

**Risk Factors of Stunting among a Group of Egyptian
Adolescents attending Stunting Outpatient Clinic of the
National Nutrition Institute in Cairo**

Thesis submitted for partial fulfillment of MD in Public
Health by

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﴿بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ﴾

يَا أَيُّهَا النَّاسُ إِن كُنْتُمْ فِي رَيْبٍ مِّنَ الْبَعْثِ فَإِنَّا خَلَقْنَاكُمْ مِّن تُّرَابٍ ثُمَّ مِّن نُطْفَةٍ
ثُمَّ مِّن عَلَقَةٍ ثُمَّ مِّن مُّضْغَةٍ مُّخَلَّقَةٍ وَغَيْرِ مُخَلَّقَةٍ لِّنَبِّئَنَّ لَكُمْ وَنُقَرُّ فِي الْأَرْحَامِ مَا نَشَاءُ
إِلَى أَجَلٍ مُّسَمًّى ثُمَّ نُخْرِجُكُمْ طِفْلًا ثُمَّ لَتَبَلُّغُوا أَشُدَّكُمْ وَمِنْكُمْ مَّن يُّتَوَفَّى وَمِنْكُمْ مَّن
يُرَدُّ إِلَى أَرْدَلِ الْعُمُرِ لِكَيْلَا يَعْلَمَ مِّن بَعْدِ عِلْمٍ شَيْئًا وَتَرَى الْأَرْضَ هَامِدَةً فَإِذَا
أَنْزَلْنَا عَلَيْهَا الْمَاءَ اهْتَزَّتْ وَرَبَتْ وَأَنْبَتَتْ مِّن كُلِّ زَوْجٍ بَّهِيجٍ ﴿٥﴾

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List of abbreviations:

EDHS: Egypt Demographic and Health Survey.

RDA: Recommended Daily Allowance.

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Introduction

Stunting is defined identically in childhood and during adolescence as height less than -2 Z scores below that expected on the basis of the international growth reference (WHO technical report series 1995, World bank 2006).

Twenty nine percent of Egyptian Children under the age of five are stunted. National averages , however , obscure vast regional differences in stunting prevalence. The stunting rate for children in urban Upper Egypt is 22.7% while that for children in urban lower Egypt is nearly twice as high (39.3%) (El Zanaty and Way ,2009)

The prevalence of stunted children in Egypt has increased from 17.6% (2005) to 28.9% (2008) in the last few years. This would mean that 2.7 of the 9.2 million children under the age of five in 2009 are affected by growth retardation. Additionally, 33% of the school age population, representing 7.4 million children, and 41% of the working age population, representing 20.4 million people, are also suffering from the consequences of childhood stunting. (World food program, 2013)

This high and increasing level of stunting and substantial micronutrient deficiencies among young children, coexists with growing levels of overweight and obesity among adolescents and adults, especially girls and women (EDHS, 2005 and 2008).

Over 6 million people lack direct access to water at the household level and a similar number lack improved sanitation services (El Zanaty and Way, 2009).

A study was done in Cairo , El Marg district showed that 34.1% of preparatory school students were stunted and 73.6% of them were found in public schools. (El-Moselhy et al. , 2011)

Studies of the determinants of linear growth have focused largely on the period before the age of 5 years . However, little is known about the influences of early-life exposures on linear growth during school age, especially in low- and middle-income countries. Understanding these influences would provide information about whether the adverse impact of early exposures on linear growth will continue throughout childhood or may be reversed. (Barbara H et al ,2012)

The Maternal and Child Under-nutrition Study Group (Victora et al. 2008) reviewed cohort studies from five low-income and middle-income countries: Brazil, Guatemala, India, Philippines and South Africa. The studies involved long-term follow-up of children into late adolescence and adulthood. The study group concluded that small size at birth and childhood stunting were linked with short adult stature, reduced lean body mass, less schooling, diminished intellectual functioning, reduced earnings and lower birth weight of infants born to women who themselves had been stunted as children.

Recent evidence also indicates that children born to women who are stunted have a higher mortality rate than

children of mothers with normal height (Ozaltin et al. 2010).

Research hypothesis and research question:

Most of studies done in Egypt on stunting and mal-nutritional disorders concentrate on the “under five years” children . In the current study attention is paid to adolescence age group. This period of growth is considered critical time in human life so this study aims to withdraw attention to adolescents.

Are the risk factors of stunted growth during period of adolescence different from risk factors of stunted growth during infancy and childhood? Is stunting reversible during period of adolescence or not ?

Aim of the work

Goal :

To improve health of Egyptian children and adolescents.

Specific objectives:

- 1- To identify risk factors of stunting among a group of adolescents (10-15 years old) attending stunting clinic, National Nutrition institute in Cairo.
- 2- To compare percentage of other mal-nutritional disorders (eg., anemia and obesity) among two groups (stunted group and a control group) of adolescents.

Physical , psychological and cognitive development in adolescence period

1.1 Definition of adolescence: the period in development between the onset of puberty and adulthood. It usually begins between 11 and 13 years of age with the appearance of secondary sex characteristics and spans the teenage years, terminating at 18 to 20 years of age with the completion of the development of the adult form. During this period, the individual undergoes extensive physical, psychological, emotional, and personality changes.

(Mosby's Medical Dictionary, 2009)

In Egypt, adolescents (10-19 years) constitute 19.5 percent of the population, comprising one fifth of the total population. Therefore comprehensive health care of this section fulfills the health need of 1/5 population. Achievement of optimum growth during this period is of utmost importance in maintaining good health thereafter. (Dambhare et al.,2010) & (US census bureau 2011)

1.2 Normal Physical development:

The period of puberty is usually defined as the physical transformation of child into an adult. An enormous number of changes occur by that time including:

- Sexual maturation
- Increases in height and weight
- Completion of skeletal growth accompanied by a marked increase in skeletal mass
- Changes in body composition

The sequence of these events is the same in all adolescents but there is a great deal of deviation in the time of onset and speed, that's why adolescents of the same age may vary in the external physical appearance. (Stang and Story, 2005)

Normal physical , psychological and cognitive development during adolescence should be understood and well clarified.

The linear growth spurt in *females* begins most commonly between 9.5 and 14.5 years of age. Peak velocity of linear growth takes place approximately 6 to 12 months prior to menarche. While peak velocity of linear growth occurs later in puberty among *males* than among females, most often at 14.4 years of age on average. The greatest rates of linear growth among males coincide with or closely follow testicular development and the growth of facial hair. (Johnson et al.,2009)

It is estimated that *15 to 25% of final adult height is gained during the growth spurt of puberty*. The average increase in height is estimated to be (20.5 cm), with a range of (5-25 cm) seen in most females. During the peak of the linear growth spurt, females gain roughly (8 - 9 cm) per year. On the other hand adolescent males experience increases in height of (10-30 cm) during puberty, with an average of (7 - 12 cm) attained each year. .(Johnson et al.,2009)

The linear growth spurt lasts 24 to 26 months, ceasing by 16.5 years of age in most females. Some adolescent females experience small increments of growth past age 19

years. Linear growth may be delayed or slowed among females who severely restrict their caloric intake.

(Johnson et al.,2009)

In adolescent males linear growth continues throughout adolescence, at an increasingly slower rate, ceasing between 18 and 21 years of age. (Stang and Story, 2005)

Internal changes are of great importance at that time. Recently, neuro-scientific research stated that during early adolescent years , the brain cells almost double in the course of year , with reorganizing emotional, physical and mental abilities. (Johnson et al.,2009)

Girls enter puberty 12-18 months earlier than boys with more advanced course of physical and sexual development.

The frontal lobe, the part of brain which is responsible for reasoning and decision making, develops later and takes longer in boys than in girls .That's why boys' tendency to act impulsively and to be uncritical in their thinking lasts longer than girls.(Johnson et al.,2009)

- **1.3 Psychological development:**

To facilitate the understanding of psychosocial and cognitive development , adolescence is divided into three periods:

- Early adolescence (11-14 years),
- Middle adolescence (15-17 years),
- Late adolescence (18-21 years).

Each of these periods is marked by the group of new emotional, cognitive and social skills

Psychological and biological changes that occur during puberty are like a branching web. Every change can affect the others either positively or negatively. For example , preoccupation with body image is a fundamental task during adolescence. Rapid and dramatic changes in body shape and size can cause a big deal of confusion to the adolescent especially if not well addressed by the family or health professional.(Stang and Story,2005)

In this aspect , girls are different from boys. In girls changes in body image can lead to development of poor body image and eating disorders . Girls in late adolescence are at a greater risk than boys for psychiatric disturbances such as “depression”. This risk is magnified by gender discrimination and abuse. Also girls at that stage are more prone to eating disorders such as “bulimia nervosa” and “anorexia nervosa”. This vulnerability is derived from deep anxiety and worry about body image. On the other hand delay in sexual maturation in boys may lead to lowered self-esteem and poor body image .(Stang and Story,2005)

Peer influence is a key psychological issue during adolescence especially in early stages. This idea was obvious in a focus group discussion that was done in a study in the United States showed that girls classify food they eat into junk food and healthy food. Junk food is associated with having fun and being with friends while