

E R K E X U E



儿科学

PEDIATRICS

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内 容 提 要

本书在参考国外原版教材 Nelson Pediatrics, Comprehensive Pediatrics 等的基础上,根据全国高等医学教材五、七年制规划教材的内容及教学大纲的要求而编写。内容涉及到儿童生长发育、儿童保健、病历书写及体格检查、液体疗法、营养及营养缺乏病、新生儿及新生儿疾病、免疫缺乏病、结缔组织病、消化、呼吸、循环、泌尿、造血、神经肌肉、内分泌代谢及小儿结核等十五个章节。一方面吸收了国外原版教材的先进的教学理念、教学方法与教学思维模式,同时又体现和反映了中国高等医学教育五、七年制规划教材的内容及教学大纲的要求,非常适合国外留学生的全英语教学,对于全国本科、七年制、八年制的儿科学教学也是一本很好的英语教学参考书。

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前 言

我校自 1995 年开始招收外国留学生,并开展了留学生医学本科专业的学历教育,是国内最早开展留学生教学的学校之一,目前已有在校留学生近 500 人。按照教育部办公厅 2001 年 9 月印发的《关于加强高等学校本科教学工作,提高教学质量的若干意见》中“积极推动使用英语等外语进行教学,按照教育面向现代化、面向世界、面向未来的要求,为适应经济全球化和科技革命的挑战,本科教育要创造条件使用英语等外语进行公共课和专业课教学”的要求,我校从 2001 年起在本科生、七年制学生中开展了儿科学理论课的双语教学。

在引进国外原版教材进行教学的实践中,我们发现,国外教材有许多可借鉴之处,但在教学理念、教学方法与教学思维模式上与国内有很大的差别;在疾病的描述、诊断思路上也许多不同之处,不便于直接学习和使用。

为了更好地吸收国外原版教材先进的教学理念、教学方法与教学思维模式,为了能够体现和反映中国高等医学教育五、七年制规划教材的内容及教学大纲的要求,为了更好地进行国外留学生的全英语教学,也为了全国本科、七年制、八年制的儿科学教学有一本很好的英语教学参考书,迫切需要一本适合中国教师及学生使用的《儿科学》英文教材。

基于上述考虑,我们组织了从事临床工作多年的专家教授,结合他们在临床英语教学中的经验和体会,在不断学习和深入讨论的基础上,编写了这本儿科学英文教材。该英语教材编写组成员已经承担 8 届国外留学生的全英语教学任务,积累了丰富的教材编写和教学经验,曾编写留学生儿科学讲义,已经使用 3 年。本书参考国外原版教材 Nelson Pediatrics, Comprehensive Pediatrics 等的基础上,根据全国高等医学院校五、七年制规划教材的内容及教学大纲的要求而编写。内容包括儿童生长发育、儿童保健、病历书写及体格检查、液体疗法、营养及营养缺乏病、新生儿及新生儿疾病、免疫缺乏病、结缔组织病、消化、呼吸、循环、泌尿、造血、神经肌肉、内分泌代谢系统疾病及小儿结核等十五个章节。

为了保证教材质量,在编写过程中,全体编者齐心协力,积极配合,较圆满地完成了书稿;我校留学生 Nisha Jyoti Shrestha 和 Samundra Rana 在文字校对、处理方面给予了大量的帮助。

本书的编写是一项又十分艰巨的开拓创新任务,尽管编者倾注了大量的心血,并付出了艰辛的劳动,但由于目前国内尚无同类教材可供参考,加之编者们的水平有限,肯定会有不少的不足和错误之处,恳请读者批评指正。

张宝琴

2005 年 12 月 10 日于西安交通大学医学院

PREFACE

The School of Medicine of Xi'an Jiaotong University began to recruit international students in 1995 and has been carrying out undergraduate medical education for international students ever since. As the first to offer medical teaching to foreign students, the school has an enrollment of nearly 500 international students at present. According to the document "A Few Suggestions on Strengthening Undergraduate Education and Improving the Quality of Teaching" issued by the General Office of the Ministry of Education in September 2001, English should be advocated as the medium of instruction, and undergraduate education should provide favorable conditions so that general and specialized courses can be taught in English and other foreign languages in order to meet the requirements of modernization, the world and the future, and the challenges brought by globalization and scientific and technological revolution. In the light of this spirit, we have conducted bilingual teaching in theoretical course of pediatrics to 5-year and 7-year medical students since 2001.

In our practice of introducing original editions from abroad to our own teaching, we found great differences in the conception, methodology and way of thinking of teaching between textbooks of our country and those of foreign countries. Differences also exist in disease description and diagnostic process, which does no good to direct learning and use, although many contents can be used for reference.

An English textbook of Pediatrics that suits Chinese medical teachers and students is urgently needed in order to better absorb the advanced teaching conception, methodology and way of thinking from original textbooks from abroad, reflect the contents and syllabus requirements of planned textbooks for 5-year and 7-year medical programs in China, better conduct English teaching to international students, and compile a good English reference book for pediatrics teaching for 5-year, 7-year and 8-year programs in our country.

In the light of the considerations mentioned above, we have written the present pediatrics textbook in English by incorporating the efforts of the experts engaged in clinical practice for years. All of the authors have rich experiences in textbook writing and teaching because they have undertaken English-only teaching to international students for 8 rounds and compiled lecture notes on pediatrics which have been in use for 3 years. In writing this textbook we referred to international original textbooks such as Nelson Pediatrics and Comprehensive Pediatrics, and arranged it according to the requirements of teaching contents and syllabus of planned textbooks for 5-year and 7-year medical

programs in China. This textbook comprises 15 chapters concerning growth and development, child care, pediatric case history writing and physical examination, fluid therapy, nourishment and nutritional deficiency diseases, newborn infants and neonatal diseases, immunodeficiency diseases, connective tissue diseases, and diseases of the digestive, respiratory, circulatory, urinary, hematological, neuromuscular as well as endocrine and metabolic systems, and infantile tuberculosis.

Thanks to all the cooperative authors for putting in a great amount of time and effort in bringing this book together. Nisha Jyoti Shrestha and Samundra Rana, two foreign students from our university, provided a lot of help by doing proofreading and word processing. Ms. Fan Xiaohui, associate professor from the Foreign Languages Faculty of our university and also part - time English copy - editor for a few medical journals in China, edited all the parts of the manuscript of the book. To all those people who contributed directly or indirectly to this book I would like to express my heartfelt gratitude.

The compilation of this book is a pioneering and an arduous task. In spite of our great efforts, this book is not without any fault in view of the unavailability of any reference books of its kind at home. Any suggestions and criticism from readers would be greatly appreciated.

Zhang Baoqin
Editor - in - Chief
December 2005

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Chapter 1 INTRODUCTION TO PEDIATRICS

Pediatrics is concerned with the health of children and adolescents, their growth and development, and their opportunity to achieve full potential as adults. As physicians who assume responsibility for children's physical mental and emotional process from conception to maturity, pediatricians must be concerned with social and environmental influences, which have a major impact on the health and well – being of children and their families. The young are often among the most vulnerable or disadvantaged in society and thus require special attention.

Mission and Scope of Pediatrics

[Pediatric Assignment]

The main tasks of pediatrics are as follows :

- To improve the prevention and treatment of childhood disease.
- To decrease the morbidity and mortality of pediatrics age group.
- To improve physical condition of children.
- To ensure physical and mental stability in children.
- To improve quality of human life.

Characteristics of children :

- Gradual growth of tissues and organs.
- Development of psychological characteristics.
- Genetic and congenital diseases are commonly found.
- More liable to acquire infectious and communicable diseases.
- High morbidity and mortality.
- Environmental influences are common.

[Scope of Pediatrics]

The scope of pediatrics is very wide, it is basically divided into 3 different categories.

1. Preventive pediatrics

The aims of preventive pediatrics are to prevent life – threatening infectious diseases by vaccination, psychological disorders, nutrition interference, accidental injury and poisoning, and carry out education in health and hygiene. Preventive pediatrics has a substantial impact on our society. The screening test and early interference methods and treatments should also be applied to prevent genetic and congenital diseases.

2. Developmental pediatrics

It is essential to study and solve the problems about growth and development of children for a healthy childhood. It involves observation of the normal physical and psychological growth and development understanding the factors affecting growth and development; and early detection of abnormality in growth and development of children.

3. Clinical pediatrics

It involves the systematic and psychological diseases. It mostly deals with the diagnosis of childhood diseases and treatment to decrease morbidity and mortality. Clinical pediatrics is branched into different groups according to system: pediatric cardiology, pediatric respiratory medicine, pediatric hematology, pediatric nephrology, pediatric neurology, pediatric endocrinology, pediatric genetics, pediatric emergency medicine and infection medicine. Special branches of pediatrics are perinatology, neonatology, adolescence medicine and behavioral medicine. We will be dealing with clinical medicine in the following chapters.

Age Group Distribution

According to the anatomical, physiological and psychological characteristics, there are 7 pediatric age groups during childhood.

1. Fetal period

This period is from formation of embryo till 40th week of gestation. Clinical gestational period is divided into 3 trimesters.

① First trimester of pregnancy is the first 12 weeks. The embryo descends from Fallopian tube embeds in uterus, and undergoes continuous mitosis for organogenesis. From 4th week of pregnancy embryo heart starts functioning; by the 8th week, as embryonic period comes to an end, the rudiments of all the major organ systems have developed. From 9th week fetal period starts and fetal somatic changes consist of increase in cell number and size and structural remodeling of several organ systems; by the 10th week the face is recognizably human. By 12th week, external genitals become clearly distinguishable. This period is very important for development and organogenesis. Thus, infection, radiation, chemotherapy or genetical changes may give rise to congenital malformation of organs.

② Second trimester of pregnancy is the period from 13th week to 28th week (altogether 16 weeks). Lung development proceeds with budding of bronchi, bronchioles, and successively smaller divisions. By weeks 20th ~ 24th, primitive alveoli have formed and surfactant production has begun; before that time, the absence of alveoli renders the lungs useless as organs of gas exchange. Thus, the birth after this period increases the viability of the fetus. By the 28th week the body weight of the fetus is about 1000g.

③ Third trimester of pregnancy is the period from 29th week to 40th week (altogether 12 weeks). During this period, weight triples and body length doubles as body stores of protein, fat, i-

ron and calcium increase. Influencing factors such as maternal nutrition deprivation, immune response (e. g. hemolytic syndrome), exposure to radiation, chemotherapy, poisoning, drug abuse, smoking and alcohol consumption, psychological disturbances, maternal infection and abnormality of placenta and umbilical cord can lead to low birth weight, intrauterine growth retardation, diseased condition or spontaneous abortion, or premature birth. Thus medical consultation, laboratory examination, nutritional guidance, avoidance of toxic substance like drugs, radiation, alcohol and smoking, and prevention of infection in pregnant women are the key to the normal fetal growth and development.

2. Neonatal period

Neonatal period is from the first day starting from the tying of umbilical cord to 28 days of life. Incidence rate and death rate of various diseases are high during neonatal period. The mortality rate among neonates occupies $1/3 \sim 1/2$ of infant mortality. Most of the neonatal deaths can be prevented, meticulous health care, nutrition, and sterilization can decrease the mortality rate of neonates.

The period from 28 weeks of gestation to 7 days after birth is termed as perinatal period. During this period the baby undergoes vigorous changes and may suffer from life – threatening illness.

3. Infancy period

This period starts from deletion of umbilical cord to 2 years age (< 2 years). It is a period in which the baby grows most rapidly, up to 1 year, baby weight increases 3 times more than the birth weight and height increases 1.5 times compared with the birth height. Every organ system continues developing and completing, therefore daily demands for energy and protein are relatively great, but gastrointestinal function is not completely developed, which causes disturbances of digestion and nutrition, giving rise to diseases like rickets, anemia, malnutrition, and diarrhea. During infancy, maternal immunity gradually disappears, but auto – immunity is not mature and immunity against various diseases is poor, so they are vulnerable to communicable and infectious diseases. Thus we should encourage exclusive breast feeding during this period, guide for the rational nutrition and supplementary diet, planned immunization and prevention of infection. Good living habit and healthy mental development should start from this period.

4. Toddler age

Duration from 1 year less than to 3 years is called toddler age. Growth and development in this phase are comparatively slower than those in infant period, but movement range increases, and contact with the surrounding environment increases; this is the period of rapid development in language, thoughts, and ability to respond to people and objects. Due to lack of ability to distinguish the dangerous objects and self – protection, much attention has to be given to prevent the occurrence of accidental injury, road traffic injury and poisoning. Along with the increase in external contacts, occurrence of infectious diseases should be prevented. We should also ensure nutrition and timely supplementary food, development of good eating habit and skills.

5. Preschool age

Preschool age is from 3 years to 6 ~ 7 years of age. In this period growth and development fur-

ther slow down, but intelligence development increases, understanding capacity gradually enhances, children are getting more surprises and feelings, and can imitate others; they can also use language to express their thoughts and feelings. At this time, they should be admitted to kindergartens for studying simple alphabets, drawings and songs, and should be educated to labor, to maintain hygiene, unity, and good manners. We should pay special attention to oral and dental hygiene. Children are susceptible to infectious diseases, accidental injury and poisoning. Nephritis and connective tissue disorders start to increase in this age group; thus, preventive measures should be taken.

6. School age

The age from 6 ~ 7 years to the starting of adolescence phase (12 years for girls, 13 years for boys) is classified as school age. In this period reproductory system and other organ systems develop more close to the adult standard, the shape and development is basically complete, intelligence development becomes more mature, children can accept the scientific knowledge of various organ systems. Education in this period develops the morals, knowledge, perseverance and deeds. In this age group, it is essential to give a proper guidance, ensure nutrition, exercise and good sleep, prevent dental caries, protect eyesight, and avoid excessive nervousness.

7. Adolescence

Girls aged 11 ~ 12 to 17 ~ 18 years and boys aged 13 ~ 14 to 18 ~ 20 years are termed as adolescents. The age range varies among individuals, the difference of 2 ~ 4 years may be found. The major important characteristic of this age group is rapid increase in growth; it is the second - peak of growth after infancy. The reproductory system grows more mature, at the end of this period each organ system matures, and height gradually stops increasing. In adolescent period, both incidence and mortality rate are less than those in other pediatric age groups, but instability of the mind, behavior, and psychology can be encountered. Education to enhance moral characters and psychological health should be emphasized; knowledge of hygiene and nutrition should be included. In this period, hypertension and obesity are more common, which might be the risk factor of old age cardiac diseases; preventive measures should be taken in the early age.

Basic and Clinical Characteristics of Pediatrics

Pediatrics is different from other medical fields, mainly in two aspects. Firstly, infancy and adolescence periods see growth and development. Differences exist among individuals, but also in age. Thus in clinic, to master the characteristics of each age group is very important. Secondly, in pediatrics, prevention occupies one of the most important position. Therefore, we should not simply regard children as "little adults".

[Basic Medical Characteristics]

1. Anatomy

During growth and development, children's weight, height, head circumference, and chest circumference increase continuously; changes in ratio of body parts, teeth eruption, cranial bones,

anterior fontanel, bone age, skin, muscle, lymph node, and nervous system develop and change along with age. Size and position of visceral organs such as the heart, lung, kidney, liver, and spleen and anatomical characteristics of children are not similar to those of adults. For example, in a neonatal period the thickness of both right and left ventricles are almost the same; infants younger than 2 years have more horizontal heart. Consequently, only after being familiar with normal anatomical characteristics of children and developmental rules, can we determine the abnormalities.

2. Physiology and biochemistry

Different age groups of children have different normal physiological and biochemical values, including heart rate, respiratory rate, blood pressure, blood profile, and body immunity. Neonatal kidney function is not matured, so water electrolyte disturbance is common. In infants metabolism is active and nutritional demand is relatively high; but gastrointestinal absorption is relatively immature. After mastering age – specific physiological and biochemical characteristics, we can make confirmed diagnosis and management accordingly.

3. Immunology

As age increases, immune factors like skin, mucosa, lymphatic system, body immunity and cellular components are maturing. In neonates, physiological decrease of immunity is often found; therefore they are more liable to infectious diseases. However, neonates less than 6 months old contain maternal IgG, which reduces the chances of infectious diseases. As maternal IgM, IgA cannot cross the placenta, neonates are easily infected by Gram negative bacteria. Usually at age of 6 ~ 7 years, self composed IgG just reaches the adult level. For example, neonates with IgM deficit may suffer from Gram negative infection, by 3 ~ 5 months maternal IgG disappears from the infant body, and endocrine IgA is not sufficient, thus the infants are vulnerable to respiratory and gastrointestinal infections.

4. Pathology

In children the pathological reactions are not similar to those of adults even in the same disease or pathogen. For example, vitamin D deficiency in young children results in rickets, whereas in adults, osteomalacia. Pneumococcal lung infection brings about bronchitis in childhood but lobar pneumonia in adults.

[Clinical Characteristics]

1. Disease pattern

There are great differences in disease pattern between children and adults. For instance, in neonates, scleredema neonatorum and hyperbilirubinemia are more often seen; in infant – toddler age, febrile convulsion is far more common than in adults. In pediatric malignancy, leukemia is more common, whereas in adult, lung cancer; nasopharyngeal cancer, esophageal cancer and others are more common. As for cardiovascular disorders, congenital heart disease is more prevalent in children but coronary heart disease is predominant in adults.

2. Clinical manifestations

Since onset of illnesses in pediatrics is very rapid, recurs easily, atypical and the clinical

changes are very extreme, doctors should meticulously observe and treat the patients in time. For example, while children are suffering from infectious disease, especially in low immunity status, they are more liable to develop septicemia but primary focus is not easily found. In neonatal septicemia, it might present with atypical clinical features although purulent meningitis has presented; constant poor response, refusal to suck milk, and failure to elevate temperature may easily miss the diagnosis.

3. Diagnosis

Children usually cannot give details about their disease conditions, or describe symptoms appropriately, thus during the course of diagnosis, doctors must make an analysis according to history given by the guardian and epidemiological data. Along with positive signs during physical examination and laboratory data, the patient's age factor should also be considered while analyzing. The same symptoms in different age group might have different diagnosis. For example, in case of convulsion in neonates, we should first consider birth trauma, hypoxic ischemic encephalopathy or intra cranial hemorrhage; in infant, we have to consider vitamin D deficiency related seizure or febrile convulsion; in older children, we should think of epilepsy.

4. Treatment

The pediatric drug dose varies in different age groups and differs from that of adults. Some treatment methods are specially designed for pediatric patients; for example, blue light phototherapy and exchange transfusion are the special treatment methods in hemolytic disease due to ABO incompatibility. During the course of illness children easily develop fluid and electrolyte disturbances, so during dehydration therapy, fixing the quantity, determining the type of dehydration and adjusting the speed of infusion should be considered. As the children's development is not fully mature, immunity is poor, multiple system organs might be involved. For example, during the course of pneumonia, diarrhea and convulsion might easily occur. Therefore, while treating primary diseases, we should treat the complication as well. Nursing plays a very important role in management of pediatric disease, children have less capability of self-independence, so meticulous nursing should be provided. Intravenous puncture should be carefully done, nutrition, affection, and entertainment are the special components of pediatric nursing. For some children of school age and those with chronic diseases, guidance is also essential.

5. Prognosis

The children are in the period of continuous growth with increasing activity and rapid tissue recovery; Early diagnosis and prompt treatment can bring rapid recovery and less sequels and complications, although the onset of disease is acute with a terrifying force and the clinical manifestations change rapidly.

[Characteristics of Prevention of Disease]

Completion prevention is one of the most important tasks of pediatricians. Planned immunization is an important aspect of pediatrics in that it can control many acute infectious diseases. For example, small pox has been eradicated, measles and poliomyelitis prevalence have decreased; hep-

atitis B vaccine has helped to control hepatitis B infection in China. For genetic disease, genetic consultation and screening among neonates can prevent the occurrence and development, aplasia of globin formation induces anemia (e. g. thalassemia), phenylketonuria, and congenital hypothyroidism. Nowadays more attention has been paid to adulthood diseases like arteriosclerosis, hyperlipidemia, hypertension and diabetes mellitus which originate from childhood. Therefore, each prevention is focused. We should also attach importance to child psychology, which can bring psychological disorders as they grow up. Thereby, prevention of physical and mental illnesses is very essential for children's health.

(孙晓勉 Sun Xiaomian)

Chapter 2 GROWTH AND DEVELOPMENT

Growth and development represent a continuous interaction of biologic processes that begin at conception and terminate at death. The integrity and the quality of these processes are influenced by a myriad of variables, including genetic, physiologic, biochemical, psychological and socioeconomic factors.

The terms 'growth' and 'development' are often used synonymously or at least to imply a symbiotic relationship. Growth implies a physical change, usually resulting from either an increase in cell number or cell size; for example, increase in height, weight, and head circumference. Development suggests a change or modification in capacity to function; for example, the enhancement of a skill and increasing specialization or the development of new functional capacities.

Rules of Growth and Development

[Continuous Course and Two Growth Peaks]

Sequence or pattern of growth in children is comparable but the rate is not always uniform. The increment in growth over a unit time is not always equal. There are specific periods in a child's life when the rate of growth accelerates, decelerates or undergoes a steady buildup of body tissues. In the early postnatal period the velocity of growth is high during the first three months. There is a steady growth during mid - childhood. A second phase of accelerated growth is during puberty. Growth decelerates step by step after that and then ceases.

[General Principles of Growth and Development]

Growth and development follow the following principles:

1. Up to down; for example, a baby raises head first, then sits, then stands, and finally walks.
2. From proximal to distal; an infant moves its extremities from arms to hands, from legs to feet.
3. From gross to fine; babies always use their palms as early as fingers when they want something.
4. From elementary to advanced; children often learn to observe their surroundings at first, then have their own feelings, remember them, produce their own thoughts, and try to analyze by themselves.
5. From simple to complex; for instances, if a child draws pictures, he can express his thoughts from lines to circles, and to whole pictures at last.

[Unbalanced Development of Systems and Organs]

There is a comparison between the general body growth, genital growth, neural growth and lymphoid growth at different ages. As mentioned above there are two rapid growths during body growth, one is in infancy life and the other is in adolescence. The rapid growth of genital system occurs during adolescence but remains dormant during childhood. Neural growth continues fairly rapidly during the first few years of life but then approaches a plateau. Lymphoid system growth is most notable during mid – childhood. For example, tonsils grow larger during infancy and childhood but get smaller later during adolescence.

[Individual Variation]

Though growth and development follow their law, there are individual variations because of genetic and environmental influences. Mostly adolescences are affected by environmental changes, children born in affluent families or educated families are well built. Frequent exercise and adequate exposure to various sports help the good development of bone and tissue. On the contrary, poor socio – economic status, lack of exercises and games lead to growth delay or inadequate growth in children. Some children may be well fed and frequently participate in various sports, but if their parents are genetically short in stature or have thin body structure, those children might not gain much height or weight. So we can see that individual variations among the same age group children are due to different nutrition, disease condition, sports participation or genetic predisposition.

The Factors Influencing Growth and Development

Growth and development can be modified by a number of exogenous and endogenous influences, working independently or in combination with one another. Several of these factors will be reviewed briefly.

[Genetic Factors]

Potentials for growth and development are determined by the interplay of inherited genes. Each gene exerts an influence on the developing embryo and fetus and gets a template for future growth of the child. Genetic factors include: ① phenotype, ② characteristics of parents, ③ race, ④ sex, ⑤ biorhythm and maturation, ⑥ genetic disorders, and ⑦ children of multiple pregnancies. Genes decide the hereditary characteristics of human, eg. height, weight, skin color, structure and function of organs, the number and shape of cells, the types and quantity of organs and the developmental potentials.

[Environmental Factors]

1. Nutrition

Abnormalities of nutrition may directly affect cell division and cell growth and thereby modify total growth and development. There are diverse causes of inadequate nutrition which extend from uterine life through adulthood, including placental dysfunctions, chronic illness and disease, inadequate dietary intake and maternal neglect. The intrauterine fetal malnutrition influences organogenesis, growth and development which may cause irreversible damage and suppression resulting in ab-

normalities such as intrauterine growth retardation, brain developmental delay and others.

Malnutrition after birth especially the first 1 ~ 2 years leads to severe malnutrition which influences growth and development, body immunity, endocrine and nervous regulation. The nutritional requirements of children include protein, fat, carbohydrate, vitamins, minerals and water. Deprivation of protein leads to protein energy malnutrition (PEM), one of the leading nutritional problems in society. Deficiency of vitamin D leads to rickets and tetany whereas vitamin B₁₂ deficiency causes megaloblastic anemia, and vitamin A deficiency results in xerophthalmia and phrynoderma.

Although malnutrition is often used synonymously with nutrients deficiency for children, overfeeding is also a serious health hazard. Overfeeding during critical periods of growth and development may have a detrimental influence on stature, adipose depots which results in obesity.

2. Diseases

In spite of etiology, diseases can disturb the normal function of the organs and slow down the physical and mental growth and development. As normal channels of growth are approached, the rate may return to normal, but when growth failure is severe and prolonged the child may never regain his normal growth potential. It is not only because of the reduction of food intake during the illness, but also because of the interference to the metabolism by disease. Acute infection makes slight decrease in weight whereas chronic diseases affect the development of weight as well as height; endocrine disease often leads to delay in the skeletal growth and nervous system development; congenital diseases like congenital heart disease delay the growth. Moreover, repeated adverse influences can interfere with stature growth, resulting in delayed bone maturation, extension of the growth period and ultimate diminution of potential growth. After diseases are cured, body weight, height, bone age are speeding up in a short period of time. The growth and development would be obviously increasing at this stage if rational nutrition and suitable exercises are performed.

3. Maternal factors

During fetal life, different factors like maternal living style (alcoholic and smoker), nutrition, psychology, and disease (diabetes mellitus, hypothyroidism, PKU, severe emesis) influence the growth and development of fetus. For example, during early trimester, viral infection (TORCH, syphilis, AIDS) might lead to congenital malformation of organs, maternal malnutrition leads to abortion, premature birth, and influences growth and development and delays development of the brain; maternal exposure to various drugs (sedatives, hallucinogen, aspirin, phenytoin), radiation, poisoning and mental stress, can lead to growth arrest of fetus. Multiple pregnancies, abnormal labour (breech presentation, foot presentation), abnormalities of placenta (placenta previa), difficult birth (shoulder dystocia, cephalopelvic dysproportion), disease in later trimesters like eclampsia, preeclampsia, and UTI can affect the neonates' growth and development. Post - birth maternal health condition is also a factor influencing the child's health. Maternal diseases and malnutritional status should be meticulously avoided.

4. Social factors

After delivery a variety of social factors that directly affect potentials for growth and develop-