

**Epidemiology and clinical characters of
congenital adrenal hyperplasia patients
attending Endocrinology Clinic at Cairo
University Children's Hospital**

Thesis

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Abstract

Congenital adrenal hyperplasia (CAH) is one of the most frequent inborn endocrine disorders; it comprises autosomal recessive disorders of cortisol biosynthesis in the adrenal gland caused by various enzyme deficiencies. Because of paucity of epidemiological data of CAH in developing countries, this study aimed to identify clinical characters, laboratory parameters and treatment outcomes of CAH in Egyptian children. This is a retrospective study covering 180 patients attended the Diabetes Endocrine Metabolic Pediatric Unit at Cairo University Children's Hospital being a referral center for all Egyptian governorates. Demographic data, clinical examinations, laboratory and radiological investigations and treatment options are obtained from the files of patients and analyzed. The results of this study showed that deficiency of 21-hydroxylase is by far the most common cause of CAH, corresponding to more than 90% of our cases. However, 3 β -hydroxysteroid dehydrogenase deficiency represents 8%. Salt wasting form accounts for more than 80% of cases followed by simple virilizing then non classic form. Parental consanguinity was found in 62% of cases. Genital ambiguity was the most common presentation followed by salt losing symptoms and signs then premature pubarche manifestations. Our study indicates that newborns with developmental anomalies of the external genitalia should be diagnosed as early as possible so that medical, psychological, and social complications are minimized.

Keywords: CAH, Intersex, 21-hydroxylase deficiency.

بسم الله الرحمن الرحيم

وقل رب زدني علما

صدق الله العظيم
طه ١١٤

In the Name of ALLAH, The Most Beneficent, The Most Merciful

« **And say: My Lord, Increase me in knowledge** »

Tâ-Hâ 114

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Praise be to ALLAH, Lord of world, and may HIS blessings & peace be upon Muhammad, HIS servant and HIS messenger.

"First of all, I am deeply thankful to GOD by the grace of whom this work was possible"

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Reham Mohammad Alfergany
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To the soul of my father
To my devoted mother
To my dear husband
To my darling kid

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List of abbreviations

11OHD = 11 β -Hydroxylase Deficiency
17OHD = 17 α -hydroxylase deficiency
17OHP = 17 Hydroxyprogesterone
17Preg = 17-Hydroxypregnenolone
21OHD = 21-Hydroxylase Deficiency
3 β HSD = 3 β -Hydroxysteroid Dehydrogenase
3 β HSDD = 3 β -Hydroxysteroid Dehydrogenase Deficiency
ABS = Antley–Bixler syndrome
ACTH = Adrenocorticotrophic hormone
AMH = Anti-Mullerian Hormone
AR = Androgen Receptor
ARR = Aldosterone - Renin Ratio
BA = Bone Age
BMD = Bone Mineral Density
BMI = Body Mass Index
BP = Blood pressure
C4A & C4B = complement 4 A & B genes
CAH = Congenital Adrenal Hyperplasia
CaM = Calmodulin dependent protein
cAMP = cyclic Adenosine MonoPhosphate
CPP = Central Precocious Puberty
CRH = Corticotropin Releasing Hormone
CVS = Chorionic Villus sampling
CYP = Cytochrome P450 enzyme
DEMPU = Diabetes Endocrine and Metabolism Pediatric Unit
DHEA = Dehydroepiandrosterone
DHEAS = Dehydroepiandrosterone Sulphate
DNA = Deoxyribonucleic acid
DOC = Deoxycorticosterone
DSD = Disorder of Sex Development
DXM = Dexamethasone
EIA = Enzyme-linked Immunosorbent Assays
FAD = Flavin Adenine Dinucleotide
FAH = Final Adult Height
FGFR2 = Fibroblast Growth Factor Receptor 2
FGFR2 = Fibroblast Growth Factor Receptor 2
FH = Final Height
FIA = Fluoroimmunoassays
FMN = Flavin Mono Nucleotide
FSH = Follicle Stimulating Hormone
GA = Genital Ambiguity

GC = Gas Chromatography
GC = Glucocorticoid
GH = Growth Hormone
GnRH_a = Gonadotropin Releasing Hormone analogue
HbA_{1c} = glycosylated hemoglobin A1
HC = Hydrocortisone
HLA = Human Leucocyte Antigens
HPA = Hypothalamic-Pituitary-Adrenal
HSD3B1&HSD3B2 = Hydroxysteroid Dehydrogenase3B1&2 genes
ICU = Intensive Care Unit
IVF = In-vitro Fertilization
LC = Liquid Chromatography
LDL = Low Density Lipoprotein
LH = Luteinizing Hormone
LHRH = Luteinizing Hormone Releasing Hormone
MPH = Mid-Parental Height
MS = Mass Spectrometry
NADPH = Nicotinamide Adenine Dinucleotide Phosphate
NC = Non Classic
NC21OHD = Non Classical 21-Hydroxylase Deficiency
ORD = Oxidoreductase Deficiency
PACAP = Pituitary Adenylate Cyclase-Activating Polypeptide
PCOS = Polycystic Ovarian Syndrome
PCR = Polymerase Chain Reaction
POR = P450 Oxidoreductase
Por gene = P450 Oxidoreductase gene
PRA = Plasma Renin Activity
RIA = Radioimmunoassay
RP1 & RP2 = putative nuclear protein 1 & 2 genes
SDS = Standard Deviation Score
SRY = Sex-determining Region on the Y chromosome
StAR = Steroidogenic Acute Regulatory protein
START domain = StAR-Related Transfer domain
SV = Simple Virilising
SW = Salt Wasting
TART = Testicular Adrenal Rest Tumors
TH-SD = Target Height – Standard Deviation
TNXA & TNXB = tenascin-X A & B genes
VIP = Vasoactive Intestinal Polypeptide
XA & XB = tenascin-X A & B genes

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AIM OF THE WORK

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Congenital adrenal hyperplasia (CAH) is one of the most frequent inborn endocrine disorders; it comprises autosomal recessive disorders of cortisol biosynthesis in the adrenal gland caused by various enzyme deficiencies. The consequent compensatory rise of ACTH production causes hyperplastic growth of the adrenal glands. The clinical presentation of patients with CAH is heterogeneous and depends on the type of deficient enzyme as well as on the sex of the patient.

Because of paucity of epidemiological data of CAH in developing countries, this work aimed to identify clinical characters, laboratory parameters and treatment outcomes of CAH in Egyptian children who have attended the Diabetes Endocrine and Metabolism Pediatric Unit (DEMPU) at Cairo University Children's Hospital being a referral center for all Egyptian governorates.

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