

Adolescent endocrinology in Saudi Arabia

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ABSTRACT

Objective: The importance of providing special health care services for adolescents has been recently stressed. In Saudi Arabia, adolescents have no special services. In this study, we describe our first 5 years experience of an adolescent endocrinology clinic in Security Forces Hospital. We believe it is the first clinic with this objective in the Kingdom.

Methods: An adolescent endocrinology clinic was run by a team composed of pediatric endocrinologist, diabetic nurse educator, clinic nurse and a dietician in collaboration with other supportive staff and consultants from other disciplines. The methodology of setting up, staffing and running the clinic is described.

Results: About 223 cases were registered over 5 years. The most common problems were short stature 53 (24%), diabetes mellitus 49 (22%), obesity 40 (18%), thyroid disorders 28 (13%), delayed puberty 20 (9%) and rickets (8%). The clinic was well accepted by parents and their families. We learned a lot on how to handle these problems locally.

Conclusion: Based on our experience, we recommend establishing special health care services for adolescents both at the primary care, as well as secondary and tertiary care levels.

Keywords: Adolescent, endocrinology, Saudi Arabia.

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According to the WHO, 50% of the world population are below 25 years of age and almost one third are 10-24 years old (adolescents).¹ Despite the physical and emotional stress, as well as variable behavioral disorders encountered during this period, teenagers remain, as a whole, healthy, too old to have a high frequency of congenital disorders, and too young to have yet acquired the degenerative disorders of aging. Consequently, most physicians in the major specialities do not see many adolescents. Therefore, when the occasional adolescent does present with a problem, he is likely to be seen foreign to both pediatricians and adult physicians.² This is particularly so when practicing in Saudi Arabia and many developing countries where people are categorized from the health care point of view, into children (below 12 years) and adults (over 12 years) without any consideration to the very important age group, the adolescents. When it comes to

endocrinology, most of the physicians and pediatricians in the Kingdom are trained in the western countries. In these countries, adolescent, endocrinological problems are mostly handled by pediatricians as the cut-off age for pediatric goes up to 18 years. Therefore these patients are likely to be looked at as strangers by most adult endocrinologists and after sometime of local practice by pediatric endocrinologist as well. As a result adolescents become "orphans of medical care".

As our belief that adolescents have special health problems and also to build up our local experience in this area, we decided in 1993, to establish an adolescent endocrinology clinic at Security Forces Hospital which to the best of our knowledge at that time was the first of its kind in this country. In this paper we describe our first 5 years experience of this clinic. We are aiming to share our experience in establishing and running the clinic and briefly

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highlights on the pattern of diseases encountered. Detailed information on these cases is beyond the scope of this article and will be addressed in future. We hope by doing so to encourage our colleagues in other institutions to establish similar services for adolescent endocrinology and even more important for adolescent health care in general.

Methods. The idea of establishing the clinic was first discussed with colleagues from other disciplines including adult medicine, obstetrics and gynecology and a final approval was obtained from the department heads and hospital administration who supported us fully. Then a team composed of pediatric endocrinologists, adult endocrinologists, gynecologist, biochemist, diabetic nurse educator and other supporting staff including social workers and dieticians was formed. This team met once every month to discuss problematical cases and any issues related to endocrinology, services in addition to update talks and reviews. It was agreed that patients aged 12-19 years with suspected endocrine problems should be seen in this clinic. This is the usual age group of adolescents before joining the high education in this country. Patients over 19 years were thereafter gradually referred to adult clinics after discussion with the patients' family and adult endocrinologists. Patients were referred from the various Ministry of Interior health centers throughout the country, the primary care clinics in the hospital, upgraded from the pediatric endocrinology clinic or from adult-endocrinology clinics and occasionally from the gynecology clinics. The clinic was run by a team composed of a pediatric endocrinologist, bilingual diabetic nurse educator, dietician, 2 clinic nurses and a social worker. Help was regularly obtained from a pharmacist and a psychologist if needed. The clinic was run once per month in the afternoon (1300-1700 pm) because that is the most suitable time for school children. A total of 6-8 patients, 2 new and 6 follow-up, were seen, i.e. each patient was given about 30 minutes minimally. Opportunities were given for adolescents to be interviewed alone by team members.

The clinic is located in the out-patient clinics of the department of pediatrics. Arrangements were made for no mix up to happen between male and female patients. There were separate reception and waiting areas for males and females. Females reception area was the same as for young children. Vital signs for males including weight, height, blood pressure etc. were carried out inside the consultation room and for females in the children vital signs room. Three rooms were used to run the clinic including one for the diabetic nurse educator and the dietician. Fixed time schedules were made for appointments. However we were very flexible in accepting walk-ins and no patient was ever turned

away. Those who defaulted their appointments were called by telephone and another appointment arranged. This is because adolescents are well known for non-compliance with appointments. Communications were made through telephones, correspondence and visiting with educational authorities, schools, social services department, religious leaders, well-fare societies in issues related to patient management. At occasions our diabetic team arranged some home visits after prior permission from parents. Group meetings for each sex were separately held with patients and their families within the hospital to discuss issues related to their diseases. Discussion topics included medical and social issues. For socio-cultural reasons, we were not able to arrange for trips or camps outside the hospital premises.

There is no separate in-patient adolescent unit in our hospital. Prepubertal boys and some pubertal females were admitted to the pediatric medical ward, whereas pubertal boys were mostly admitted to the adult wards and managed in collaboration with the adult physicians.

Results. A total of 223 patients were registered in the clinic during this period. Out of these, 221 (99%) were Saudis and 2 (0.9%) non-Saudis; 103 (46%) were males and 120 (54%) females. The mean age was 15.6 (12-19.6) years. Fifteen (7%) were referred from adult endocrinology clinic and the rest came from other sources mentioned earlier.

The pattern of encountered problems is shown in Table 1. As shown growth and nutrition disorders including short stature, tall stature, puberty disorders rickets and obesity constituted more than 65% of the referrals. These were followed by diabetes (22%), and thyroid disorders (13%) whereas the other endocrine problems formed almost less than 5% of the cases.

Adolescents referred primarily for short stature formed 23% of the clinic. The etiology of these cases is shown in Table 2. Almost 50% of these had non-organic causes. Endocrinological problems (3 with isolated growth hormone deficiency and one with panhypopituitarism) constituted 7.5% of the study cases. Three of the patients with Turner syndrome were first diagnosed after the age of 10 years. Growth hormone was offered to those with growth hormone deficiency, chronic renal failure and Turners syndrome.

Causes of delayed puberty are shown in Table 3). The most common cause of delayed puberty was constitutional delay. All these cases, except 3 were managed conservatively. The patient with coeliac disease was interesting in the sense that he was otherwise asymptomatic. He went into spontaneous puberty after about 18 months of gluten free diet. We had relatively large number of hematological

Table 1 - Pattern of problems seen in the clinic (n=33).

Problem	Number (%)
Short stature	53 (24)
Diabetes mellitus	49 (22)
Obesity	40 (18)
Thyroid disorders	28 (13)
Delayed puberty	20 (9)
Rickets	17 (7)
Gynecomastia	2 (0.9)
Tall stature	2 (0.9)
Ovarian masses	2 (0.9)
Menstrual disorders	2 (0.9)
Hypertrichosis	2 (0.9)
Hypoparathyroidism	1 (0.5)
Anorexia nervosa	1 (0.5)
Total	223 (100)

Table 2 - Causes of short stature among the adolescents referred to the clinic (n=53).

Aetiology	Number (%)
Constitutional	12 (23)
Genetic	9 (17)
Genetic delay	5 (9)
Chronic renal failure	5 (9)
Sickle cell anemia	4 (8)
Skeletal dysplasia	5 (9)
Turner syndrome	5 (9)
Isolated growth hormone deficiency	3 (6)
Nephrotic syndrome	1 (2)
Noonan's syndrome	1 (2)
Ellis Van Creveld syndrome	1 (2)
Panhypopituitarism	1 (2)
Pseudo pseudohypoparathyroidism	1 (2)
Total	53 (100)

Table 3 - Cases referred primarily for delayed puberty (n=19).

Aetiology	Number (%)
Constitutional	10 (53)
Chronic renal failure	2 (11)
Panhypopituitarism	1 (5)
Coeliac disease	1 (5)
Sickle cell anemia	4 (21)
-thalassemia major	1 (5)
Total	19 (100)

Table 4 - Aetiopathogenesis of rickets among the study population (n=17).

Aetiology	Number (%)
Nutritional	11 (64)
Hypophosphatemic	2 (12)
Vitamin-D dependent type 1	1 (6)
25-hydroxylase deficiency	2 (12)
Chronic renal failure	1 (6)
Total	17 (100)

Table 5 - Pattern of thyroid disorders seen among the study population (n=28).

Aetiology	Number (%)
Hashimoto's thyroiditis	12 (43)
Simple colloid goitre	7 (25)
Grave's disease	3 (10)
Dyshormonogenesis	3 (10)
Toxic adenoma	1 (4)
Tuberculosis of the thyroid gland	1 (4)
Iodine deficiency	1 (4)
Total	28 (100)

problems. Sicklers with low serum zinc were offered zinc sulphate in additions to the usual sickle cell management and all of them behaved similar to constitutional delay and went into spontaneous puberty.

Cases referred for evaluations of obesity formed about 18% of the clinic population. Thirty five (87.5%) of the cases were due to nutritional obesity, 2 (5%). Prader Willi syndrome and 3 (7.5%) Bardet Biedl Syndrome. Treatment of these cases was mainly based on nutritional advice and encouragement of exercise. No facilities were available for proper behavior modification therapy though we always tried to involve the whole family. Surgery (gastroplasty) was offered to an 18-year-old girl whose weight went up to 156 kg and developed most of the physical and psychological obesity complications after failure of 10 years attempt of medical therapy including intragastric balloon. She lost 35 kg post-operatively. On the whole, only about 10% of the patients lost and maintained their weight. In general the compliance rate with diet and exercise was very poor.

Patients with rickets formed about 8% of the clinic population. Causes of rickets are shown in Table 4. Most patients with rickets presented with non-specific aches and pains in the lower limbs and some were initially referred to other services including rheumatology and orthopedics. Low 25-hydroxycholecalciferol was demonstrated in 7 of the nutritional rickets cases. Almost all the patients were having low calcium containing diets. We are currently undergoing study to see the exact calcium intake among adolescent girls. None of the girls was practicing any exercises. All these patients responded well to calcium and vitamin D therapy. The 2 patients with possible 25-hydroxylase deficiency had other 2 younger children affected with the same disorder.

The pattern of thyroid disorders seen in the clinic is shown in Table 5. The most common cause of goitre was Hashimotos thyroiditis followed by simple colloid goitre. We used radiotherapy in a 13-year-old boy with Graves disease on whom medical treatment failed. Our experience with goitre in general has been published elsewhere.³

Adolescents with diabetes formed almost 22% of our clinic population. The most common causes was type I diabetes, 3 patients satisfied the criteria of maturity onset diabetes of youth, MODY and one patient had Wolframs syndrome. All our patients were trained on all aspects of management of diabetes including home blood sugar monitoring. In general, we had successful experience with group meetings and learned a lot about local adolescent behavioral and social problems. The details of our experience with diabetic adolescents are beyond the scope of this article and will be addressed in future.

Overall the clinic was run very smoothly. The presence of both males and females in the team helped a lot in overcoming some cultural barriers. Females were more frank in disclosing their social problems to the female members of the team and it was more easier for them to be examined by female members. The team was trusted so much so that we were eventually involved in even solving some marital and social problems at home, putting some truant adolescents back to school, tracing 1 or 2 who got involved in drugs and treating them, releasing 1 or 2 from jail and helping many to plan for their future careers. The success of this experience wouldn't have been possible without the cooperation of the hospital endocrine team and excellent support from the department and hospital administration. We are currently planning to increase the number of the clinics due to significant increase in the number of patients.

Discussion. Adolescence is usually defined as the period of rapid physical and psychological growth and development occurring during the second decade of life.⁴ Recently adolescent health has increasingly been recognized as an important issue and adolescent medicine has become an important speciality.

The growth of modern adolescent medicine has resulted from several occurrences. They include early observations about the biologic and psychological differences of adolescents as compared with children and adults,⁴ the process of adolescent growth and development including the profound changes in the family, the economy and the world all of which have had a major impact on adolescents and on the science and practice of adolescent medicine.⁴ While mortality and conventional morbidity are relatively low among this group compared to very young children and older group, its a mistake to accept these statistical realities uncritically.⁵ Over the past 3 decades, there have been a dramatic worsening across range of indicators of health and well-being in young people in both developed and developing countries. Drug and alcohol abuse, teenage pregnancy, smoking, eating disorders, delinquency and violent crimes, stress, depression and suicide are among the difficulties that youth are facing today.⁵ In Saudi Arabia, as in many developing countries this speciality is practically non-existing and the population is categorized, from the health care point of view into children (if under 12 years) and adults (for all those over 12 years) and adolescents are considered as strangers to both pediatricians and adults physicians and as such we consider them as orphans of medical care.

In this respect, there are 2 aspects of care that we should talk about. The general adolescent health care and the subspeciality problems. Concerning the

general health care, ideally these adolescents should be looked after by adolescent specialists. Until these specialist become available in Saudi Arabia, we believe that the family health physicians, if well trained by adding more on adolescent health to the undergraduate and postgraduate curriculum, should be able to handle these cases. Also school health doctors should be trained on that. These should then refer cases, if necessary, to various subspecialty services at secondary or tertiary care centers. Concerning teenagers with endocrinological problems, if one looks into the most common problems seen during this period one would realize that the growth, pubertal and nutritional problems are the dominant ones. Pediatric endocrinologist, we think, are more trained in these areas, familiar and willing to look after these problems than adult endocrinologists. We therefore concur with what Dr. Graeme Mitchell has said as early as 1941. "The pediatrician is the fellow who perhaps more than anyone else is and should be interested in growth and development and therefore I know of no one better able than he (or she) to carry on the studies and the direction of adolescents".

Therefore we think that adolescents with endocrinological problems should be referred to pediatric (endocrinology clinics and the upper age limit should not be 12 years as is the current practice. According to our experience we have proved that it could possibly be carried out both at the out-patient and in-patient levels. However, ideally there should be a separate in-patient admission unit for adolescents. To achieve these, one needs a complete cooperation between all endocrinology disciplines and related supporting services including the hospital administration. Though our clinic is still in its infancy we feel proud that we have managed to pass through this experience successfully. We are now planning to increase the number of our clinics and discussing the issue of having a separate adolescent in-patient unit if possible. We therefore think that such clinics could be started in all hospitals where endocrinology services exist.

Short stature was the most common problem encountered in the clinic. This is because adolescents and the community as a whole are becoming more height conscious and people are now becoming more aware of the availability of growth hormone. Nevertheless the most common cause of short stature were genetic or constitutional and in neither of them do we recommend or offer growth hormone, as is the practice elsewhere.⁶

In the Western countries puberty is considered to be delayed if no signs of puberty is seen by 13 years in girls or age 14 years in boys.⁷ In Saudi Arabia, data on the exact age of onset of puberty are scanty. In a cross sectional study from Asir region, girls, were found to start their adolescent height spurt at

about 12.5 years and reach peak height velocity at about 13.5 years with boys starting their puberty later by about 1-5 years.⁸ In another study the mean age of Menarche was 13-24 year.⁹ In Geizan area, the mean age of onset of puberty was considered to be 13 years (10-16 years).¹⁰ In our clinic, and until we get definite Saudi data we still refer to the Western cut-off ages. We have never found the difference so significant to affect our over-all management.

In a country with high incidence of sickle cell anemia and thalassemia, it was not surprising to encounter hematologically affected adolescents with growth problems. The issue of growth in sickle cell anemia and thalassemia is well discussed elsewhere.¹¹⁻¹⁴ Most of the sicklers behave like constitutional delay and go into spontaneous puberty and don't need specific therapy. More studies related to this subject should be carried out in Saudi Arabia.

Adolescent obesity represents the most prevalent nutritional problem among Americans between the ages 12-17 years. Currently at least 21% of the adolescents are obese indicating at least 39% increase in adolescent obesity during the last 2 decades, the causes being multifactorial.^{15,16} In Saudi Arabia, obesity is becoming a public health problem and this subject has been recently reviewed.¹⁷⁻¹⁸ In one study among male school children in Riyadh, the prevalence of overweight and obesity were 11% and 18% with figures going up to 22% among age group 12-18 years. Practically all cases referred to the endocrinology clinic were significantly obese and parents were hoping to find endocrinological causes. None of the cases had an endocrinological etiology. This high prevalence of obesity is certainly alarming. This upsurge is thought to be multi-factorial in origin. The major economical changes in the last 2 decades have resulted in changes in lifestyle including sedentary life (cars, watching TV and computers, lack of exercise), and excessive consumption of high calorie foods including fast-foods which are becoming very popular among adolescents in this country. Addressing the issue of obesity even at this age is too late and therefore emphasis on prevention should start from childhood with more stress on health and nutritional education and encouragement of exercise. Unless these active measures are taken with stress on family approach, attempting to treat these patients to make them lose weight in our experience is practically useless as is the experience of other workers.¹⁷ Adolescent hardly ever comply with dietary instructions.

The subject of calcium metabolism in adolescents is discussed elsewhere.²⁰ Vitamin-D deficiency is a common problem in Saudi Arabia and this subject was reviewed elsewhere.²¹ Most of the studies however were carried out on young children and elderly.²² Concerning teenagers, in one study almost 19% of males and 38% of females were found to

have insufficient 25-hydroxycholecalciferol levels.²³ Similarly the lowest 25-hydroxycholecalciferol levels were demonstrated among school girls aged 12-15 years in Riyadh.²⁴ Bone mineral density (BMD) of apparently normal Saudi adolescents aged 13-16 years was lower than that of Caucasian Americans especially females.²⁵ Not all of our patients had low 25-hydroxycholecalciferol levels. Therefore we think that the etiology of adolescent rickets or low bone mineral density is multi-factorial including low vitamin D resulting from inadequate exposure to sun, low calcium intake and reduced physical activity. In some recent studies from South Africa²⁶ and Nigeria²⁷ rickets mainly resulted from dietary calcium deficiency. We are currently undergoing more detailed dietary studies among our patients to analyze their calcium intake. Our overall impression is that the calcium intake among adolescent Saudis is very poor. Active health education should be made at schools and community level to improve on calcium intake, more exposure to sun and exercises.

Our experience with thyroid disorders was published elsewhere.³ In this study, Hashimoto's thyroiditis was the most common cause of goitre. Since we used radio-iodine in one of the cases shown in this series, we started to use radiotherapy more frequently in our clinic than we used to do before. The incidence of thyroid tumors and carcinoma varies from one country to another and thyroid carcinoma is perhaps less frequently encountered in Saudi Arabia among this age group compared to USA. In 4 published series on thyroid malignancy in Saudi Arabia, malignancy was rarely encountered among this age group.²⁸⁻³¹ No case of thyroid malignancy was seen in our study group. However the number is too small to draw a conclusion.

The subject of diabetes mellitus and its problems during puberty is well reviewed elsewhere.³²⁻³⁴ By establishing this clinic we learned a lot about these problems particularly issues related to the local culture and environment. We are now quite convinced that adolescent diabetics should never be seen in the crowd of adult diabetology clinics nor with young children. Practically all our patients are enjoying having a separate clinic and of being looked after by a team. Details of the outcome of our management will be addressed in the future.

Lastly, over the last recent decades it became evident that gynecological disorders of children and adolescents warrant more attention than had been formerly devoted to them.⁵ These disorders might sometimes become difficult to diagnose and treat. This is where a complete cooperation between various disciplines including endocrinology and gynecology is needed. As seen in the clinic's problem list, possibly for cultural reasons, most of adolescent females with menstrual and other gynecological

problems were not at the moment primarily referred to adolescent clinic, but sent to gynecologist or adult physicians nevertheless we learned a lot and also contributed to solving these problems through the combined hospital endocrine team meetings.

In conclusion, we believe that in this country active steps should be taken to give special health care to adolescents both at in patient and out patient levels. Until adolescent subspecialty physicians become available, family physicians and school health physicians should be trained to give these services at general primary care levels. Relevant subspecialty services should also be made available at the secondary and tertiary care centers. For endocrinology, we strongly believe that pediatric endocrinologists are the most suitable to offer this service. However, such service would never be successful without cooperation between various disciplines.

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