CONTEMPORARY ASPECTS OF NEPHROPATHIES PREVENTION IN CHILDREN

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ABSTRACT.

In the sense of our own research and literature data of recent years, risk factors affecting the formation and progression of nephropathies (hereditary, teratogenic, external environmental) were thoroughly scrutinized. With due detection and adherence to simple preventive measures (diet, fluid mode, microclimate elimination of infectious, toxic, allergic effects and correction of dysmetabolism) they do not bring about complications of nephritis (interstitial nephritis (IN), urolithiasis (ICD), secondary dysmetabolism, secondary pyelonephritis). Environmental factors that contribute to pathology manifestation in children with metabolic disorders includes seasonal climatic fluctuations - adaptation to low and high temperatures, errors in nutrition, emotional and physical overload, membranopathies and intercurrent diseases. The presence of a latent diathesis in a child from a family which is prone to certain diseases (pedigree, index of hereditary burden) is arbitrated using biochemical, immunological, functional studies. A scheme has been formed for preventive prophylaxis and metaphylaxis of nephropathy in uric acid diathesis.

I. INTRODUCTION

The foremost strategy of preventive medical practice is not a statement of early disease stages, but is active prevention of morbidity for which activities’ reorientation of family doctors and primary health care to identify hereditary predisposition (diathesis), borderline conditions and the implementation of preventive measures at this level is of paramount importance [2, 11, 19]. Moreover, on an annual basis, ubiquitous prevalence of the urinary system diseases (OMS), both in adult and in pediatric population, their tendency to recurrence and chronicity with an outcome in chronic renal failure, requiring replacement therapy already in childhood and young age make problems’ development of preventive prophylactic nephrology overly urgent [9, 24]. Conditions in Uzbekistan are characterized by a combination of natural climatic and geographical ecopathogenic factors (heat load, hyperinsolation) with a high technogenic xenobiotic load, as well as a high inbreeding coefficient (frequency of consanguineous marriages) which are considered to be extreme risk factors for disease formation in the presence of a predisposition. On an increasingly basis, allegations appear that in decades of late, the prevalence of chronic somatic diseases, in particular chronic kidney disease (CKD), is becoming a rampant epidemic [10,13]. It emphasizes the undoubted priority of primary prevention of nephropathy, since the progression of CKD, regardless
of nosology, is inevitable with the development CRF at different instances [22, 23]. In the existing system of specialized nephrological care organization, special emphasis is to be paid to outpatient stage (polyclinic). In these very conditions, disease derivations are arisen for the first time, dispensary risk groups are formed, primary diagnostics of nephropathy, clinical examination and rehabilitation of children are carried out [2]. Family doctor needs nephrological alertness which means careful attention to minimal changes in kidneys - isolated proteinuria, microhematuria, crystalluria, as well as markers of a possible predisposition to nephropathy. Dispensary service reorientation to precautionary prevention and the organization of specialized laboratories that allow to pinpoint people with a predisposition to certain diseases - this is a qualitatively new level of clinical examination which requires new approaches, especially in terms of laboratory services: improvement and centralization on a city-wide basis and district, taking into account the requirements of preventive medicine [8]. Currently, in the general nosological structure of kidney diseases, the total frequency of various dysmetabolism is significantly higher than that of other kidney diseases. Meanwhile, they do not invoke complications (IN, urolithiasis, secondary dysmetabolism, secondary pyelonephritis) with opportune detection and adherence to simple preventive measures (diet, fluid regime, microclimate, elimination of infectious, toxic, allergic effects and correction of dysmetabolism). Environmental factors contributing to the manifestation of pathology in children with metabolic disorders, indeed, incorporate seasonal climatic oscillations - adaptation to low and high temperatures, errors in nutrition, emotional and physical overload, membranopathies and intercurrent diseases [22]. In this day and age, it can be argued that a real scientific concept that meets the requirements of precautionary prevention medicine is the active identification of children with hereditary predisposition (diathesis), borderline conditions and their early correction, preventing their clinical manifestation [2, 7].

II. MATERIAL AND METHODS

Hence, in relation to nephrology, life has also made it necessary to develop and implement the principles of prenosological diagnosis and clinical examination. In order to do so, convincing prerequisites have been created for the orientation of family doctor's activities mainly towards prevention:

- primary prevention of nephropathy in children with diathesis (hereditary predisposition) is organized, if possible, not only by non-invasive, but also mainly by non-drug methods (regimen, microclimate, diet, herbal remedies, physiotherapy, elimination of chronic foci of infection - a healthy lifestyle);
- the priority of preventive prophylaxis of dysmetabolism assumes the implementation of these activities in the preclinical stage. CKD often arises in childhood and predisposition’s objective signs can be considered even in newborns (burdened heredity for nephropathology, diseases of the urinary system organs in mother, etc.). Accordingly, early identification of risk factors, hereditary predisposition and the elimination of exogenous risk factors (refusal to prescribe nephrotoxic drugs, membrane therapy in early neonatal period with nephropathic fetopathy, etc.) are paramount, yet still underutilized reserves that can exponentially proliferate the effectiveness of prophylactic activities of a family doctor [2,11];
- family doctor’s function in the aspect of nephrological care for the sake of children is currently being established. However, there is still no priority in his activities in the formation and high-quality dispensary observation of children with a risk of developing urinary system diseases. Children’s contingent who should be under dispensary supervision with nephrological alertness is currently known and are of grand significance.

During follow-up observation for 6 years concerning children who have experienced nephropathy in the neonatal period, a complete recovery was registered in only 15%, all the rest afflicted with one or other type of pathology of the urinary system organs [13]. Recent studies have revealed pathological immaturity of the kidneys in 62 - 74% of full-term pregnancies in children from mothers with chronic pyelonephritis complicated by OPH gestosis [7,8]. The presence of kidney pathology in a pregnant woman, as well as gestosis, is a risk factor for impaired nephrogenesis as a basis for the nephropathy development in the postnatal period. Observation of 68 children born with kidney pathology in the period of 13 years depicted that 60% of the observed witnessed kidney damage [2]. Newborns whose gestation befalls against the background of OPH - gestosis, combined with chronic pyelonephritis even in the absence of pronounced dysadaptation syndromes, in the early neonatal period, need to fill the deficiency of antioxidants arising in the prenatal period [18,19]. This avoids critical conditions’ development in the neonatal period and the formation of chronic somatic pathology in the postneonatal period. The cornerstone, the basis for active prevention of all multifactorial diseases is the precocious identification of hereditary
predisposition (diathesis) and the implementation of preventive measures at this very level [8]. "Diathesis is neither a disease, nor a pre-disease, nor a borderline state, it is only a predisposition to certain diseases, thanks to which we can elaborate the preventive direction of pediatrics" [11]. At the same time, there is no precise line, a criterion for differentiation between "predisposition" (diathesis) and the so-called "borderline states" as well as the latter from early manifestations of pathology.

Pursuant to the urinary system organs, M.S. Ignatova (2013) defines as follows: "Structural changes of an anatomical, histological nature, biochemical transformations that occur at the cellular and subcellular levels in kidneys until they induce syndromes characteristic manifestations of kidney pathology, can be deemed as a borderline state". At the same time, preventive measures, considering the nature of the predisposing factor, are of a preventive nature. Determination of diathesis type arbitrates recommendations for the prevention of certain diseases [13] and therefore, the latter should enable pinpoint diagnostic criteria. There are four variants of such a predisposition: allergic, dysmetabolic, organ (systemic) and neurotropic [5]. Within these groups, there is the preponderance of different diathesis subspecies than that of the mentioned above. Consequently, active children’s observation with diathesis, rational nutrition organization, taking into account the nature of diathesis, active hygienic education are elements of preventive prevention of morbidity.

III. RESULTS

Hence, dysmetabolic nephropathies in these families are frequently manifested against the background of oxidative stress (OSTD) in respiratory infections (SARS, pneumonia, bronchitis), which is a paramount pathogenetic mechanism of the development and progression of urinary system diseases [8]. This mechanism is relevant for all diathesis types, especially, for families with calculous (calcium oxalate) diathesis which are characterized by familial cytmembrane instability. In addition, there is a strong rapport between pulmonary ventilation and renal hemodynamics (respiratory - renal syndrome), i.e. maladaptive vascular reactions in broncho-pulmonary diseases lead to a run-down in renal hemodynamics, glomerular filtration which gives a rise to nephrological hitches in pulmonary patients, especially in the presence of a hereditary predisposition. It is known that for people with calculous diathesis, the starting link for the onset of pathology can be:

- hyperinsolation contributing to oxidative stress and other factors with a similar mechanism, infection, etc.;
- excess consumption of foods rich in oxalates, excess vitamin C in diet and food containing it;
- deficiency of vitamin B6;
- decreased activity of intestinal microflora - oxalobacter formigeneres.

One of the ways of preventive prophylaxis in these cases, along with other measures, may be food products development with the limitation of oxalogenic substances while enriching them with natural protective factors such as vitamin F, E, etc. [2]. In the event of situations that contribute to oxidative stress accompanied by the elimination of the main factor, the appointment of complex antioxidant drugs such as Veteron (contains water-soluble B-carotene, vitamin C and E, Kudesana (contains ubiquinone and vitamin E is indicated. Preventive prophylactic priority orientation of clinical medicine entails raising to a new level of biochemical, immunological, functional studies which make it feasible to identify markers of hereditary predisposition that can be achieved by creating large centralized laboratories [24]. The presence of a latent diathesis in a child from a family which is prone to certain diseases is identified through the assistance of biochemical, immunological and functional investigations. Preventive prophylaxy and metaphylaxis of nephropathy in uric acid diathesis are illustrated as follows (Table 1):

<table>
<thead>
<tr>
<th>Health Group</th>
<th>Markers</th>
<th>Preventive prophylaxy and metaphylaxis measures</th>
<th>Prophy level</th>
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<tbody>
<tr>
<td>I – Healthy children</td>
<td>No burden; Hereditary; biological and social history; with physiological during pregnancy and childbirth; normal level physical</td>
<td>Observation and advice on feeding, care and hardening a child into decreed terms</td>
<td>I</td>
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Table 1. Preventive prophylaxy and metaphylaxis of nephropathy in uric acid diathesis

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| II – Children with uric acid diathesis | Restricted diet purines in food; with metabolic type of GU; in stressful situations allopurinol; regulation microclimate; drinking regimen; vitamin therapy | I |
| III – Children with uric acid diathesis and complicated pyelonephritis | 1. Unloading potato diet for 2-3 weeks, then low purine diet; 2. allopurinol, oratat potassium; 3. Warning crystalluria, vitamin therapy. 4. Antibacterial controlled therapy bacteriuria and their sensitivity | II |
| - interstitial nephritis (IN) | Clinic - laboratory picture of interstitial nephritis | II |
| - Urolithiasis | Clinic-radiological and laboratory picture of urolithiasis | II |
| Autoimmune layering and elopment of hyperuricemia glomerulonephritis in stages of compensations kidne function | Extrarenal and renal clinical laboratory syndromes of glomerulonephritis. Normal renal potential is between 80-50. Creatinin amount in d: 0.008-0.265 mmol / l and instrumental signs of pyelonephritis, interstitial nephritis and glomerulonephritis, urolithiasis. Violation of partial and renal tubular function | II |
| IV - rything in listed group of | Renal potential: 50< 25%, number of active nephrons; less than 30%, creatinine in blood: 0.12-0.53 mmol/l | II |
| sick with uric acid diathesis in the stage of sub-compensation kidney function, tubular violations | targeted to slowing down of nephrosclerosis |
| V – listing in the lists of patients with efficient renopressive therapies are aimed at the development of chronic renal compensation of kidney function |
| Renal function: less than 30%, the number of active nephrons: less than 30%, osteodystrophy develops, anemia, arterial hypertension, complications with the side of the cardiovascular system. Blood creatinine: 0.485 - 0.8 mmol/l | Conservative therapy aims to correct metabolic violations; a warning of complications; When GFR decreases to 5 ml/min/1.73 m², an increase is recorded in creatinine more than 1.2 mmol/l, potassium over 6.5 mmol/l; patient transferred to dialysis therapy |

Hereditary predisposition to multiple diseases (diathesis) remains latent for a long time and only under certain conditions turn to the borderline state (micro-signs of the disease or its biochemical markers appear) or bypassing it directly into the disease. Even nephropathies in children, dwelling in unfavorable environmental conditions in regions contaminated with heavy metals, are primarily manifested in individuals with a hereditary predisposition. Children with dyspurinosis constitute an immunocompromised contingent, since the processes of maturation and differentiation of lymphocytes matter significantly [4] and therefore immunocorrecting agents’s 1 - 2 courses per year are optionally advised (prodigiosan, lysozyme, levamisole). In dysmetabolic diathesis, kidneys are primarily affected as the main organ of elimination. However, in the absence of opportune correction of metabolic disorders, some transformations may be encountered in various organs and systems (Fig. 1).
Fig. 1. Mechanisms of multifactorial diseases formation

Example of "uricopathies" in children and adults clearly illustrates the formation of the disease. At the same time, the use, even before the clinical manifestation of a low-purine diet, measures to influence the metabolism of purines and their renal excretion through the sequential application of allopurinol, magurlite, urodan, kanefron, urate nephropathies and so forth.

IV. DISCUSSION

Traditionally established system of specialized pediatric nephrological care is undoubtedly progressive, however it needs to be elaborated based on the scientific and practical achievements of pediatric nephrology in the 21st century [24]. Dispensary service orientation towards preventive prophylaxis will naturally require organizational decisions: the creation of large prevention centers with applicable equipment and staffing and the use of large multidisciplinary hospitals for these purposes and etc. i.e. serious qualitative changes must take place both in the structure and in the content of the dispensary service. A system of clinical examination of children who have witnessed critical conditions at birth is entailed as well as mandatory long-term dispensary observation of children who have afflicted nephropathy in the neonatal period using diagnostic methods adopted in nephrological practice. So far, measures’ scope for the preventive prophylaxis of nephropathy, depending on the nature of the risk factor (predisposition) in different age periods, has not been worked out. For each stage, task lists should be precisely formulated. Such system, apparently, should be multi-stage: Antenatal; Perinatal; Neonatal; Pediatric; Teenage. Moreover, it is necessary to ensure mutual acceptability between specialists (obstetrician - gynecologist, neonatologist, pediatrician, therapist).

V. CONCLUSION

1. Existing system of specialized pediatric nephrological care needs to be elaborated with an emphasis on the achievements of modern preventive prophylactic nephrology.

2. Priority of primary prophylaxis of chronic diseases of the urinary system is oriented towards the need for a significant strengthening of specialized nephrological services at the primary level, the creation of diagnostic centers that allow to identify pathogenetic markers of hereditary predisposition.mail.ru

3. Strategically paramount and consequential condition is the organization of preventive centers with appropriate biochemical, immunological and genetic services allowing the identification of borderline conditions.
4. Considering current level of scientific medicine, it is still arduous to assert the exceptional completeness of the etiological and pathogenetic mechanisms in many chronic somatic diseases. Hence, recommended preventive prophylaxis measures remain predominantly speculative and naturally need to be further elaborated.

**REFERENCE LIST**


