



**Risk Factors Associated with Rickets Among
Gaza Children Under Three Years Old, A clinic
Based Case Control Study.**

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Abstract



The aim of this study is to identify rickets risk factors and provide a baseline information for the development and implementation of appropriate prevention programs in Gaza area.

A clinic based case control study was carried out at El-Sheikh Radwan clinic (a referral health facility catering for children from Gaza Strip for rickets). The study population constituted of 86 cases (6-36 months) and 172 healthy child matched with cases for sex, age and locality.

Data was collected through a self constructed structured questionnaire administered to subjects' parents at their houses. Response rate was as high as 86%. Factors strongly associated with rickets as identified by the study were mother education, maternal age at first delivery, parity more than five, and short interval between pregnancy. Moreover, pregnancy disorders, breast-feeding, late introduction of complementary feeding and late weaning were associated with rickets. More importantly, lack of sunlight exposure, and inadequate vitamin D supplementation during infancy were associated with rickets.

The study contributes in highlighting rickets risk factors providing hints for implementing strategies that could contribute in prevention of rickets. These preventive measures include; socioeconomic, dietary, maternal, health and health education and housing dimensions as well as and vitamin D supplementation.

ملخص الدراسة

إن هدف هذه الدراسة هو تحديد عوامل الخطر المصاحبة لداء الكساح بين الأطفال دون سن الثالثة في محافظات قطاع غزة والإسهام في تطوير قاعدة معلومات تساعد في برامج الوقاية والمكافحة الملائمة لهذا المرض.

خلفية الدراسة:

مع بداية العقد السابع من القرن العشرين أصبح داء الكساح قابلاً للوقاية منه وذلك بإضافة فيتامين "د" للمستحضرات الغذائية للأطفال. منذ ذلك الحين اعتبر داء الكساح نادراً وبخاصة في البلدان الصناعية. وفي السنوات الأخيرة تم تسجيل أعداد متزايدة من الحالات لدرجة أن الداء أصبح من المشاكل الصحية المتفشية بين الأطفال في البلدان المتقدمة والبلدان النامية على حد سواء. ومحلياً وطبقاً لتقارير وزارة الصحة الفلسطينية لازال داء الكساح يسجل حالات جديدة، حيث بينت دراسة محلية أن نسبة حدوث المرض مرتفعة في غزة (12.5٪).

من هذا المنطلق ترجع أهمية هذه الدراسة للإسهام في الكشف المبكر ومنع الإصابة بالداء ومكافحته لمنع بعض التعقيدات الناجمة كالفسور والالتهابات التنفسية علاوة على ذلك، يسبب المرض عاهات وتقوساً في العظم الطويل وأيضاً يؤدي المرض إلى تأخر النمو الطبيعي للجسم.

علاوة على ذلك هناك بعض الخلاف بين مقدمي الرعاية الصحية ليس فقط بخصوص حجم المشكلة لكن أيضاً بخصوص حقيقة وجود المرض بسبب أن داء الكساح ما زال يعتبره الكثير نادراً جداً في غزة بسبب وفرة الشمس، لذلك فإنهم عادة لا يعيرونه أى اهتمام في الكشف السريري و يبالغون أيضاً في تبسيط الداء.

الأهداف الخاصة:

من أجل تحقيق الهدف العام فإن هذه الدراسة تسعى إلى:

1. استكشاف عوامل الخطر المحتملة التي تسهم في حدوث داء الكساح في غزة وتطوره.
2. فحص العلاقة الارتباطية بين الشروط الاجتماعية والاقتصادية وداء الكساح.
3. فحص العلاقة بين بعض متغيرات الأمومة المختارة وداء الكساح.
4. تقييم العلاقة بين بعض المتغيرات المختارة في صحة الطفل وداء الكساح.

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Chapter 1


Introduction

Globally rickets in infancy and early childhood due to vitamin D deficiency continues to be a problem that has significant effects on children morbidity. Over recent years a wealth of evidence has accumulated documenting that rickets remains a problem primarily in developing countries (Gessner et al, 1997).

Locally, according to MOH records rickets is common and a steady trickle of new cases is still recorded (*field interview*). Although local unframed study has shown high prevalence of rickets (12.5%) in Gaza (Abu Jahal and Kuhil, 1997), there is some controversy among health care professionals not only regarding the magnitude of the problem but also regarding the seriousness of the problem. This could be due to the fact that rickets is still considered so rare especially in Gaza where sunlight abundant and most patients will eventually recover spontaneously. Thereupon, the disease is usually not considered in the clinical routine examination by the majority of local practitioners and continues to be oversimplified and neglected. Therefore, as a part of efforts aiming to provide an adequate database for the control and prevention of rickets in Gaza the author has conducted the study to explore those risk factors contributing in the development of rickets.

1.1. Need for the study:

By the seventh decade of the 20th century, rickets was preventable by adequate supply of children diet with vitamin D (vitamin D fortification). Since that, rickets was considered so rare particularly in industrialized countries. In recent years, rickets has



At a wider scope, the finding and recommendation of this study will hopefully be helpful contribution in prevention and control of rickets in Gaza.

1.2. Objectives:

The overall aim of this study is to identify the possible risk factors associated with and contributing in the development of rickets. The study aims at providing more reliable information for the development of appropriate prevention program.

Specific Objectives:

The objectives of this study were to:

1. Identify the possible risk factors contributing in the development of rickets in Gaza Strip
2. Examine the association between socioeconomic conditions and rickets.
3. Examine the association between selected maternal variables and rickets.
4. Assess the relationships between selected child health variables and rickets.
5. Assess the relationships between infants feeding patterns and rickets.
6. Examine the association between vitamin D supplementation and rickets.
7. Estimate the association between sunlight exposure and rickets.
8. Establish a baseline information in Gaza to enable further needed researches.
9. Conclude recommendations for health providing authority of how best to prevent the disease



1.3. Research Questions:

- 1- What are the risk factors associated with rickets among Gaza children?
- 2- What are the effects of socio-demographic conditions “average income, mothers education, occupation, housing condition” on rickets occurrence?
- 3- Are there association related to child variables such as birth weight, gestational age, feeding patterns and weaning practices, health disorders, sun exposure, vitamin D supplementation and rickets?
- 4- Are there differences between those children of consanguinity marriage couples and rickets?
- 5- Are there associations related to maternal variables such as age at first delivery, interval between pregnancies, pregnancy disorders, sun exposure, nutritional intake and rickets?

1.4. Research presuppositions:

- 1. There are significant differences between cases and controls related to socio-demographic variables, such as parent’s age, education, occupation, monthly income, consanguineous marriage, and housing condition.
- 2. There are significant differences between cases and controls related to maternal variables, such as age at first delivery, number of pregnancy, interval between pregnancy, pregnancy disorders, and maternal nutrition.
- 3. There are significant differences between cases and controls related to selected child health variables, such as birth weight, gestational age, breast feeding and

feeding patterns, complementary feeding, weaning age, health disorders, hospitalization, sun exposure, and vitamin D supplementation.

1.5. Background to the study:

Geography

Gaza Strip is located in the Middle East, to the north of Egypt, the west southern edge of Palestine, and the Mediterranean Sea run along the west side of the Gaza Strip (Appendix 1). Its area comprises of 362 square kilometers. Gaza Strip is 46 kilometer long, from Beit Hanon in the north to Rafah in the south. Its width reaches 5-12 km and an altitude of 0-40 meters above the sea level. It has a subtropical climate with four-distinct season (MOH, 1998).

The Gaza Strip is administratively divided into five Governorates: North, Gaza City, Mid-zone, Khan Younis and Rafah. Within these provinces, there are four towns, eight refugees camps and fourteen villages as it is clear in (Appendix 2).

Demography of the Gaza Strip

Population

According to Palestinian Central Bureau of Statistic (PCBS, 1998) the total population was 1,039,580 including repatriates whom returns after the Peace Agreement between Israeli Government and the Palestinians. Among the population 50.5% are males and 49.5% are females (Appendix 3). The population is a young population, with 50.4% are under 15 years, indicating a high dependency ratio. The Gaza strip has one of the highest birth rate in the world, the Palestinian Bureau of Statistics estimates in its

Chapter 6


Conclusion and recommendations

Over the past decade, several studies have been helped to elucidate the role of vitamin D in the pathogenesis of rickets. Since that time, considerable advances have been made in understanding vitamin D metabolites and the etiology of rickets in children. Despite these advances, rickets is still seen not only in the developing countries but also in industrialized countries. Rickets also remains common in many countries where sunshine is abundant.

A number of risk factors have been associated with the development of the disease among Gaza children were identified; these include socio-demographic, obstetric, extended breast feeding, maternal nutrition, lack of sunlight exposure, maternal and child health disorders and more importantly mothers and children who did not take vitamin D supplementation.

The major conclusion derived from the results is that, the traditional inverse association between rickets and certain socio-demographic variables such as mother literacy rate, household size, housing condition and consanguinity, appear to be common in the area and not only associated with rickets but also with other health disorders. The major policy goal, therefore, should be clearly set and implemented to prevent and improve the situation.

Maternal factors such as adequacy of diet during pregnancy and reproductive behavior (age at childbearing, length of interval between pregnancies, number of pregnancies).




These are factors that generally have an indirect impact on infant's health through their effect on pregnancy outcome. Therefore, efforts to prevent and minimize them simply by providing more and better prenatal care services and concentrate on enhancing the overall quality of mother's life.

Although, some of the rachitic children were exposed to the sunlight and a considerable proportion of cases do not have enough sunlight exposure due to housing condition, and limited access to the sunlight, simple sunlight deprivation alone is unlikely explain the high prevalence of the disease in the community.

Based on the study finding, the negative association of rickets with certain foodstuff such as milk, eggs and cerelac consumption support that dietary factors play a role. Although, the exclusion of fish, meat and other foodstuff naturally rich in vitamin D, could contribute in the development of rickets, this alone does not explain the high prevalence of rickets. Thus, the role of other dietary constituents (food fortification) must be considered.

The pattern of poor health and excessive morbidity associated with rachitic children particularly respiratory tract infection, compared to their counterpart were significantly differing. This should reinforce the concern with many factors associated with rickets and their effects on the present and future health of the children.

The result provides an evidence for the high prevalence of rickets among breast fed infants. However, maternal vitamin D deficiency may be the likely causes of rickets. This can only be known by studying the vitamin D status in a large group of women and their babies. It is unlikely, that this result encourages restriction of breast-feeding rather.



The study revealed a negative association between rickets and vitamin D supplementation. Regardless of the explanation, it appears that a large proportion of physicians do not prescribe vitamin D routinely for breast-fed infants. However, rickets might be avoided with careful attention to the following risk factors; crowded inner indwelling, unusual maternal and child diet, extended breast feeding, maternal and child health disorders, minimal sunlight exposure, and the amount of time spent in direct sunlight as well as the amount of clothing worn. Moreover, occurrence of rickets in infants even in sunny areas like Gaza, encourage to adopt measures to improve maternal and child vitamin D. The measures needed to be directed towards the availability and the use of fortified infants formula, educating mothers to change their attitudes towards family planing, sun exposure and administration of vitamin D supplements to pregnant and nursing mothers as well as infants especially premature ones.

Recommendations

Recently, rickets has reappear and an increase number of cases have been reported. Moreover, it results in several complications such as deformities of the long bone, with sever bowing, interfere with the usual shape and size of the body and inhibit the natural growth and respiratory infection. Therefore, the author proposes several recommendation and the reasons that lies behind them for improving knowledge among health care professionals to eradicate this preventable disease. Since, this is the first substantial study on rickets among Gaza children, thereby, it may increase the awareness of health professional to the presence of this problem.