

# GROWTH PARAMETERS AMONG SAUDI CHILDREN ATTENDING HEALTH CARE CENTER OF KFU, ALHASSA, SAUDI ARABIA. IS THERE DEVIATION FROM NORMALITY?

Amjad Alhathlul, Bayan Alsultan, Noor AlBaloushi, Sara AlOmaid

**Abstract— Background:** The assessment of growth in children is important for monitoring health status. Growth charts have been used for at least a century to screen for potentially inadequate growth.

**The aim of this study:** is to look at growth parameters of normal children at our university health center.

**Material and methods:** This study type is a prospective, descriptive study. In primary health care center of KFU, Alhassa, KSA. It is based on assessment of growth parameters especially weight and height of healthy children attending health center.

**Results:** A total of 47 healthy children from birth to 11 years of age were included in this study. There were 25 males, their mean age (3.1±2.5), and 22 females, their mean age was (4.8±3.6). Most of Females height parameters were located between 25<sup>th</sup> – 75<sup>th</sup> percentiles. All male height centile were located above 75<sup>th</sup> centile. Regarding the weight, male and female were equally located between 25<sup>th</sup> – 75<sup>th</sup> centile, but we noticed that there was leaner growth pattern in weight parameter between the ages of 2 to 12 months in both male and female. Male had tendency to be taller than female in all ages.

**Conclusion:** Growth patterns over time using multiple data points must be used in conjunction with other medical and family history to evaluate appropriate growth. Training on accurate measurements techniques, especially for recumbent length, is critical for any assessment to be valid.

**Key words:** Growth charts, Growth parameters, and Saudi children.

## I. INTRODUCTION

Understanding children's growth is important to understand the child's physical condition. If the growth is either poor or rapid it can lead to different health problems, such as obesity or cardiovascular disease. So understanding growth can be a primary prevention of disease.<sup>1</sup>

The assessment of growth in children is important for monitoring health status, identifying deviations from normality and determining the effectiveness of interventions. The significance of timely detection of poor growth in early life resides in its association with adverse functional consequences,

including poor cognition and educational performance, low adult wages, lost productivity and, when accompanied by excessive weight gain later in childhood, increased risk of nutrition-related chronic diseases.<sup>2</sup>

Growth parameters in the form of weight-for-age, height-for-age, weight-for-height, head circumference, and body mass index (BMI) are important tools for assessing growth of children and adolescents. Sex-specific growth charts for each growth parameter are available for children and adolescents from the United States and the United Kingdom.<sup>3</sup>

Growth charts have been used for at least a century to assess whether a child is receiving adequate nutrition and to screen for potentially inadequate growth that might be indicative of adverse health conditions.<sup>4</sup>

Up to lately, many countries used charts and tables based on the references of 1978 National Center for Health Statistics (NCHS) to assess and supervise growth. NCHS references had several limitations. Therefore, the World Health Organization (WHO) initiated a global multicenter growth reference study and the WHO growth standards were released in 2006.

Based on analysis of these Saudi children and adolescents, the difference in growth between boys and girls was not uniform but depended on age. However, the pattern was remarkably consistent across all growth parameters and appears to reflect the timing of maturation between boys and girls.<sup>3</sup>

As the use of growth charts in assessing the growth in children in some health centers is not predicted till now. The aim of this study is to look at growth parameters of normal children at our university health center.

## II. MATERIAL AND METHODS

Our study type is a prospective, descriptive study. We conducted our study in primary health care center of KFU, Alhassa, KSA. It will be from March to April 2014. The study is based on assessment of growth parameters especially weight and height of healthy children attending health center. We exclude premature children, twins and children with chronic diseases. First, we will measure the height and weight of the children. Second, a questioner will be distributed among nurses and doctors to assess their using of growth charts and its significance. After that, Data will be collected and statistically

analyzed with the SPSS program, version 22. Also, data will be plotted on normal growth charts for Saudi children. Then, we will compare it with the normal growth chart of normal Saudi children.

### III. RESULTS

A total of 47 healthy children from birth to 11 years of age satisfied the criteria for growth measurements. After analysis, there were 25 boys and 22 girls all attending the primary health care center.

**Table (1)** shows the mean and standard deviation of age, height and weight for both male and female. The pattern of variation on the main growth parameters in male children from birth to 11 years of age, for height was shown in (**Figure 1.1**) where most of female children in different age groups were located between 25<sup>th</sup>-75<sup>th</sup> percentiles. The highest values of growth parameters were noticed at the ages of one year, 6,7,9 and 11 years. The lowest percentile in height was below the third centile at the age of one year. In this age it was noticed that most of children were located from the 75<sup>th</sup> to the 90<sup>th</sup> percentile. While in males they tend to be taller in all age groups. Their height is located from the 75<sup>th</sup> to the 90<sup>th</sup> percentile and at certain ages they exceed the 90<sup>th</sup> centile (**Figure 1.2**). The pattern of Weight for both males and females were shown in (**Figure 1.3,4**). The weight of both males and females were correlated with their height. The peak weight centile value was also in the same ages of height for both genders. While in female the highest weight centile (90<sup>th</sup> – 97<sup>th</sup>) was located at 3, 6 and 8 years. On the other hand, the lowest centile (10<sup>th</sup> – 25<sup>th</sup>) was at 4 months, 2 and 5 years.

Figure 2 shows the differences of the number and percentage of cases of both males and females in the measurement of weight percentile. It shows that the highest weight percentile in female is between 75th-50th and between 90th-75th in male. Their height was represented in Figure 3. It also shows the same as weight.

Table (1): Mean & Standard Deviation Of Age, Weight And Height Of Studied Group

Gender/mean± SD	Age (year)	Height (cm)	Weight (kg)
Male	3.1±2.5	97.6±19.8	15.8±7.4
Female	4.8±3.6	105.6±30.2	19.7±11.4

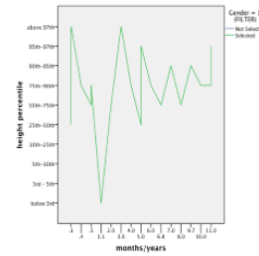


Figure 1.1 pattern of height as regard to age in females

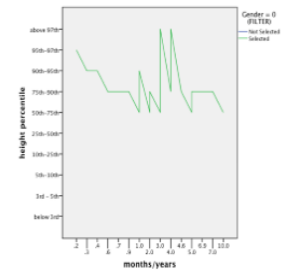


Figure 1.2 pattern of height as regard to age in males

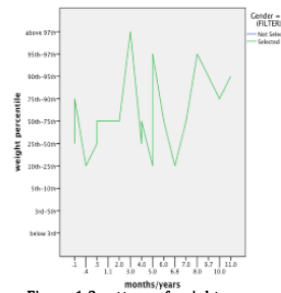


Figure 1.3 pattern of weight as regard to age in females

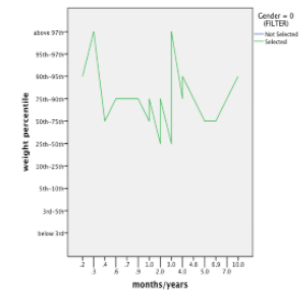


Figure 1.4 pattern of weight as regard to age in males

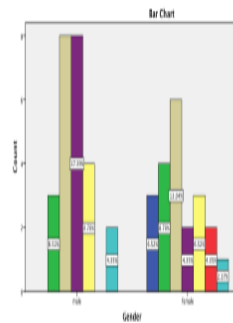


Figure 2: Percentage Of Males & Females Children According To Their Weight Percentile

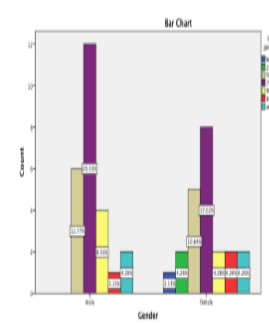


Figure 3: Percentage Of Males & Females Children According To Their Height Percentile

### IV. DISCUSSION

Normal growth is the progression of changes in height, weight, and head circumference that are compatible with established standards for a given population. The progression

of growth is interpreted within the context of the genetic potential for a particular child.<sup>3</sup> The accurate measurement and charting of growth may prevent unnecessary evaluation or intervention in a child who has a normal pattern of growth.<sup>7</sup> Clinicians need to seek out the causes for poor growth and propose changes accordingly. For example, poor weight gain might result from neglect, substantial morbidities or medical problems that need urgent attention.<sup>4</sup>

In our study we notice that boys were consistently taller than girls this is agreed with Al-Frayh, et al: 1993)<sup>6</sup> who indicated that Saudi boys were slightly taller than Saudi girls during their first year of age. But girls after that tend to be taller than boys. While he restricted this to the first year of age that is against our study which indicated in all age groups. Another study also reported from Saudi Arabia that was done by (El Mouzan et al: 2010)<sup>3</sup> agrees with our present results and shows that boys are taller than girls from birth to 3 years of age. This is explained by the fact that our research is done on a sample of children from birth to adolescence.

It is noticed that there is linear growth parameters at 50th-75th centile at the ages from 4 to 6 month of life in both males and females infant. The linear growth rate shifts during the first two years of life in nearly two-thirds of normal infants. Shifts in growth rates were very common for children from birth to 6 months of age, somewhat less common for children 6 to 24 months of age, and least common for children 24 to 60 months of age.<sup>8</sup>

The strength of our study that it was done in the university health center to ensure that other factors affecting growth were the same in all studied groups such as, socio economic status and educational status for the parents. Other studies were done in different health centers that will necessitate fixation of these factors during this study.<sup>8</sup>

A potential limitation that faced us during our study was the small number of children that may affect our statistical analysis. Also we faced another limitation, which was the short duration of the time availability.

#### V. CONCLUSION

Growth patterns over time using multiple data points must be used in conjunction with other medical and family history to evaluate appropriate growth. Training on accurate measurements techniques, especially for recumbent length, is critical for any assessment to be valid.

#### VI. RECOMMENDATION

Our recommendation is to do more researches about the benefits of growth monitoring, the optimal frequencies of it and to assess the prevalence of the usage of growth charts for growth monitoring in various health care centers. Other recommendations are to increase the sample size and study other factors that may affect the growth of children.

#### VII. ACKNOWLEDGMENTS

We are grateful and thankful for those who helped us and cooperated with our research.

We present our biggest thanks to our mentor Dr. Gihan Yousef, who devoted her time to guide us during each step of our research and who supported us. We also thank Dr. Khaled Alahmed and Dr. Ibtissem Alklifi pediatric physician in health center for welcoming us in their clinics and for allowing data collection. Our final thanks is for our parents for their continues support.

#### REFERENCES

- 1) Lucas A. , Makrides M. , Ziegler E.E. : Importance of growth for health and development, Nestlé Nutrition Institute Workshop, Pediatric Program, Kuala Lumpur, March 2009, Vol.65
- 2) De Onis M, Onyango AW , Borghi E , Siyam A, Blo'ssner M, Lutter C : Worldwide implementation of the WHO Child Growth Standards, Public Health Nutrition, February,2012.
- 3) El Mouzan M, Al Herbish A, Al Salloum A, Foster P, Al Omar A , Qurachi M, Kecojevic T : Pattern of Sex Differences in Growth of Saudi Children and Adolescents, GENDER MEDICINE, 2010,VOL. 7, NO. 1
- 4) Grummer-Strawn L, Reinold C, Krebs N : Use of World Health Organization and CDC Growth Charts for Children Aged 0–59 Months in the United States, Morbidity and Mortality Weekly Report, 2010, Vol. 59 , No. RR-9.
- 5) Ahmad UN, Yiwombe M, Chispo P, Cole TJ, Heikens GT and Kerac M. Interpretation of World Health Organization growth charts for assessing infant malnutrition: A randomised controlled trial. Journal of Paediatrics and Child Health 50 (2014) 32–39.
- 6) Al-Frayh AS, Bamgboye EA, Moussa MA. The standard physical growth chart for Saudi Arabian preschool children. Ann Saudi Med. 1993;13:155-159
- 7) Lifshitz F, Cervantes CD. Short stature. In: Pediatric Endocrinology, Lifshitz F (Ed), Marcel Dekker, New York 1996. p.3.
- 8) Mei Z, Grummer-Strawn LM, Thompson D, Dietz WH, SO Pediatrics. 2004;113(6):e617.