Study of the Prevalence of Rickets among Infants Attending Primary Health Care Centers in Cairo

Thesis

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List of Abbreviations

24HRecall	*24 hour recall*
7DHC	*7-dehydrocholesterol*
AAP	*American academy of pediatrics*
AAS	*Atom absorption spectrophotometer*
ALP	*Alkaline phosphatase*
BMI	*Body mass index*
FFQ	*Food frequency*
Iu	*International unit*
Lt	*Length*
Mcg	*Microgram*
MED	*Minimal erythamatus dose*
Mg/day	*Milligram/Day*
Mmol/l	*Millimole/litre*
Mo	*Month*
Ng/ml	*Nanogram/millilitre*
Nmole/l	*Nanomole/litre*
NR	*Nutritional Rickets*
Pre-D3	*Previtamin D3*
PTH	*Parathyroid hormone*

RDA	*Recommended Dietary Allowance*
S	*Significant*
SD	*Standard deviation*
UV	*Ultraviolet*
VDD	*Vit. D deficiency*
Wk	*Week*
Wt/Lt	*Weight/Length*

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Introduction

Rickets is a disease of growing bones where defective mineralization occurs in both bone and cartilage of epiphyseal growth plate. The condition is associated with biochemical abnormalities, bone deformities, developmental delays, impaired growth and sometimes even seizures (in the late course of disease) **(Brunner, 2015)**.

Rickets is a potentially devastating condition, as affected children can experience delays in learning to walk, fractures and crippling deformities. Furthermore, this disease dramatically increases the risk of pneumonia, which is a condition that contributes significantly to childhood mortality in developing regions of the world **(Brunner, 2015).**

Rickets is a disruption in the pathway of either vitamin D or phosphate metabolism **(Plotkin et al., 2014).**

There are risky groups for rickets e.g.: dark skinned infants who live at higher altitude and infants born to vitamin D deficient mothers, presence of nonspecific symptoms like poor growth, gross motor developmental delay and unusual irritability, chronic kidney disease, hepatic failure ,mal absorption syndromes. Children who receive medications like anticonvulsants, glucocorticoids, AIDS medications and antifungals (ketoconazole), also obese children **(Holick et al., 2011).**

Vitamin D deficiency is considered the most common nutritional deficiency and also one of the most common undiagnosed medical conditions in the world **(Holick, 2012).**

Rickets, once thought defeated, is reappearing and remains a major health problem in many developing and developed countries **(Plotkin et al., 2014)**.

In Middle East although majority of population lives in areas receiving ample sunlight throughout the year, vitamin D deficiency is very common in all the age groups and both the sexes across the country **(Marwaha and Sripathy, 2008; Harinarayanan and Joshi, 2009).**

Limited sunlight exposure, exclusive or prolonged breastfeeding without vitamin D supplements, gestational vitamin D deficiency and low socioeconomic status have a key role in the pathogenesis of nutritional rickets **(Baroncell et al., 2008).**

Rickets is most common in children who are between 6 and 36 months old. During this time period, children usually experience rapid growth. This is when their bodies need the most calcium and phosphate to strengthen and develop their bones **(Cafasso, 2012).**

Aim of The Work

The aim of the work is to determine the prevalence of rickets in Egyptian infants in Cairo at the age of 9 and 18 months of age.

Rickets

Definition

Rickets is a term applied to an abnormality of growing bones related to a failure of normal mineralization. The essential bone lesion is an accumulation of excess osteoid tissue owing to lag in the mineralization of the cartilaginous epiphyseal plate **(Kelly and Levine, 2010).**

Normal bone growth and mineralization depends on the availability of adequate calcium and phosphate **(Pitt, 1991).**

Etiology

While some cases relate to hereditary syndromes, renal cause, or use of medication, rickets, the state of vitamin D deficiency, has reemerged as a potential problem **(Rajakumar et al., 2007).**

Vitamin D deficiency is observed among breastfed infants at one end with dietary calcium deficiency in older children at the other end. Between these two extremes, it is likely that vitamin D insufficiency and decreased calicum intake or high phytate intake combine to induce Vitamin D deficiency and rickets, which may be the most frequent cause of rickets globally **(Pettifor, 2004).**

Classification

Rickets may conveniently be classified in to:

1) Calciopenic rickets can result from inadequate vitamin D, defective utilization of vitamin D or inadequate calcium and includes:

- ❖ Nutritional vitamin D deficiency
- ❖ Calcium deficiency
- ❖ Vitamin D deficiency secondary to :
- Malabsorption
- Antiepileptic drug therapy
- Chronic renal failure
- Liver failure
- Distal renal tubular acidosis
- 25 hydroxylase deficiency in liver (rare)
- Vitamin D resistant rickets

2) Phosphopenic rickets is not common, but occurs in special situations :

- ❖ Low phosphorous intake
- ❖ Prematurity/ Total parenteral nutrition
- ❖ Renal phosphate wasting
- ❖ Proximal renal tubular acidosis
- ❖ Fibrous dysplasia
- ❖ Oncogenic hypophosphataemic rickets
- ❖ •Hereditary hypophosphataemic rickets:
- X -linked dominant (XLH)

- Autosomal dominant
- Autosomal recessive
- Hereditary hypophosphataemia with hypercalciuria (HHRH) **(Atapattu, 2013).**

The most frequent cause is vitamin D deficiency, which may arise from poor diet, lack of sunlight, malabsorption of fat soluble nutrients.

There are several types of cells constituting the bone. Osteoblasts are bone forming cells which lay down osteoid. Osteoclasts help in bone remodeling. Osteoid is subsequently mineralized by calcium salts. In rickets, the mineralization defect leads to the accumulation of osteoid in the bone tissue below the growth plate (metaphysis). This leads to weak bones and bowing over a period of time **(Sahay and Sahay, 2012).**

Nutritional rickets (NR) is still the most common form of growing bone disease despite the efforts of health care providers to reduce the incidence of the disease. Among the factors responsible for the high prevalence of Vitamin D deficiency (VDD) in developing countries and its resurgence in developed countries is limited sunshine exposure due to individuals' spending more time indoors (watching television and working on computers) or avoiding sun exposure intentionally for fear of skin cancer. Traditional clothing (covering the entire body except the face and