for how long.

Q6

My child has been diagnosed as nephrotic syndrome. How should he/she be treated?

- *First episode*: For the first episode of nephrotic syndrome, prednisolone is given for a course of 12 weeks (first 6 weeks daily prednisolone followed by alternate day prednisolone for the next 6 weeks). Prednisolone is available as 5 mg, 10 mg, and 20 mg tablets, to be taken after food. The dose and schedule of prednisolone will be decided by the treating doctor based on the weight of the child. You can mix the medicine in honey or sugar syrup or fruit juice as it is slightly bitter.
- *For the subsequent episodes* of nephrotic syndrome (called relapses), the treatment with prednisolone is given daily till urine protein becomes nil (For this purpose, the parents are taught to maintain a urine protein diary at home). Thereafter, the dose is changed to alternate day prednisolone (given in mornings 8–9 AM) for the next 4 weeks.
- *Frequent relapses*: If there are four or more episodes of nephrotic syndrome relapses in a 12-month period, this is termed as frequently relapsing nephrotic syndrome (a more difficult variety of MCD), and other medicines such as levamisole, cyclophosphamide, mycophenolate, cyclosporine, or tacrolimus may be required in such cases.

In addition, no-added salt is advised in the diet to prevent worsening of swelling. Medicines to increase urine output (known as diuretics) may be required to manage cases with moderate-to-severe swelling. Mild swelling does not require diuretics.

Q7

What are the side effects of the medicines used for treatment of nephrotic syndrome and what is the role of parents in preventing them?

Every drug has certain side effects and the treating doctor will monitor the child for any adverse effects and take steps to monitor and minimize these side effects. Steroids are the only drugs that can effectively reduce the swelling over the face and body by decreasing the leakage of proteins into the urine. Some side effects such as weight gain, increased appetite, and full cheeks are temporary and are likely to resolve after completion of the steroid course. It is important to take the medicines on full stomach to prevent gastritis.

When multiple courses of steroids are required for treatment of the disease (e.g., in frequently relapsing nephrotic syndrome), side effects such as high blood pressure, slow height gain, cataract, and glaucoma (increased eye pressure) can occur. The pediatrician will monitor the above-mentioned side effects and take appropriate remedial measures. In such cases, alternative drugs may be used to reduce the dose of steroids. Your pediatrician or a pediatric nephrologist will be the best judge to decide the need and type of these medicines.

Usage of steroids and other immunosuppressive medications is also associated with infections as these drugs reduce immunity. Hygienic measures such as hand washing, eating cooked food, and usage of safe drinking water will help in prevention of some infections. Vaccination against diseases such as pneumococcal pneumonia and chickenpox, as well as routine vaccines prescribed as per the National Immunization Schedule helps to prevent serious infections. In spite of these, if the child has fever, stomach ache, cough, rash, appears unwell, or has breathing difficulty, it is important to consult the doctor as soon as possible.

Q8

Any role of alternative therapies, e.g., homeopathy, Ayurveda, Siddha, or dietary regulations in prevention or treatment of the disease?

There is no robust scientific evidence to support the use of homeopathy, Ayurveda, Siddha, or other therapies for management of nephrotic syndrome. Food items or changes in diet are not known to cause nephrotic syndrome or relapses.

A healthy diet is nevertheless important for the well-being of the child. A "no-added salt" diet is advised during periods of swelling over the body. During a relapse, when there is face or body swelling, salted food items such as pickles, salted chips, savory snacks, salted dried fish, canned meat, salted cheese, and *paapad* that contain excessive salt should be restricted in the diet. A diet adequate in protein (including items such as egg-white, *dals* of various kinds, soyabean products, milk, and dairy products) should be encouraged since there is excessive protein loss from the body.

Since steroid therapy leads to a tendency to weight gain, a healthy lifestyle including exercise and inclusion of healthy items in diet, e.g., vegetables and fruits is advised. Fluid restriction is not advised. Food items such as fish, fruits, vegetables, or meat should also not be restricted. Junk foods and excessively oily or fatty food add to the tendency to gain excessive weight, and should be restricted.

Q9

How and when should my child with nephrotic syndrome be vaccinated?

Children with nephrotic syndrome should get vaccinated so that they are protected against serious infections. Special vaccines such as those against certain microorganisms, e.g., *Pneumococcus* and varicella (chickenpox virus), as well as routine vaccines prescribed under the national immunization schedule helps in prevention of serious infections. Pneumococcal vaccine is especially advised for children with nephrotic syndrome, since it protects against serious infections such as infection of fluid in the abdomen, as well as lung infections. The vaccine dosage schedule as well as types vary according to age and will be prescribed by the treating pediatrician.

However, as steroids affect the immune system, your pediatrician may wish to omit or delay some "live" vaccines while the child is receiving steroids. These are usually given one month after stopping the steroids.

Q10 Is nephrotic syndrome curable and by when? Is kidney failure likely to occur in this disease? When should a pediatric nephrologist's opinion be sought?

Children with nephrotic syndrome who respond well to steroids (including infrequently relapsing and frequently relapsing nephrotic syndrome) do not have increased risk for kidney damage or kidney failure. Even though multiple relapses might occur in childhood, as long as the child responds to steroids well, long-term outcome is excellent, with up to 80% of children getting permanently cured by adolescence.

However, a small proportion of children with nephrotic syndrome, who do not respond to steroids, and are known as steroid-resistant nephrotic syndrome, are at risk for kidney failure, especially if they do not respond to alternative medications.

Children with nephrotic syndrome should be referred to a pediatric nephrologist under the following situations, which indicate a more difficult variety of nephrotic syndrome: steroid-resistant nephrotic syndrome (no response to steroids by 4–6 weeks), nephrotic syndrome beginning before the age of 1 year of age or more than 15 years of age, kidney failure, persistently elevated blood pressure, blood in urine, steroid toxicity requiring alternative medications, or frequently relapsing nephrotic syndrome requiring medicines other than steroids.