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Welcome to the MEJIM June of 2011. Our June issue is packed with interesting studies from our region. The journal has accepted two studies about cervical lymphadenopathy in children. The first study explores the diagnostic yield from fine needle aspiration of cervical enlarged lymph nodes. This technique reduces the need for more invasive and costly procedures. The authors, however, recommend that cultures and further histopathological evaluation should be considered if repeated Fine-needle aspiration cytology is non-diagnostic. The second study examined the incidence of tuberculous lymphadenitis among children presenting with persistent cervical lymph node enlargement. The study examined 260 cases and noted the incidence of tuberculous lymphadenitis in thirty children (12%).

We have included two additional studies that examine issues related to diet and overweight. El-Gilany et al assessed the association of gestational weight gain (GWG) on pregnancy outcomes among Saudi women. The study involved 769 women registered for antenatal care at primary health care centers. Maternal weight was measured at each visit and before delivery and gestational weight gain was calculated. The study observed a clear association between mothers with GWG beyond the normal recommended

range and increased risk of adverse pregnancy outcomes. The second study examined whether the new lifestyle of macrobiotics is accepted by the Middle Eastern people and specifically by the Lebanese market and the Lebanese society from the economic perspective. The researcher concluded that a macrobiotic natural foods diet is very economical only if practiced correctly in one's culture and if the "international or super-foods" are less expensive or substituted by local products.

This issue included a study that demonstrates a 30 % *Staphylococcus aureus* nasal carriage incidence and an alarming high resistance to antibiotics among the hospital staff when compared with the community population. Concerns about prophylactic antibiotic and GCSF in prevention of bacterial infection in neutropenic patients with cancer were delineated in a review article. Finally a study from Amman Jordan demonstrated that two-point injection is more efficacious in treatment de Quervain's tendonitis than a single one-point injection.

I hope you will enjoy this issue of MEJIM.

The incidence of tuberculous lymphadenitis among Jordanian children at King Hussein Medical Center

Hashem E. Aqrabawi
Ahmad Abu- Zaid

ABSTRACT

Objective: To estimate the incidence of tuberculous lymphadenitis among children presenting with persistent cervical lymph node enlargement.

Design: A prospective study that was conducted at King Hussein Medical Center over a one year period from January 2008 to January 2009 . The study included all children who were referred to the pediatric infectious disease clinic with cervical lymph node enlargement > 1cm in size and persisting for more than two weeks.

Method and material: Children between the age of three months and fourteen years with cervical lymph node enlargement persisting for more than two weeks were included in the study. Complete blood count, blood film, ESR, U/S and PPD were done for all of them on initial presentation and a management strategy was proposed and followed, in their management.

Results: Two hundred and sixty children presented to the infectious diseases clinic with persistent lymph node enlargement. In one hundred and forty children (53%) the nodes regressed within 2 weeks, in another sixty children (23%) they regressed within 4 weeks. Tuberculous lymphadenitis was diagnosed in thirty children (12%). Twenty children (8%) had lymph node abscess; six children (2%) had Epstein Barr virus infection and four children (1.5%) had Hodgkin's lymphoma on initial presentation.

Conclusion: Tuberculosis is a common cause of cervical lymphadenopathy among Jordanian children. Reactive lymphadenitis is the commonest cause of cervical lymph node enlargement in children. The majority of lymph nodes regress within 4 weeks. Persisting lymph nodes more than 4 weeks warrant histological examination.

Key words: lymphadenopathy, lymphadenitis, tuberculosis

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Introduction

Lymphadenopathy refers to any disease process involving lymph nodes that are abnormal in size and consistency. This condition has multiple etiologies, the most common of which are infection, neoplasia, and autoimmune diseases. Lymphadenitis refers to lymphadenopathies that are due to inflammatory processes. It is characterized by nodal swelling, pain, skin changes, fever, edema and/or purulent collection. In the pediatric age group, most lymphadenopathies are attributable to an infectious etiology, often viral in origin. Enlarged, palpable lymph nodes are common due to reactive hyperplasia of the lymphoid tissue (1).

Cervical lymphadenitis is a common pediatric problem, and most patients with this condition are treated successfully by their primary care physicians. Histological examination and surgical consultation are, however, often required to assist in the diagnosis and treatment of patients who do not respond to initial therapy or in whom there is an index of suspicion for a neoplastic process (2). Despite the frequency of the problem in children, few original studies on the issue are recent. Most of the studies were conducted to define the causative agents.

The aim of this study was to estimate the incidence of tuberculous lymphadenitis among Jordanian children and to evaluate a management strategy based on clinical, laboratory, ultrasonic and histological findings.

Methods

A prospective study was conducted over a one year period from January 2008 to January 2008 at King Hussein Medical Center/pediatric clinic to evaluate children with persistent lymphadenopathy and to estimate the incidence of tuberculous lymphadenitis.

Persistent lymphadenopathy was defined as enlarged lymph nodes (> 10 mm in diameter) and persisting for more than 2 weeks.

The study included all children who were referred from the general pediatric clinic to the infectious disease clinic with

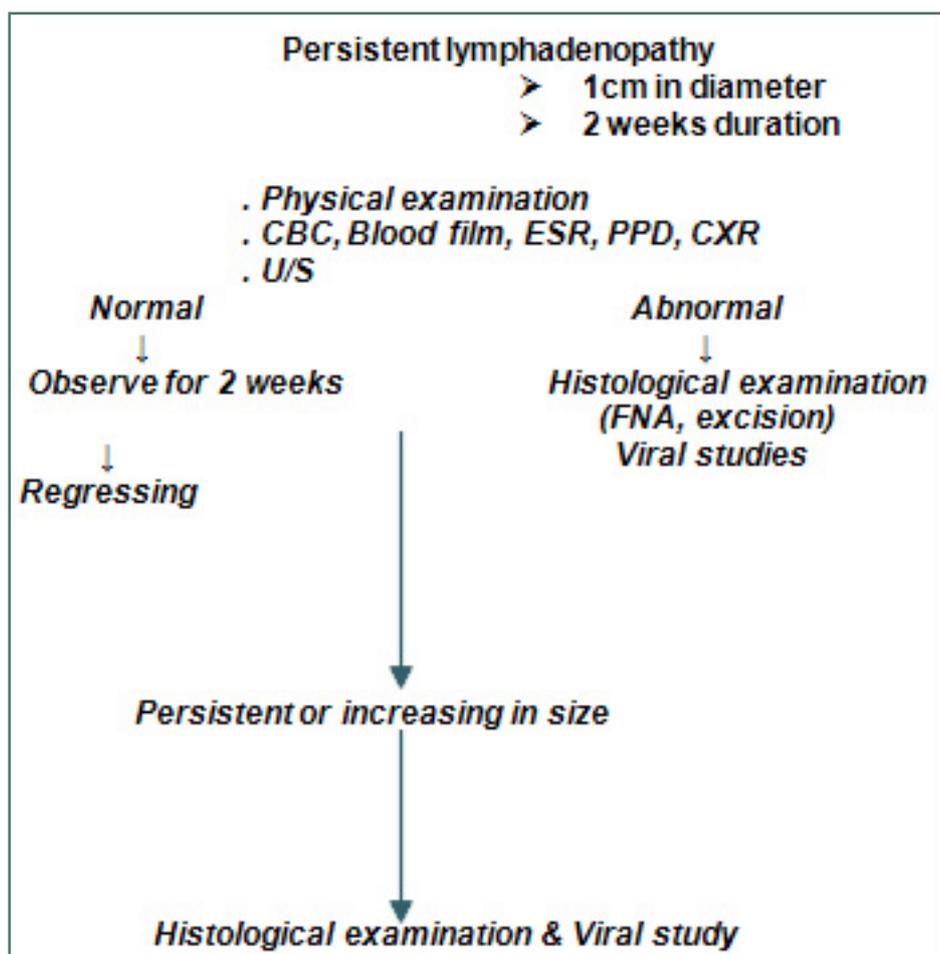


Diagram 1: Suggested management algorithm for children with persistent lymphadenopathy

the diagnosis of persistent lymphadenopathy. Age, gender, and accompanying diseases of the patients were assessed.

Initial work up of all patients included: detailed physical exam, complete blood count, blood film, ESR, PPD, CXR and ultrasonic examination. Viral studies for CMV and EBV, and histological testing by fine needle aspirate (FNA) or excision were preserved for cases with abnormal findings (abnormal WBC count; abnormal blood film; high ESR > 20 ml/hr; PPD > 10 mm in transverse diameter) Diagram 1 above.

Results

Two hundred and sixty children between the ages of 3 months and 14 years were referred to the infectious disease clinic during the specified period of time. All had persistent lymph node enlargement based on our previous definition. One hundred and fifty children (58%) had unilateral cervical lymph node enlargement, while in 110 children (42%) the pathology was bilateral. There was no sex difference.

The jugulodigastric and the submandibular lymph nodes were the two most common enlarged nodes in 80% of children. Submental and anterior cervical accounted for the rest of the pathology (20%). After following the suggested algorithm in the management, we found that in 140 children (53%) the lymph nodes regressed in size over 2 weeks and in 60 children (23%) they regressed within 4 weeks as proved by ultrasonic examination. The FNA showed reactive lymphoid hyperplasia in these 60 children. All of these

children had tender, mobile, and soft nodes on clinical examination. In all of them complete blood count, blood film, ESR and CXRs were normal. Ultrasound showed enlarged lymph nodes with homogenous echo-texture in all of them Figure 1. Fever was the commonest systemic manifestation in these children (77%). Of the remaining 60 children, 20 children (5%) had lymph node abscess on initial presentation based on clinical and ultrasonic findings, and surgical excision was done for them and histological testing confirmed the diagnosis. Tuberculous lymphadenitis was diagnosed in 30 children (12%) based on clinical examination, PPD testing (> 10 mm in transverse diameter) and caseating granuloma on lymph node histology Figure 2,3. The ultrasound showed a non-homogenous echo-texture with necrotic shadows and areas of calcification in these patients - Figure 4. Six children (2%) with bilateral lymph node enlargement and splenomegaly had Epstein Barr virus (EBV) proved by PCR; and four children (1.5%) who had bilateral firm, non-tender lymph node enlargement had Hodgkin's lymphoma on excisional biopsy. These four children had high ESR on initial presentation, and their CXRs showed widened mediastinum with hilar lymphadenopathy - Figure 5.

Table 1 (top next page) summarizes the results.

Figures are on pages 5 -

Diagnosis	Number (%)
Reactive hyperplasia regressed in 2 weeks	140 (53)
Reactive hyperplasia regressed in 4 weeks	60 (23)
Lymph node abscess	20 (5)
Tuberculous lymphadenitis	30 (12)
EBV infection	6 (3)
Hodgkin's lymphoma	4 (1.5)
Total	260

Table 1 Diagnosis of persistent cervical lymphadenopathy in 260 children

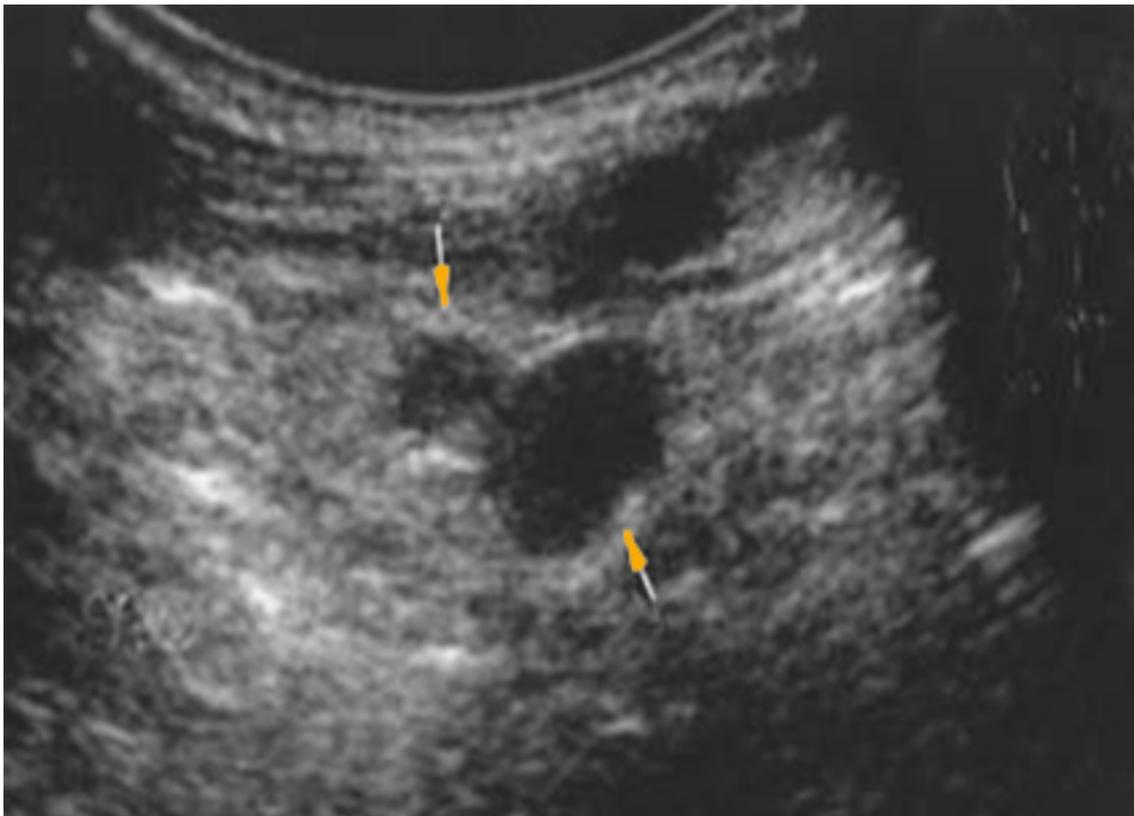


Figure 1: Homogenous echotexture lymph node

Discussion

Cervical lymphadenopathy is a common presentation in children in both the primary care and hospital setting. Park states that 90% of children aged 4 – 8 years have palpable cervical lymph nodes (3). According to Larsson et al 38- 45% of otherwise healthy children have palpable cervical lymph nodes (4).

The differential diagnosis of a persistent neck lump in children is different from adults because of increased incidence of congenital anomalies and infectious diseases and rarity of malignant disorder. In our study we excluded congenital anomalies and limited our research to persistently enlarged lymph nodes. It is widely accepted that the absence of clinical signs of inflammatory disease, negative laboratory testing and progressive reduction of size of lymph node indicates reactive hyperplasia (5). The study indicates that reactive inflammatory changes are the commonest pathology in children as confirmed by other studies. Our observation indicates also that most cases of lymphadenopathy are self-limited and require no treatment. Failure of resolution after 4 weeks might be an indication for diagnostic histology. Most

research indicates that bilateral lymphadenopathy is more likely to be reactive in nature but our study cannot confirm that because in 58% of children enlargement was unilateral (6). Tuberculosis is a common cause of persistent cervical lymphadenopathy among Jordanian children and should always be considered in the differential diagnosis. This could be explained by the high immigrant rate to Jordan in the last decade.

Mobility, softness and tenderness are almost always associated with reactive changes, which is similar to observation by other researchers (7). We found that ultrasound is a valuable diagnostic tool for showing the size, shape and echo-texture of lymph nodes. A homogenous echotexture, oval shape, central necrosis, blurred margins were associated with reactive hyperplasia in most cases, while a non-homogenous echo-texture suggests other diagnoses. Nevertheless ultrasound should not be considered as a definitive means to rule out neoplasia in patients with persistent lymphadenopathy (8).



Figure 2: Tuberculous lymphadenitis in a 7 year old male child



Figure 3: Tuberculous lymphadenitis in a 5 year old male child

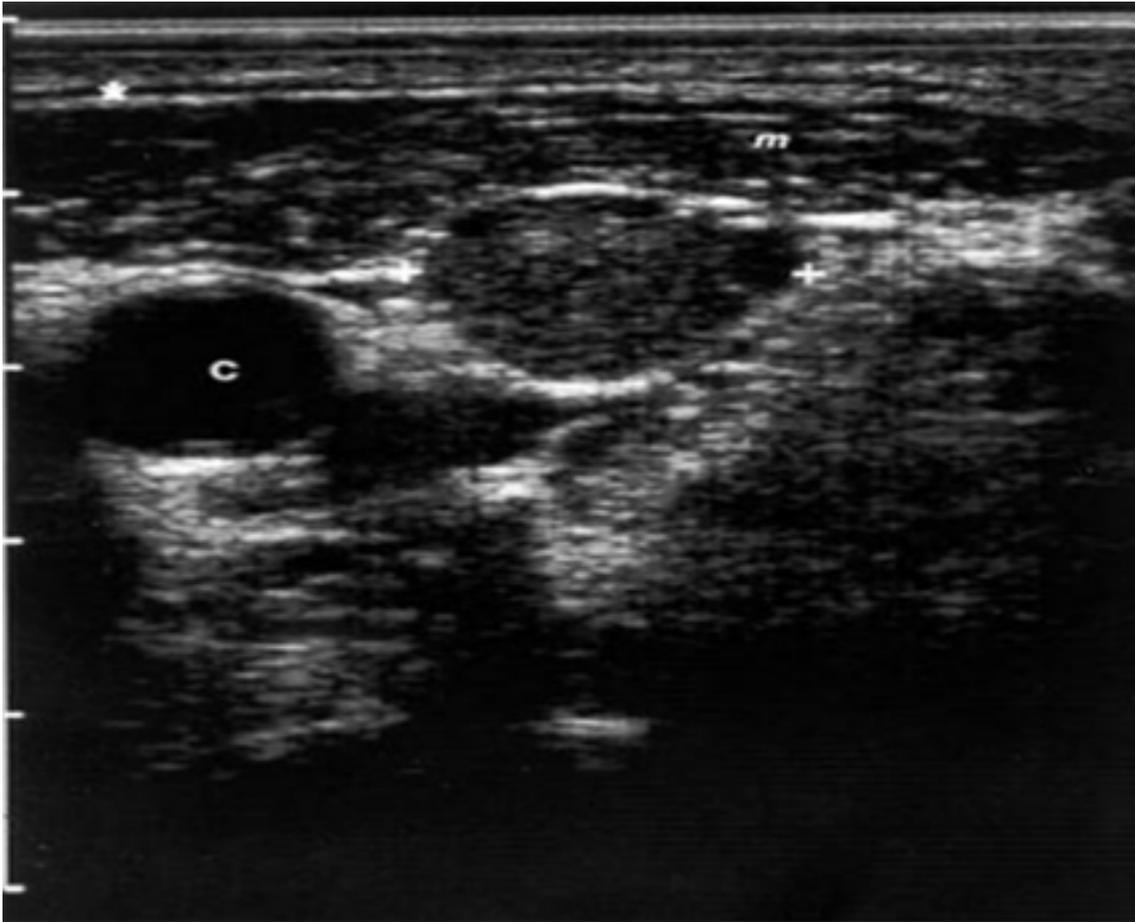


Figure 4: Tuberculous lymph adenitis showing necrosis and calcification

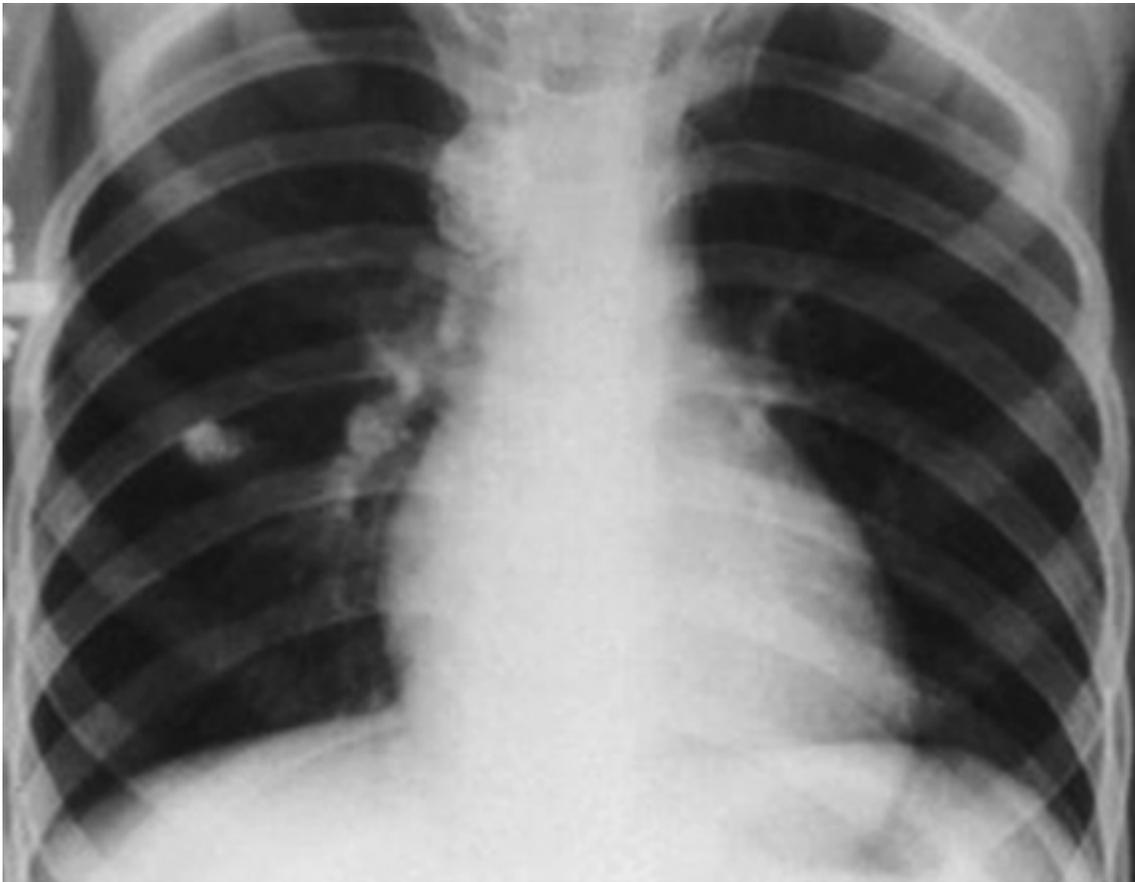


Figure 5: CXR showing hilar lymphadenopathy in a child with Hodgkin's lymphoma

Conclusion

Enlargement of cervical lymph nodes is a common problem in children. Reactive hyperplasia secondary to benign infectious causes is usually the commonest pathology. Most of these cases regress within 4 weeks. Persistent lymph nodes more than 4 weeks warrant histological examination. Tuberculosis is a common cause of cervical lymphadenopathy among Jordanian children, although no previous studies have been done on this issue. A management strategy should be established to diagnose children with persistent lymph node enlargement.

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Clinicopathological Analysis and Role of Fine-Needle Aspiration in Diagnosis of Cervical Lymphadenopathy at Queen Alia Military Hospital

ABSTRACT

Objective: To study the clinicopathological profile of children with cervical lymphadenopathy and the role of fine-needle aspiration cytology.

Methods: This is a retrospective study conducted on 41 children (31 male: 10 female) who attended the pediatric clinic at Queen Alia Military hospital from January 2007 to June 2010, in the age group of 9 months to 14 years.

All subjects were evaluated by history, physical examination, hemo-gram, chest X-ray, Mantoux test, viral screen, fine needle aspiration cytology (FNAC), acid-fast bacillus (AFB) staining, and ultra-sonography (USG) of lymph node.

Results: A total of 41 patients were included (31 male: 10 female). Reactive hyperplasia was the most common type of lymphadenitis 22(54%).

Other causes were: cyst with reactive lymph node 6 (15%), Malignancy 4 (10%), suppurative lymphadenitis with abscess 3(7%), Granulomatous 3(7%), one case (2.4%) of each, tuberculosis, reactive lymph node with eosinophilia, and chronic sialadenitis.

Conclusions: Fine-needle aspiration is a valuable diagnostic tool in the management of children with the clinical presentation of enlarged cervical lymph nodes. The technique reduces the need for more invasive and costly procedures, and culture and histopathology, however, should be considered in cases where repeated Fine-needle aspiration cytology is non-diagnostic.

Key words: cervical lymphadenopathy (CL), fine needle aspiration cytology(FNAC)

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Introduction

Cervical lymph node enlargement is a common clinical finding in pediatric practice(1, 2). Enlargement of lymph node may result from proliferation of lymphocytes either due to infection or due to lymphoproliferative disorder or from the migration and infiltration of nodal tissue by either extrinsic inflammatory cells or metastatic malignant cells. Etiological profile varies from region to region, in developing countries; acute respiratory infection, supportive skin infections and tuberculosis are the major causes for regional lymphadenopathy.

The evaluation of the child with lymphadenopathy is a common clinical scenario for the pediatrician(3). The majority of these children will have a benign, self-limited process. However, some children with serious systemic disease or malignancy may present with lymphadenopathy, and therefore an understanding of the differential diagnosis is critical in directing an appropriate and timely evaluation. While the diagnosis is usually evident from the history, physical examination, and preliminary laboratory evaluation, the pediatrician should be aware of less common causes of lymphadenopathy that he or she is likely to encounter in practice.

Any failure in decreasing the size of the lymph node within 14-21 days of treatment, indicates a need for further evaluation (4, 5, 6).

Fine needle aspiration cytology (FNAC) is a simple, safe, reliable, rapid and inexpensive method of establishing the diagnosis of lesions and masses in various sites and organs and can be an attractive alternative to open biopsy. (7, 8)

The value of FNAC, besides making a diagnosis, also lies in early direction of appropriate investigations. (9, 10) Aspirates from lymph nodes are usually very cellular and their interpretation varies from clear diagnosis to a firm request for histopathology(11). However, limitations and pitfalls of the procedure should be recognized.

So we aimed at studying the clinicopathological profile of children with cervical lymphadenopathy and the role of fine-needle aspiration cytology at our center.

Methods

Retrospective review was made of all 41 patients who underwent fine needle aspiration for cervical lymph node enlargement between January 2007 to June 2010.

Those with significant cervical lymphadenopathy attending Queen Alia Military hospital, with age ranging from 9 months to 14 years formed the study material.

Significant lymphadenopathy means

- (i) Cervical lymph node > 1cm in size.
- (ii) Lymph nodes which are hard and rubbery in consistency on palpation
- (iii) Matted/Fixed lymph nodes
- (iv) Lymph node with discharging sinus
- (v) Duration of complaints for more than 4 weeks (12).

An especially formulated data sheet devised by the authors themselves, was used. It included detailed history and physical examination. Description of the involved lymph nodes, history of contact with a diagnosed case of tuberculosis, relationship with the case, previous treatment for tuberculosis and presenting complaints were also recorded.

Investigations done included (I) Hemogram (ii) Mantoux test (iii) Chest X-ray (iv) Ultrasonography of lymph node (v) fine needle aspiration cytology (FNAC) and were reviewed. Additional investigations like biopsy, bone marrow examination, culture, serological tests were done wherever required.

Results

Of the 41 cases in the present study, the predominant age group was 11-14 years with 20 cases (49%) followed by 6-10 years with 14 cases (34%)

(Table 1 - opposite). There was a male preponderance accounting for 31 cases (75.6%) with M: F ratio 3.1:1.

Among the diagnostic outcome, reactive hyperplasia was the most common type of lymphadenitis 22 (54%) (13,14). Overall prevalence of various lesions were cyst with reactive lymph node 6 (15%), Malignancy 4 (10%), suppurative lymphadenitis with abscess 3 (7%), Granulomatous 3 (7%), and one case (2.4%) of each, tuberculosis, reactive lymph node with eosinophilia, and chronic sialadenitis.(Table 2 - opposite)

Among the malignant lesions 50% had Hodgkin's lymphoma, while 50% had metastatic nasopharyngeal carcinoma.

The frequency distribution of pathologic findings by sex group are seen in (Table 3 - opposite).

The relation between the pathological findings of FNAC and the age group is seen in Table 4 - opposite.

Discussion

In this study an attempt was made to study the role of FNAC in diagnosis of children with cervical lymphadenopathy after correlating history, clinical findings and relevant laboratory and sonographic diagnosis.

In patients with CL, one should wait for 3 weeks to rule out common viral infection(15). In such patients, one should study the blood counts and peripheral smears, careful for various types of hematological malignancy i.e. leukemias and if needed, supplemented with bone marrow examination. If CL is of more than 3 weeks duration and the hematological status is normal, then instead of giving empirical (therapeutic test), patients should be considered for FNAC. FNAC is found to be safe and simple in diagnosing the lesions responsible for CL including the tuberculosis. Not a single complication is recorded during the study with FNAC.

FNAC is extremely useful in certain clinical setups i.e. metastases of unknown origin, pyrexia of unknown origin, and symptomatic and asymptomatic cervical mass lesions. CL is not an uncommon clinical presentation in clinical practice. All patients should be carefully examined for cervical lymph nodes enlargement. High index of suspicion is essential in the clinical setup. The detailed clinical examination for lymph nodes, supplemented with routine laboratory examination and FNAC give a very important clue to medical professionals. Among patients presented with cervical lymphadenopathy, in our study, the majority of the children presenting were in age group of 11-14 years; however Reddy MP et al.(16) noted the majority in the 4-8 years group but Knight et al(17) emphasized in one of the largest studies relating age to lymphadenopathy that age is not important in predicting the incidence of significant lymphadenopathy. In our study there is a male pre-ponderance (with M: F ratio 3.1:1) but there is no such predilection of sex in the study by Mishra S.D. et al.

In the present study, the commonest cytopathological finding was Reactive lymphadenitis in 54% of cases, followed by cyst with reactive lymph node in (15%). Doddamani M et al.(18), Gupta A et al Cervical lymphadenopathy in children(19), Lake et al(20) and Reddy MP et al also noted the commonest cytopathological finding as reactive lymphadenitis followed by granulomatous lymphadenitis.

In India, tuberculous lymphadenitis is one of the most common type of lymphadenopathy encountered in clinical practice (21, 22, 23). Janardan et al (24) studied 532 children with 276 (51.9%) due to tuberculous lymphadenopathy. This is in sharp contrast to the very low frequency of 1.6% in Western studies(25). The latter studies showed a predominance of malignant lesions in the clinicopathological findings: Steel et al (26) reported 59% of cases of malignant lesions and 34% cases of benign lesions. This may be attributed to the epidemiological variations in the etiology of cervical lymphadenopathy.

Comparing results obtained from this study for the effectiveness of FNAC as a simple diagnostic procedure of persistent cervical lymphadenopathy with figures available from other studies (27,28,29,30) revealed that the effectiveness

Age	Number of Patients (%)
9 months-5 years	7(17%)
6-10 years	14(34%)
11-14 years	20(49%)

Table 1: Age distribution of patients

FNAC diagnosis	Number of cases	Percentage (%)
Benign Reactive lymphadenitis	22	54%
Cyst with Reactive lymphadenitis	6	15%
Malignancy	4	10%
Suppurative lymphadenitis with abscess	3	7%
Granulomatous lymphadenitis	3	7%
Tuberculous lymphadenitis	1	2.4%
Reactive lymphadenitis with eosinophilia	1	2.4%
Reactive lymphadenitis with sialadenitis	1	2.4%
Total	41	100 %

Table 2: Etiology by fine needle aspiration cytology (FNAC)

Diagnosis	Male (%)	Female (%)
Benign Reactive lymphadenitis	16(73%)	6(27%)
Cyst with Reactive lymphadenitis	4(67%)	2(33%)
Malignancy	2(50%)	2(50%)
Suppurative lymphadenitis with abscess	3(100%)	-
Granulomatous lymphadenitis	3(100%)	-
Tuberculous lymphadenitis	1(100%)	-
Reactive lymphadenitis with eosinophilia	1(100%)	-
Reactive lymphadenitis with sialadenitis	1(100%)	-
Total (n = 41)	31(75.6%)	10(24.4%)

Table 3. The frequency distribution of pathologic findings by sex group

Pathologic Findings	Age group		Total No (%)
	≤ 10 years (%)	≥ 10 years (%)	
Benign Reactive lymphadenitis	12(54.5%)	10(45.5%)	22(54%)
Cyst with Reactive lymphadenitis	2(33.3%)	4(66.7%)	6(15%)
Nasopharyngeal carcinoma	2(100%)	-	2(5%)
Hodgkin's Lymphoma	-	2(100%)	2(5%)
Suppurative lymphadenitis with abscess	2(66.7%)	1(33.3%)	3(7%)
Granulomatous lymphadenitis	2(66.7%)	1(33.3%)	3(7%)
Tuberculous lymphadenitis	-	1(100%)	1(2.4%)
Reactive lymphadenitis with eosinophilia	1(100%)	-	1(2.4%)
Reactive lymphadenitis with sialadenitis	-	1(100%)	1(2.4%)
Total (n=41)	21(51%)	20(41%)	41(100%)

Table 4: The relation between the pathological findings of FNAC and age group.

is similar, however the clinicopathological findings were different.

The knowledge of the pattern of lymphadenopathy in a given geographical region is essential for making a confident diagnosis or suspecting a disease.

Conclusion

Fine-needle aspiration is a valuable diagnostic tool in the management of children with the clinical presentation of enlarged cervical lymph nodes. The technique reduces the need for more invasive and costly procedures.

Culture and histopathology, however, should be considered in cases where repeated Fine-needle aspiration cytology is non-diagnostic.

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Efficacy of intra-sheath steroid injection in treatment of de Quervain's tendonitis

ABSTRACT

Objective: The aim of this study was to highlight the efficacy of dexamethasone injection in treatment of de Quervain's tendonitis and to highlight the difference between one point and two point injection.

Method: A prospective study of non-operative treatment of de Quervain's tendonitis was conducted on 60 patients who attended our clinic at Prince Rashed Hospital during the year 2008, and who had de Quervain's tendonitis. The total number was divided into two groups. An injection of dexamethasone (clear cortisone preparation) was used to minimize depigmentation and subcutaneous fat atrophy which is common with dark skin. The fluid was injected into one point above the indurations for 30 patients and into two points over the extensor pollicis brevis and abductor pollicis longus tendon in the induration for the other group.

Result: The result showed significant difference between the two groups. The efficacy rate was 80% in the two point injection and 65% in the one point injection.

Conclusion: The use of dexamethasone in treatment of de Quervain's tendonitis has a high efficacy rate, especially if two point injection was considered.

Key words: de Quervain's tenosynovitis, intersection syndrome, Wartenberg syndrome

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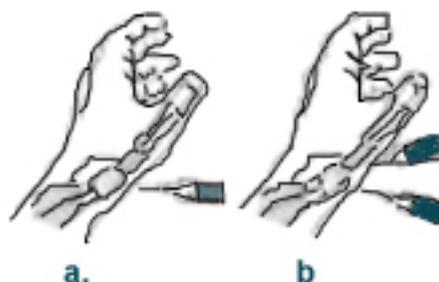
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Introduction

De Quervain's tenosynovitis (duh-kare-VAHS ten-oh-sine-oh-VIE-tis) is a painful inflammation of the tendons on the thumb side of the wrist. If you have de Quervain's tenosynovitis, you are likely to feel pain every time you turn the wrist, grasp anything or make a fist. Any activity that relies on repetitive hand or wrist movement, such as working in the garden, playing music, knitting, cooking, lifting a baby or walking a pet can aggravate the condition. The symptoms may include pain near the base of the thumb, swelling near the base of the thumb, a fluid-filled cyst in the same region, difficulty moving the thumb and wrist when doing activities that involve grasping or pinching, or a sticking or 'stop-and-start' sensation when trying to move it, or a squeaking sound as the tendon tries to move back and forth through the inflamed sheaths. The treatment of de Quervain's disease can be approached in many different ways initially. The offending activity must be stopped and the wrist should be rested to allow a decrease in the inflammatory response of the tendons and soft tissues. This can be accomplished by use of a thumb spica splint that immobilizes the wrist and thumb. The physician may treat the condition with a non-steroidal anti-inflammatory agent, and in unresponsive cases steroidal injection into the tendon synovial sheath may help. In severe cases, surgical decompression of the 1st dorsal compartment may be needed to resolve pain.



Injection methods.

a For the first 18 hands the fluid was injected into one point immediately above the indurated tendon sheath in the first dorsal compartment of the wrist.

b In hands 19–38 the amount of fluid was halved and injected into two points.



Figure 1: The first dorsal compartment. There are six compartments on the dorsal, or back side of the wrist. The first compartments are on the dorsal, or back, side of the wrist. The first and third compartments house tendons which control the thumb

A prospective study of non-operative treatment of de Quervain's disease was conducted on 60 patients who attended our clinic at Prince Rashed Hospital during the year 2008 with this diagnosis. Patients were prospectively and randomly divided into two groups. There were 40 females and 20 males with mean age of 40 years. Right hands were involved in two thirds of patients. The mean time of follow up was 6 months (range from 2 months to 1 year).

Patients were excluded from this study if they had any of following: chronic renal failure, diabetes mellitus, gout, rheumatoid arthritis, pregnant women, existing gastrointestinal ulceration, Cushing's syndrome, severe form of heart failure, severe hypertension, systemic tuberculosis, severe systemic viral, bacterial and fungal infections, pre-existing wide angle glaucoma, and osteoporosis. Carefully, localization of the most tender site was confirmed by Finkelstein test. Both groups were injected with the same dose of 0.5-1 mg dexamethasone mixed with Xylocaine to decrease the pain. For the first group one point injection was chosen within the first group, whereas verification of contours of extensor pollicis brevis and tendon of abductor pollicis longus, two point injection, was performed for the second group.

The results were categorized into four groups: excellent when there was no pain, good when there was no disruption of daily activity, fair when there was disruption of daily activity, worse when pain persisted.

Results

During the year 2008 a total number of 60 patients were diagnosed with de Quervain's tenosynovitis. Excluded from this study were those with a contraindication to corticosteroid, or a high risk group. Our study showed a significant difference between the two groups. The efficacy rate reached 80% in the two point injection group whereas it was 65% in the other group.

The efficacy rate determined as an outcome of good was when there was no disruption of daily activity, in the two point injections it was excellent in 22 patients (66%), good in 6 patients (18%), and fair in 2 patients, whereas it was excellent in 15 patients (45%), good in 10 patients and fair in 5 patients in the one point group. Recurrence rate were less than 10% in the two point injection group and reached 20% in the one point injection group.

Discussion

First dorsal compartment tendonitis, more commonly known as de Quervain's tendonitis or tenosynovitis, after the Swiss surgeon Fritz de Quervain, is a condition brought on by irritation or inflammation of the wrist tendons at the base of the thumb (see Figure 1). The inflammation causes the compartment (a tunnel or a sheath around the tendon) to swell and enlarge, making thumb and wrist movement painful. Making a fist, grasping or holding objects, often infants, are common painful movements with de Quervain's tendonitis.

The goal of treatment is to relieve the pain caused by the irritation and swelling. Your doctor may recommend resting the thumb and wrist by wearing a splint. Oral anti-inflammatory medication may be recommended. A cortisone-type steroid may be injected into the tendon compartment as another treatment option. The use of dexamethasone, which is a potent synthetic member of the glucocorticoid class of steroid drugs, acts as an anti-inflammatory and immunosuppressant. It is 20-30 times more potent than the naturally occurring hormone cortisol and 4-5 times more potent than prednisolone. Complications should be discussed with the patient before injection, which are transient in the form of increased pain and subcutaneous fat atrophy and skin pigmentation, which are very rare with the use of dexamethasone. Satisfaction rate may reach up to 80%.

Each of these non-operative treatments help reduce the swelling, which typically relieves pain over time. In some cases, simply stopping the aggravating activities may allow the symptoms to go away on their own.

When symptoms are severe or do not improve, surgery may be recommended. Surgery opens the compartment to make more room for the inflamed tendons, which breaks the vicious cycle where the tight space causes more inflammation. Normal use of the hand can usually be resumed once comfort and strength have returned.

Conclusion

The use of dexamethasone in the treatment of de Quervain's disease carries a significant efficacy rate reaching up to 80%. Success may depend on selection of patients, proper identification of the most tender site and the use of two point injections. It has a low complication rate which is very important in dark skinned and in female patients. Complications can arise if patients are not selected carefully and at risk patients excluded.

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Nasal Carriage of *Staphylococcus aureus* Among the Community Population and Hospital Staff in Erbil, Iraq

ABSTRACT

Background and Objectives: *Staphylococcus aureus* is a common cause of disease, particularly in colonized persons. *Staphylococcus aureus* nasal carriage rates were estimated among community population and hospital staff, and we compared antibiotic resistance of *Staphylococcus aureus* among the community population and hospital staff.

Methods: Nasal samples for *Staphylococcus aureus* culture were obtained from 600 persons (300 from the community population and 300 from hospital staff). These swabs were inoculated on Blood and Mannitol salt agar plates. The isolates were identified and we performed an antibiotic sensitivity test.

Results: The percentage of *Staphylococcus aureus* nasal carriage was 30.33% (25.33% for community population and 35.33% for hospital staff). *Staphylococcus aureus* was highly resistant to antibiotics among the hospital staff when compared with the community population.

Conclusions: There are higher persistent *Staphylococcus aureus* nasal carriage rates among community population and hospital staff.

Keywords: *Staphylococcus aureus*, Nasal carriage, Antibiotics, Hospital.

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rates of infection are higher in carriers than in non-carriers. Secondly, studies comparing carriers and infection isolates of *Staphylococcus aureus* have demonstrated that patients are usually infected with their own carriage isolate (3). There is considerable heterogeneity among nasal cells in participation in the adherence of bacteria. *Staphylococci* seem to adhere to mucin-coated cells much better than to cells deeper in the epidermis (6). *Staphylococcus aureus* binds to human desquamated nasal epithelial cells (8).

Patients who are nasal carriers may colonize the bacteria on their hands or other areas of intact skin, and can disperse the organism into the environment around them. Healthcare workers, who have direct contact with persistently colonized patients, or contaminated objects in the immediate environment of such a patient, can contaminate their hands and subsequently transmit the organism to other patients (5). Patients who are nasal carriers of *Staphylococcus aureus* have an increased risk of surgical site infections caused by that organism (9). The use of intubation via the nasal route may predispose to nosocomial sinusitis, which has been associated with the development of nosocomial pneumonia (10).

Introduction

Nasal carriage of *Staphylococcus aureus* has been identified as a risk factor for community and hospital acquired (1, 2, 3), nasal colonization by this opportunistic pathogen which increases the risk of development of *Staphylococcus aureus* infection (4). It colonizes the anterior nares of 20% to 30% of individuals at any given time (5).

Longitudinal studies have demonstrated that three carriage patterns can be distinguished in the healthy adult population; about 20% of individuals are persistent *Staphylococcus aureus* carriers, 60% are intermittent carriers, and approximately 20% are persistent non-carriers (3). Carriage of *Staphylococcus aureus* in the nose appears to play a key role in the epidemiology and pathogenesis of infection (6). Colonization of human nasal mucosa with *Staphylococcus aureus* sets the stage for subsequent systemic infection (7). However, these lines of evidence support the view that nasal carriage of *Staphylococcus aureus* and the development of staphylococcal infection are linked. Firstly,

Materials and Methods

Six hundred persons were examined, 300 persons (150 males and 150 females) of the community population who had no contact with hospital staff and patients, and 300 hospital staff (150 males and 150 females) at Hawler, Maternity and Rizgary teaching hospitals in Erbil, Iraq, and results were collected from July 2006 to May 2008. The nasal carriage was screened by swabbing the anterior 1.5 cm of the nasal vestibule of both the right and the left nares with sterile disposable cotton swabs moistened with sterile normal saline which were used to obtain the specimen (1). The swabs were streaked on the blood and Mannitol salt agar plates. These plates were incubated at 37°C for 24-48 hours under aerobic conditions.

The suspected colonies of *Staphylococcus aureus* were identified on the basis of conventional phenotypic characteristics, namely, colony morphology, hemolysis on Blood agar, Mannitol fermentation on Mannitol salt agar,

Carrier types	Community population		Hospital staff		Total	
	No.	%	No.	%	No.	%
<i>Staphylococcus aureus</i>	76	25.33	106	35.33	182	30.33
Other <i>Staphylococcus</i> spp.	17	5.67	33	11.00	50	8.33
Non- carrier	207	69.00	161	53.67	368	61.33
Total	300		300		600	

- High significance ($P < 0.01$), $X^2 = 75.10$, *Staphylococcus aureus* - Other *Staphylococcus* spp.
- High significance ($P < 0.01$), $X^2 = 15.73$, *Staphylococcus aureus* - Non-carrier
- Significant ($P < 0.05$), $X^2 = 4.95$, Community population - Hospital staff

Table 1: Nasal carriage among community population and hospital staff

Gender	Community population		Hospital staff		Total	
	No.	%	No.	%	No.	%
Male	40	52.63	45	42.45	85	46.70
Female	36	47.37	61	57.55	97	53.30
Total	76		106		182	

- Not significant, $X^2 = 1.84$

Table 2: Gender and nasal carriage of *Staphylococcus aureus*

Gram reaction, cell morphology, cell arrangement, Catalase test, Coagulase test and Avipath Staph kit (2, 11, 12).

Antibiotic susceptibility test was done by disk diffusion method for *Staphylococcus aureus* (13, 14).

Results

Among the 600 persons who were examined for nasal carriage, statistically the difference between non-carriage (61.33%), and *Staphylococcus aureus* carriage (30.33%) was significant ($P < 0.05$); also the percentage of *Staphylococcus aureus* statistically ($P < 0.05$) was higher than other species of *Staphylococci* (8.33%). The carriage of *Staphylococcus aureus* among hospital staff (35.33%) statistically ($P < 0.05$) was higher than that in the community population (25.33%).

The results showed that out of 182 nasal carriers of *Staphylococcus aureus*, 85 (46.7%) were males and 97 (53.3%) females, which statistically shows the differences were not significant (Table 2). Among the four age groups of the community population and hospital staff investigated, the differences were not significant among carriers of *Staphylococcus aureus* (Table 3 next page).

The susceptibility test was performed on 76 and 106 isolates belonging to the community population and hospital staff, respectively. The percentages of antibiotics resistance are shown in Table (4). Nasal carriage among hospital staff was statistically of higher resistance to Penicillin G, Ampicillin, Amoxicillin, Cephalexin and Trimethoprim + Sulphamethoxazole, than the community population. However the difference between hospital staff and the community population regarding resistance to Clindamycin

Age (years)	Community population		Hospital staff		Total	
	No.	%	No.	%	No.	%
18-22	25	32.89	20	18.87	45	24.73
23-27	16	21.05	23	21.70	39	21.43
28-32	17	22.37	34	32.08	51	28.02
33-37	18	23.68	29	27.36	47	25.82
Total	76		106		182	

•Not significant, $X^2 = 5.25$

Table 3: Age and nasal carriage of Staphylococcus aureus

Antibiotics	Community population (No.= 76)		Hospital staff (No.= 106)		Total (No.= 182)		X^2	Statistically
	No.	%	No.	%	No.	%		
Penicillin G	47	61.84	91	85.85	138	75.82	14.03	High significance (P< 0.01)
Ampicillin	41	53.95	79	74.53	120	65.93	12.03	High significance (P< 0.01)
Amoxicillin	36	47.37	63	59.43	99	54.40	7.36	High significance (P< 0.01)
Cephalexin	27	35.53	48	45.28	75	41.21	5.39	Significant (P< 0.05)
Clindamycin	22	28.95	37	34.91	59	32.42	3.81	No significance
Erythromycin	29	38.16	42	39.62	71	39.01	2.38	No significance
Ciprofloxacin	0	0.00	9	8.49	9	4.95	Not done	Not done
Trimethoprim + Sulphamethoxazole	17	22.37	34	32.08	51	28.02	5.67	Significant (P< 0.05)

Table 4: Compared antibiotics resistance of Staphylococcus aureus carriage among community population and hospital staff

and Erythromycin, was not significant. The result revealed that no Ciprofloxacin resistance was isolated among the community population.

Discussion

The percentage of *Staphylococcus aureus* carriage investigated in the present study was 30.33% and might be regarded as a risk factor for infection, similar to studied subjects from central Italy, to establish the rates of nasal carriage of *Staphylococcus aureus* at 30.5% (15). In Spain, 30.1% of the patients were nasal *Staphylococcus aureus* carriers (16). However *Staphylococcus aureus* is present in the nasal vestibule of at least 30% of individuals in the community population, and this carriage is a major risk factor for infection (2). Nasal care is often neglected as a part of routine hygiene (17).

Nasal carriage of *Staphylococcus aureus* among the hospital staff (35.33%) was statistically higher than that in the community population (25.33%). The result is in agreement with other studies; the nasal carriage rate of *Staphylococcus aureus* was significantly higher in hospitalized persons in Nigeria (18). Screening for nasal carriage of *Staphylococcus aureus* revealed that 32.4% of the surgical staff and 21.6% of the students were carriers; the rate of the hospital staff was significantly higher (19). In Abha, Saudi Arabia, *Staphylococcus aureus* was isolated from 26.1% adults in the community and 25.4% hospital personnel (20). The restaurant workers in Kuwait City were screened for nasal carriage of *Staphylococcus aureus*, and 6.6% of 500 workers studied carried *Staphylococcus aureus* (21).

The percentage of females (53.3%) was higher than that of males (46.7%), but statistically was not significant. However nasal carriage of *Staphylococcus aureus* was investigated in 475 hospital staff in Nigeria, and the overall carriage was 34.42% with a significantly higher rate in females (67.53%) than in males (23.81%) (22). On other hand, male gender was identified as a risk factor for *Staphylococcus aureus* nasal carriage (23). In 1988 screening for *Staphylococcus aureus* nasal carriage was performed by Erasmus University Medical Center, Rotterdam, Netherlands and found that sex and age were not significant for carriage status (24), which is in good agreement with this study, which is that the difference between age groups and sex was not significant.

Staphylococcus aureus resistance to antibiotics has a worldwide distribution (25). However in the present study resistance to Penicillin G, Ampicillin, Amoxicillin, Cephalexin and Trimethoprim + Sulphamethoxazole was statistically higher among hospital staff than the community population. This result is in agreement with that reported by other studies; differences in nasal carriage of *Staphylococcus aureus* between medical personnel were colonized with more antibiotic-resistant isolates than non-medical personnel (26). In Addis Ababa multiple resistance of *Staphylococcus aureus* among the hospital staff is higher than the community population and of which about 45% of the hospital isolates and 2.3% of the non-hospital isolates, showed multiple resistance (19). The resistance to Clindamycin and Erythromycin was not significant between the community population and hospital staff and that related to narrow use of those antibiotics in hospitals.

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Concerns about Prophylactic Antibiotic and G-CSF in Prevention of Bacterial Infection in Neutropenic Patients with Cancer

Introduction

Neutropenic patients are at high risk of developing various types of infections (viral, fungal and bacterial); related to abnormal decreased number of neutrophils which are the most important type of cell, that serves as the primary defense against infections. Patients with cancer are at risk of developing neutropenia due to several factors like chemotherapy and radiotherapy side effects.

Bacterial infection in neutropenic patients with cancer is a major cause of complication and death, so several preventive pharmacological and non pharmacological strategies have been developed in an attempt to protect patients, during periods of neutropenia, from bacterial infections. The two main types of pharmacological prophylactic regimens are granulocyte colony stimulating factors (G-CSF) and antibiotics.

Guided by Pender's Health Promotion Model, contributing factors to bacterial infection in neutropenic patients with cancer, pharmacological and non pharmacological prophylactic regimens will be explored, and current research literature reviewed, and concerns about prophylactic antibiotic and G-CSF in prevention of bacterial infection in neutropenic patients with cancer will be examined.

This continuous education paper is designed for nurses and other health care providers who care about prevention of bacterial infection in neutropenic patients with cancer. After studying the information presented in this paper, they will be able to:

1. Discuss the background and significance of preventing bacterial infection in neutropenic patients with cancer.
2. Identify risk factors, most common pathogens and most common sites to develop bacterial infection in neutropenic patients with cancer.
3. Understand prophylactic strategies (pharmacological and non pharmacological) to prevent bacterial infection in neutropenic patients with cancer.
4. Identify the most common concerns about using prophylactic antibiotic and G-CSF in prevention of bacterial infection in neutropenic patients with cancer.

Background and Significance

Since the 1980s, initiatives have been directed at improving the quality of oncology care through clinical practice, research, education, and policy.

Infections in patients with cancer are a significant cause of morbidity and mortality, especially in those receiving chemotherapy. However, the overall mortality rate from bacterial infections has decreased from 21% to 7% since the mid-1970s (Johanna et al., 2005; Kurt et al., 2008; Jorgensen and Gotzsche, 2009).

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Nurses play a vital role in the prevention of infection in patients with cancer through nursing practice, research, and patient education.

Since 30 years ago the relationship between infections and neutropenia was first described in patients with acute leukemia receiving chemotherapy (Rahman, 1997; Pascoe and Cullen, 2006).

Patients with cancer are at risk of developing neutropenia due to several factors like chemotherapy and radiotherapy side effects. Myelosuppression, especially neutropenia, is one of the most important, encountered complications of chemotherapy (Rahman, 1997; Glasmacher et al., 2005; Pascoe and Cullen, 2006).

Neutropenic patients with cancer are at high risk of developing various types of infections (viral, fungal and bacterial); related to abnormal decrease in number of neutrophils which are the most important type of cell, that serves as the primary defense against infections, and this may become a life-threatening condition.

Bacterial infection as well as invasive fungal infections is a leading cause of mortality and morbidity in neutropenic patients with hematological malignancies and profound neutropenia (Axel Glasmacher et al., 2006; Zitella et al., 2006).

Bacterial infection as well as invasive fungal infections, is a leading cause of mortality and morbidity in neutropenic patients with hematological malignancies and profound neutropenia (Axel Glasmacher et al., 2006; Zitella et al., 2006). Bacterial infections are predominant during the early stages of neutropenia, whereas fungal infections are more common in patients with prolonged and severe neutropenia (Wetering, Woensel, Kremer & Caron, 2005; Gafter-Gvili et al., 2009; Kenneth & Rolston, 2009).

Application of Pender's health promotion theory

For the purpose of this continuous education paper the author selected to apply Pender's health promotion model; hence it covers of the scope of prevention (before occurring of the infection) and proactive in taking care to prevent bacterial infection in neutropenic patients with cancer, guided by the concepts of health promotion and health protection that is discussed in Pender's model.

Nora J. Pender developed the Health Promotion Model that is proposed as a holistic predictive model of health-promoting behaviour for use in research and practice.

The Health Promotion Model has given health care a new direction. According to Pender, Health Promotion and Disease Prevention should be the primary focus in health care, and when health promotion and prevention fails to prevent problems, then care in illness becomes the next priority. She defined 2 concepts: health promotion and health protection (Marriner & Raile, 2005).

Health promotion is defined as behaviour motivated by the desire to increase well-being and actualize human health potential. It is an approach to wellness.

Health protection or illness prevention is described as a behaviour motivated desire to actively avoid illness, detect it early, or maintain functioning within the constraints of illness. We can apply this model in our nursing practice, and the author applies this model in this CE paper to be proactive and manage in terms of health promotion and protection. "We are moving toward an area of science-based practice in nursing that incorporates the latest findings from the behavioural and biological sciences into practice, to assist people of varying cultural backgrounds to adopt healthy lifestyles." – Pender.

We as nurses could do more by using our caring touch, and therapeutic talks. Health education is always part of a nurses' experience in the workplace.

The oncology health care setting is one of the best avenues in promoting health and preventing illnesses. The Health Promotion Model may still be applied in one way or another. This is projected towards improving health condition and prevention of further debilitating conditions (prevention of infection in neutropenic patients with cancer is an example), taking into consideration the fact of the multi-faceted nature of persons correlating with their interpersonal nature and interacting with their interpersonal and physical environments as they trail towards health and preventing bacterial infections in neutropenic patients with cancer. Figure 1 (opposite page) illustrates this multi-faceted nature in detail.

Figure 2 (page 24) shows a model designed by the author and guided by health promotion model. This model was designed to emphasize preventing bacterial infection in neutropenic patients with cancer measures and concerns about these measures. It emphasizes also the multi-faceted nature of patients correlation and shows how we could apply preventive measures (pharmacological and non-pharmacological), and how the health care providers, the patient and the family could participate in these preventive measures.

Pathophysiology

Neutrophils and other types of white blood cells are made in the bone marrow (a spongy tissue found inside larger bones such as the pelvis, vertebrae, and ribs) and then circulate in the bloodstream.

While neutropenia is a hematological disorder that is characterized by an abnormally low number of neutrophils, which are the most important type of white blood cell in the blood as they serve as the primary defense against infection by destroying bacteria in the blood (Hughes et al., 2002). Neutropenia can be acute or chronic depending on the duration of the illness. There are three general guidelines

used to classify the severity of neutropenia based on the absolute neutrophil count (ANC) measured in cells per micro liter of blood as shown in Table 1 (bottom right).

Patients with cancer are at risk of developing neutropenia due to several factors like chemotherapy and radiotherapy side effects. Myelosuppression, especially neutropenia, is one of the most important, encountered complications of chemotherapy (Rahman, 1997; Glasmacher et al., 2005; Pascoe and Cullen, 2006). Some types of chemotherapy can cause the bone marrow to not work properly, lowering the production of neutrophils. There are also cancers that affect the bone marrow directly, including leukemia, lymphoma, and myeloma, or metastatic cancer which can crowd normal bone marrow cells. Radiation therapy can also affect the bone marrow, especially if given to several areas of the body or to bones in the pelvis, legs, chest, or abdomen (Agboola and Balducci, 2003; Johanna et al., 2005).

Neutropenic patients with cancer are at high risk of developing various types of infections (viral, fungal and bacterial); related to abnormal decreased number of neutrophils which is the most important type of cell, that serves as the primary defense against infections, and this may become a life-threatening condition (Avery et al., 2002; Kummel et al., 2005; Kuderer et al., 2007).

Clinical presentation

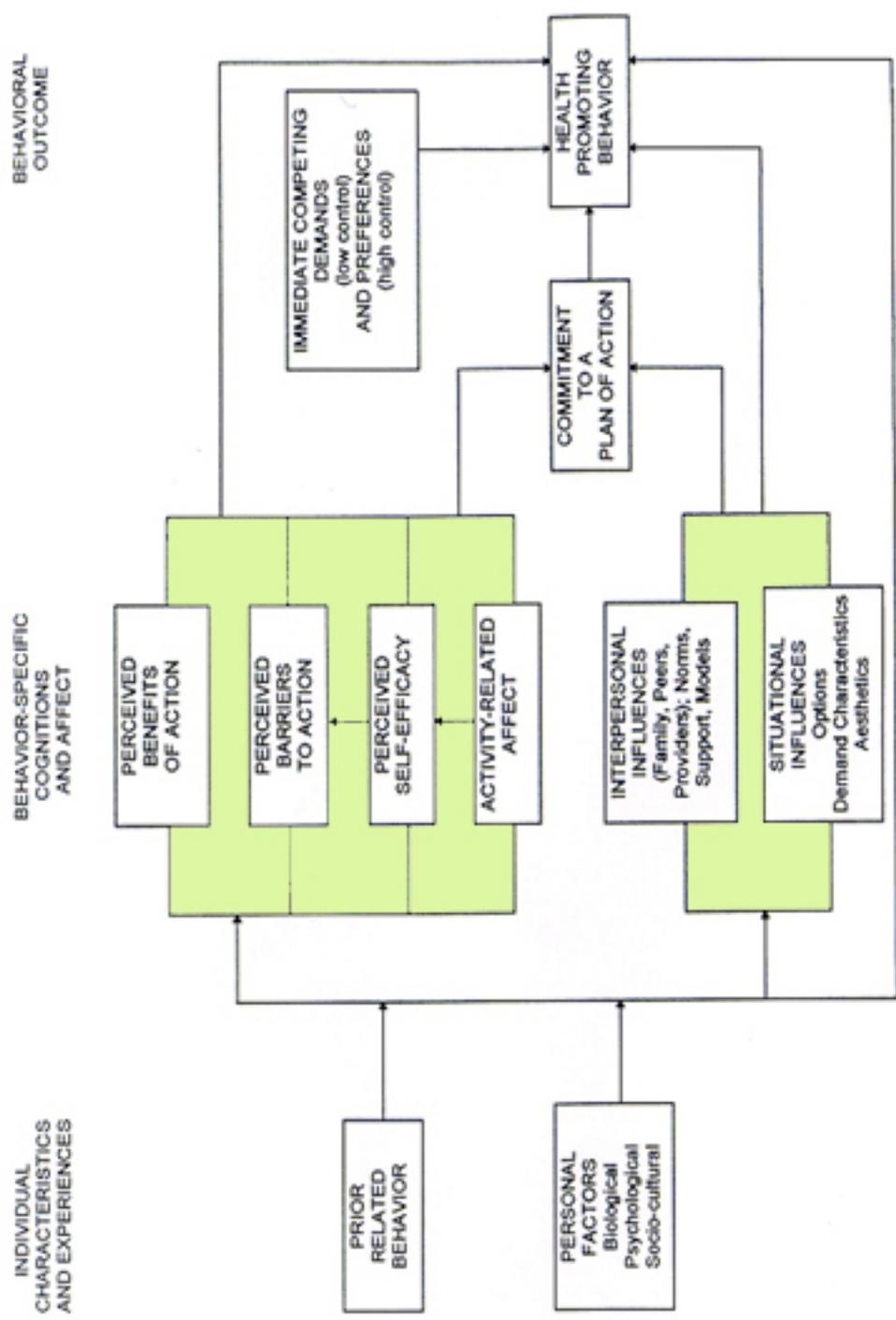
Neutropenia itself does not cause any symptoms. Patients usually find out they have neutropenia from a blood test or when an infection develops. Because neutropenia is a common side effect of some types of chemotherapy; regular blood tests, usually a complete blood count (CBC) is needed to look for neutropenia (Larson and Nirenberg, 2004). Even a minor infection in neutropenic patients can quickly become a serious problem and may be life threatening (Cullen et al., 2005).

Signs and symptoms related to infections in neutropenic patients with cancer depend on the type of infection (viral, fungal or bacterial) and the site of infection.

Febrile neutropenia (single oral temperature $\geq 38.3^{\circ}\text{C}$ or $\geq 38.0^{\circ}\text{C}$ for >1 h) which mainly indicates infection remains a frequent complication after chemotherapy among patients with cancer (Rokusz et al., 2005).

So patients should be educated to report any of these signs: Chills or sweating, a sore throat or sores in the mouth, abdominal pain, diarrhoea or sores around the anus, pain or burning when urinating or frequent urination, a cough or breathlessness, any redness, swelling, or pain, especially around a cut, wound, or an intravenous (IV) catheter site, unusual vaginal discharge or itching (Hughes et al., 2002; Johanna et al., 2005; Wolf et al., 2008).

There are some factors that increase the risk of bacterial infection in neutropenic patients with cancer: age 65 years and older, poor performance status, advanced disease, serious co-morbidities, cytopenias due to tumour bone marrow involvement, Female gender, haemoglobin <12 g/dL, poor nutritional status, combined chemo-radiotherapy, previous episode of FN, open wounds or active infections (Cullen and Pascoe, 2006; Wolf et al., 2008).



Revised Health Promotion Model

Figure 1: This model is moving towards understanding the multi-faceted nature of persons correlating with their interpersonal nature and interacting with their interpersonal and physical environments as they trail towards health. Because of the model, nurses have already advanced their health approaches, addressing not only the curative side, but as well, prevention of diseases and promotion of well-being. Application of this theory is varied and substantive on its own.

Type	ANC	Risk for Infection
Mild neutropenia	1000 ≤ ANC < 1500	Minimal risk of infection
Moderate neutropenia	500 ≤ ANC < 1000	Moderate risk of infection
Severe neutropenia	ANC < 500	Severe risk of infection

Table (1): Neutropenia classification

Causes of infection

Neutropenic patients with cancer are at high risk of developing various types of infections (viral, fungal and bacterial), for the aim of this paper the author will emphasize only the bacterial infections.

These bacterial infections may be caused by several factors. Central venous catheters were the major source of bloodstream infection, particularly in patients with solid tumors (Raad et al., 2007; Wolf, 2008).

Types of bacterial pathogens

There are several types of bacterial pathogens which cause bacterial infection in neutropenic patients. Gram-positive pathogens are the most common cause (around 60 – 70 %) of bacterial infections while about 20-30% are caused by gram-negative pathogens. (Glasmacher et al., 2005; Wolf, 2008; Cullen, and Baijal, 2009).

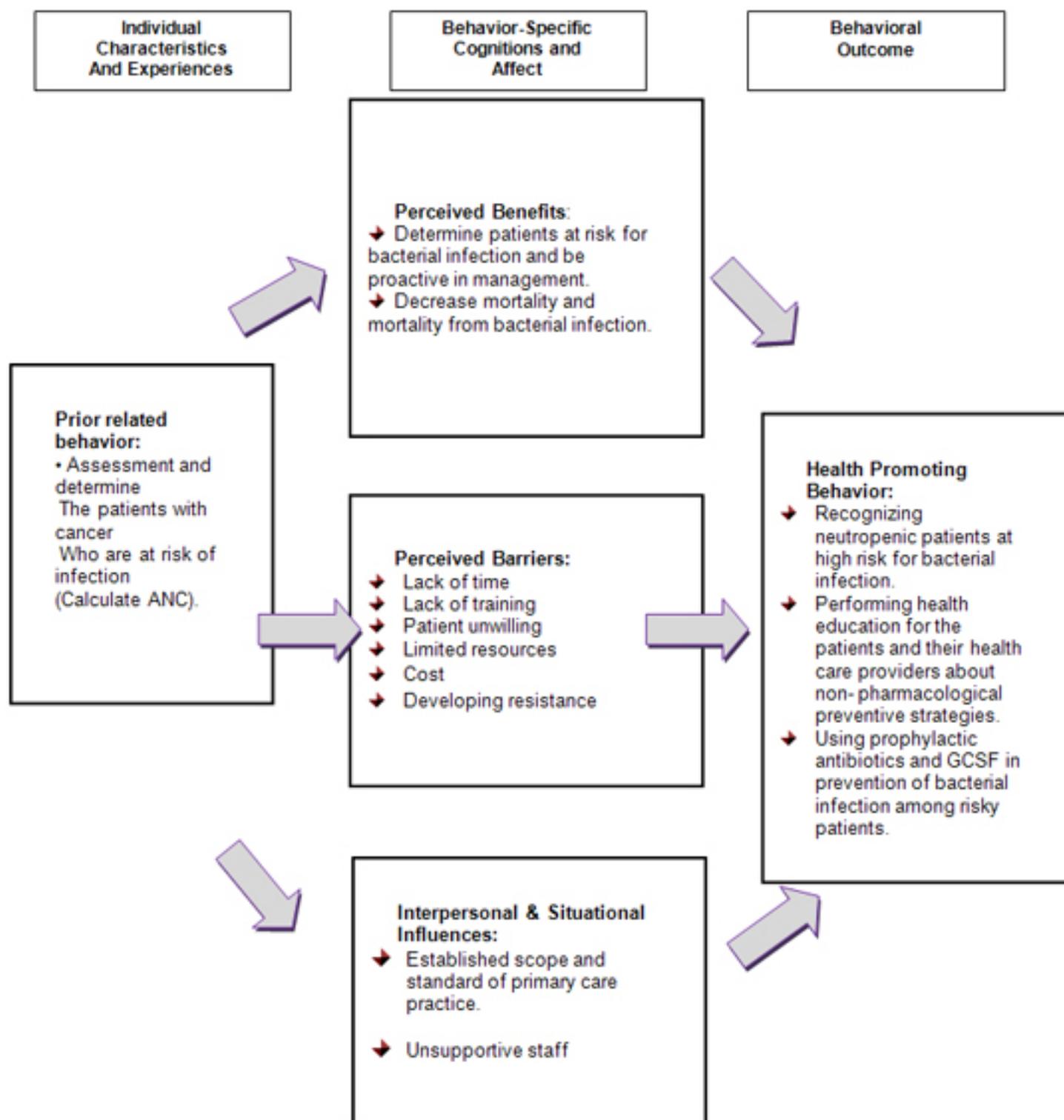


Figure 2: The Health Promotion Model Applied to Prevention of Bacterial infection in neutropenic patients with cancer by the Health Care Providers

Gram-positive organisms:

The most commonly isolated gram-positive pathogens from neutropenic patients are Coagulase-negative *staphylococci* (CoNS) followed by *Staphylococcus aureus*, *Enterococcus species*, and *viridans group streptococci* (VGE) (Agboola and Balducci, 2003; Bucaneve et al., 2005).

Organisms colonizing the skin also cause infections, frequently including catheter-related bacteremias. These include *Bacillus* species and *Corynebacterium* species.

Some recent reports have focused on the increasing frequency of infections caused by *Stomatococcus mucilaginosus*, particularly in patients who develop severe oral mucositis (Kuderer et al., 2007; Cornely et al., 2007). Although *Listeria monocytogenes* and *Rhodococcus equi* are encountered more frequently in patients with impaired cellular immunity, they need to be considered when such patients are rendered neutropenic (Cullen and Bajjal, 2009). Many gram-positive pathogens have developed resistance to agents commonly used for prophylaxis of febrile episodes in neutropenic patients.

At most cancer treatment centers more than 90% of CoNS and >50% of *S.aureus* isolates are methicillin-resistant (Jorgensen and Gotzsche, 2009).

This highlights the critical role of antimicrobial stewardship and infection control in the overall management of febrile episodes in neutropenic patients with cancer (Cullen and Bajjal, 2009).

Gram-negative organisms:

Escherichia coli, *Klebsiella* species, and *Pseudomonas aeruginosa* are the most common gram-negative pathogens isolated from neutropenic patients with cancer and collectively account for 60-65% of documented bacterial infections (Cornely et al., 2007).

As with gram-positive pathogens, resistance levels among gram-negative pathogens have risen to alarming levels (Kuderer et al., 2007). Gram-negative infections have traditionally been associated with greater morbidity and mortality than gram-positive infections with a few notable exceptions (MRSA, VRE).

Most common sites of infection

The most common sites of infection is the bloodstream infections, respiratory tract infections (both upper and lower respiratory tract), and urinary tract infections (Kenneth & Rolston, 2009).

Most bacteremias, urinary tract infections, and some skin and skin structure infections are microbiologically documented, whereas most infections at other sites are clinically documented. The majority of these are diagnosed using a combination of clinical features and information from radiographic imaging, ultrasonography, serologic testing, or other laboratory diagnostic techniques (Trueman, 2009).

Preventive strategies (pharmacological and non-pharmacological)

Preventive strategies (before developing infection) are recommended to prevent further infection complications. There are pharmacological and non pharmacological strategies used to prevent the bacterial infections in neutropenic patients with cancer, and many randomized controlled trails support and recommend these strategies.

Non pharmacological

Protective isolation:

Neutropenic patients with cancer should be educated to avoid or minimize exposure to potentially infectious people. Visitors should be screened for symptoms indicating potential respiratory infection and instructed not to visit patients if an infection is found (Larson & Nirenberg; 2004).

Hand Washing:

Hand washing for both the health care providers and the patients has been proven by multiple, well-designed studies to be one of the most effective ways to prevent the transmission of infection (Boyce and Pittet, 2002; Sehulster and Chinn, 2003; Shelton, 2003; Smith and Kagan, 2005).

Despite the strong evidence that hand washing decreases the risk of infection, clinicians are not always compliant in washing their hands before and after patient contact. The key to hand washing is friction during washing and thorough drying of the hands. Either soap and warm water or an antiseptic hand sanitizer may be used, although soap and water are preferable if hands are visibly soiled or contaminated with proteinaceous material (Smith and Kagan, 2005).

Diet

Dietary restriction as Larson and Nirenberg conclude in there study about the measures to prevent infection in neutropenic patients with cancer, have been common practice. Despite the lack of evidence to demonstrate decreased risk of infection with dietary restrictions, nearly all institutions recommend dietary restrictions to their patients. The most common recommendation is to avoid uncooked meats, seafood, and eggs and unwashed fruits and vegetables (Larson & Nirenberg, 2004; Kummel et al., 2005; Hauser et al., 2006).

Pharmacological

Using prophylactic medications is also an effective measure in prevention of such infections. To be considered as a prophylactic pharmacological regimen it is very important to administer the medication before the onset of neutropenia after risk assessment. The literature recommends the effectiveness of using prophylactic antibiotics, and G-CSF in decreasing bacterial infections in neutropenic patients with cancer (Avery et al., 2002; Larson and Nirenberg, 2004; Kenneth et al., 2005).

In 2007, several studies recommend that using prophylactic anti-fungals (posaconazole, fluconazole or itraconazole) are effective in prevention of invasive fungal infections in patients undergoing chemotherapy for acute myelogenous leukemia or the myelodysplastic Syndrome (Cornely et al., 2007; Kuderer et al., 2007).

For bacterial infection, which is the scope of this paper, there is significant evidences for using prophylactic antibiotics and granulocyte colony stimulating factors G-CSF to reduce infections in neutropenic patients with cancer. On the other hand many studies showed a significant decrease not only in the incidence of fever, bacteremia, and infection but also in overall mortality (Cullen et al., 2005; Kummel et al., 2005; Kuderer et al., 2007).

Antibiotic prophylaxis should be offered to patients receiving chemotherapy for acute leukemia and high dose chemotherapy for solid tumors. It should also be offered to those receiving moderately myelosuppressive chemotherapy. For solid tumors and lymphomas during the first cycle of chemotherapy, Antibiotic prophylaxis is defined as antibiotics prescribed for patients undergoing chemotherapy to decrease the risk of infection during chemotherapy-induced neutropenia (Zitella et al., 2006).

Oral prophylactic antibiotics decreased Gram-negative bacteraemia and infection related mortality due to bacterial causes occur during neutropenic episodes in oncology patients (Wetering et al., 2005; Zitella et al., 2006).

Prophylactic G-CSF reduces the risk of FN and early deaths, including infection-related mortality (Kummel et al., 2005; Kuderer et al., 2007).

Many studies conclude that using granulocyte colony stimulating factors G-CSF as prophylaxes reduces the severity and duration of chemotherapy-induced neutropenia and the risk of infection (Crawford et al., 1991; Avery et al., 2002; Cullen and Bajjal, 2009).

CSFs were associated with a 20 % reduction in febrile neutropenia and shorter duration of hospitalization (Johanna et al., 2005; Hauser et al., 2006).

Concerns about Prophylactic Antibiotic and GCSF

Treatment cost

There are controversial issues related to the cost effectiveness of using prophylactic antibiotics as well as prophylactic G-CSF. In this regard there have been many studies conducted to assess the cost of these prophylactic measures. One study conducted in 2006 hypothesized that the addition of prophylactic G-CSF to prophylactic antibiotics in patients considered at risk of neutropenic fever might increase the cost for the institution (Bucaneve et al., 2005). Another study was conducted in 2003 with the same aim but for prophylactic antibiotics and recommended the use of prophylactic antibiotics in terms of cost effectiveness. (Heijnen, 2003).

In the author's point of view we need to compare this cost with the long periods of hospitalization (as a result of infection cost, so further studies and reviews are needed to address this issue).

There are several studies that suggest that antibiotic and GCSF prophylaxis is cost-effective in these patient groups.

Antibiotic resistance

The main concern over the use of prophylactic antibiotics remains the emergence of antibiotic resistance, and its implications both for the individual patient and at ward level (Fraser and Paul, 2006). There is no doubt that routine prophylactic use of antibiotics can cause colonization of individual patients with resistant organisms, but the clinical relevance of this is unclear. (Bucaneve et al., 2005) observed a non-significant increase in the incidence of levofloxacin-resistant Gram-negative bacteraemia among patients receiving levofloxacin, but this did not affect outcomes such as infection-related morbidity or mortality. (Gvili et al., 2005) found that the risk of developing antibiotic resistance did not increase significantly secondary to prophylaxis, and that there was a low incidence of infections caused by resistant bacteria in patients who had received prophylaxis.

However, there is no convincing evidence that patients have suffered adverse outcomes as a result. (Glasmacher and Prentice, 2005) found that after fluoroquinolone prophylaxis had been in use for 10 years, and there was an increase in the number of cancer patients colonized or infected with fluoroquinolone-resistant *Escherichia coli*.

Bone pain

About 20% of patients who received G-CSFs reported bone or musculoskeletal pain, which is a characteristic adverse event associated with G-CSF treatment.

This is generally mild to moderate and can be managed with standard analgesics (Fraser and Paul, 2006).

Although administering a lower-than-recommended dose of G-CSF was reported to be successful in reducing bone pain (Anat et al., 2009) this strategy obviously risks achieving suboptimal protection against FN (Johanna et al., 2005; Glasmacher et al., 2006) and it is at yet unclear whether bone pain is dose-related.

Recommendations & Nursing Implication

Nurses in their practice have to be proactive in preventing bacterial infection in neutropenic patients with cancer. As health care providers we have to practice our vital role in educating patients and their families to prevent these infections; we also have to consider the concerns about using pharmacological measurements to prevent bacterial infection in these patients and to balance the risk benefit ratio.

We can apply the concepts of health promotion and health protection to guide our practice as the author discusses in this paper.

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The Economical Effect of a Macrobiotic Lifestyle in some Middle Eastern Countries

ABSTRACT

The purpose of this research is to find out whether a new lifestyle like macrobiotics could be accepted by the Middle Eastern people and specifically the Lebanese market and society. This study researched the feasibility of such a lifestyle from an economic perspective. Based on the results of this research and the tested statistical hypotheses, the researcher concluded that a macrobiotic, natural foods diet is very economical only if practiced correctly in accordance with one's culture (or place of residency) and if the "international or super-foods" are less expensive or substituted for locally. The researcher also pointed out that natural and organic food has recently become more easily accessible in shops, and in the long run results in substantial savings in many areas of life. This can be one of the encouraging factors that attract low income societies to this lifestyle.

Introduction

A macrobiotic diet is very economical and in the long run results in substantial savings in many areas of life. According to a weekly basket survey, the typical macrobiotic household spends 35-50% less on its weekly food budget on grains, fresh vegetables and naturally processed items than an ordinary family spends on meat, dairy products, canned foods, frozen foods and food stuffs imported from distant climates. Lowered food costs as a whole, for each family, would further contribute to an increase in real income, more leisure time and a general improvement in the quality of life (Kushi & Jack, 2001).

Materials and Methods

In previous studies, the health and social impact of macrobiotics on preventing and curing diseases was investigated. In this study, the researcher investigates the economical effects of macrobiotics on the people in this region: dining out, their relationships with friends and family, eating at work, their religious practices and monthly expenses. The research follows a quantitative approach which consists of a questionnaire and the analysis and interpretation of the generated data with the help of Statistical Package for the Social Sciences (SPSS).

a. Research variables

The researchers covered the necessary variables needed in order to form a clear understanding about the subject. And as clearly stated in the analysis below, two or more of these different variables together with the help of SPSS were linked. The set of independent variables investigated in this study are:

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1. Profession
2. Age
3. Gender
4. Education
5. Nationality
6. Marital Status
7. Number Of Members Living in the Same Household
8. Duration on Macrobiotics
9. Number of Meals Consumed Per Day
10. Estimated Monthly Home Food Expenses During a Non-macrobiotic Lifestyle
11. Estimated Monthly Home Food Expenses During a Macrobiotic Lifestyle
12. Impact Of Macrobiotics on Overall Monthly Food Expenses
13. Place to Purchase Macrobiotic Groceries
14. Effect of Macrobiotics on Changing Cookware and Utensils

b. Data Collection and Analysis

The most common source of data for such research is communicating with respondents. Thus, this study used a set of questionnaires filled in by a random sample of respondents. Since the percentage population who follow macrobiotics or have sufficient knowledge of it is very small (less than 1%), only individuals that have been exposed to this lifestyle were studied. A subject data-gathering technique would provide a deeper and wider range of information. For this reason, a one-on-one survey was used. In addition, the sample size was limited to 156 individuals. The samples were collected from two major places in Beirut, Lebanon: Salam Center and Beit Al Afiyah.

c. Research Question and Hypotheses

Q1: What economic value does a macrobiotic lifestyle implicate on a Middle Eastern family budget?

The hypotheses discussed below are based on macrobiotic people who live in the Middle East.

H_1 : Less than 50% limit eating out at restaurants

HOW DID MACROBIOTICS AFFECT YOU AT WORK

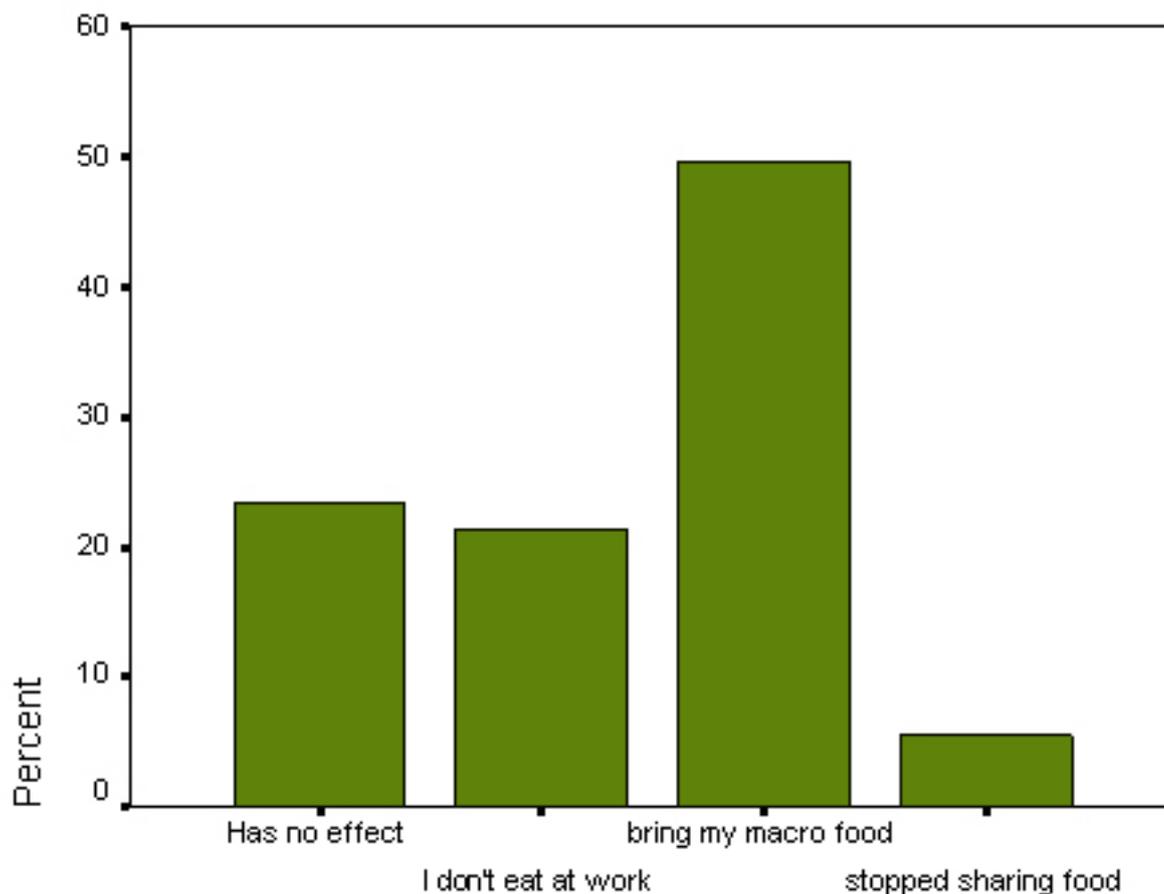


Chart 1: Percentage of sample responses to macrobiotics effects on eating at work

Category label	Code	Count	Pct of Responses	Pct of Cases
Has no effect	1	40	20.8	26.0
Limit eating out at restaurants	2	99	51.6	64.3
Limit the acceptance of invitations	3	39	20.3	25.3
Limit your invitation to friends at home	4	14	7.3	9.1
		-----	-----	-----
Total responses		192	100.0	124.7
2 missing cases; 154 valid cases				

Table 1: Group SOCIAL: Macrobiotics effect on Social life

H₂: More than 70% bring their own macrobiotic food to work

H₃: Less than 50% believe that macrobiotic lifestyle is more expensive than regular lifestyle.

d. Scope and Limitations

There were several limitations to this study ranging from time to places from which samples were collected. The first major limitation of this study was the fact that the researcher had limited time to gather information. This is because the high season for people from all over the Middle East to visit Lebanon is in August. So the time frame was limited to only one month.

Another limitation was the sample size. The fact that choosing a random sample of respondents to gather data from, and then checking/organizing the gathered data would cost even more time, the researcher was bounded by a set of 156 questionnaires.

Results and Findings

According to the “normal distribution theory”, the sample size of 156 respondents will lead to results that have a 7.8% margin error and 95% confidence interval (Churchill, 2001). All the results are presented in charts and tables obtained from the outputs files of the SPSS software.

			Has no effect	Macrobiotics is less expensive	Macrobiotics is more expensive	I don't care	Total
Occupation	Student	Count	7	14	9	4	34
		% within occupation	20.6%	41.2%	26.5%	11.8%	100.0%
	Self employed	Count	2	10	6	5	23
		% within occupation	8.7%	43.5%	26.1%	21.7%	100.0%
	Employed	Count	2	16	5	4	27
		% within occupation	7.4%	59.3%	18.5%	14.8%	100.0%
	Housewife	Count	6	21	13	8	48
		% within occupation	12.5%	43.8%	27.1%	16.7%	100.0%
	Retired	Count		2	1	1	4
		% within occupation		50.0%	25.0%	25.0%	100.0%
Unemployed	Count	1	1	2	3	7	
	% within occupation	14.3%	14.3%	28.6%	42.9%	100.0%	
Total		Count	18	64	36	25	143
		% within occupation	12.6%	44.8%	25.2%	17.5%	100.0%

Table 2: Cross tabulation between “Occupation” and “How macrobiotics affects one’s monthly expenses”.

			Has no effect	I don't eat at work	I bring my own macrobiotic food to work	I stopped sharing food with friends at work	Total
Occupation	Student	Count	11		16	1	28
		% within occupation	39.3%		57.1%	3.6%	100.0%
	Self employed	Count	5	6	15	1	27
		% within occupation	18.5%	22.2%	55.6%	3.7%	100%
	Employed	Count	5	5	16	1	27
		% within occupation	18.5%	18.5%	59.3%	3.7%	100%
	Housewife	Count	6	17	22	4	49
		% within occupation	12.2%	34.7%	44.9%	8.2%	100%
	Retired	Count	2		2		4
		% within occupation	50.0%		50.0%		100%
Unemployed	Count	2	2	1		5	
	% within occupation	40.0%	40.0%	20.0%		100%	
Total		Count	31	30	72	7	140
		% within occupation	22.1%	21.4%	51.4%	5.0%	100%

Table 3: Cross tabulation between “Occupation” and “How macrobiotics affects one at work”.

a. Data Analysis and Testing

As illustrated in the bar chart and table below, 49.7% of the sample brings his/her own food to work (Chart 1, - page 29), and 51.6% of the sample limited eating out at restaurants (Table 1 - page 29).

Cross Tabulation of Data

Cross tabulation is extremely important, since it gives clear information and comparison between any two variables. Below, the two tables that are used later on in the conclusions may be checked.

- Within occupation, 59.3% of the employed believe that macrobiotics is less expensive; while 28.6% of the unemployed believe otherwise (Table 2 - opposite).
- Within occupation, 57.1% of the students and 59.3% of the employed bring their own macrobiotic food to work (Table 3 - opposite).

Hypothesis Testing

- H_1 : Less than 50% limit eating out at restaurants.

According to Table 1, 51.6% of the sample limits eating out at restaurants. Thus, this hypothesis is rejected.

H_3 → reject

- H_2 : More than 70% bring their own macrobiotic food to work.

According to Chart 1, 49.7% of the sample brings his/her own food to work. Thus, this hypothesis is rejected.

H_3 → reject

- H_3 : Less than 50% believe that a macrobiotic lifestyle is more expensive than a regular lifestyle.

According to Table 2, 25.2% of the sample believes that macrobiotic food is more expensive. Therefore, this hypothesis is rejected.

H_7 → reject

Discussion and Conclusion

Q1: What economic value does a macrobiotic lifestyle implicate on a Middle Eastern family budget?

According to Table 1, more than half of the sample limits eating out at restaurants and as illustrated in Chart 1 around half of the respondents bring their own macrobiotic food to work. The more families consume home-made food, the more they can save on food.

According to hypothesis H3, Table 2 reveals that only one quarter of the sample believes that a macrobiotic lifestyle is more expensive than a regular diet. Around 45% stated that this lifestyle is overall less expensive in spite of the food cost (being organic and of high quality) that may be more expensive.

Around 45% of the sample believes that this lifestyle is overall less expensive and affordable compared to the current Middle Eastern diet and lifestyle which has been recently very much “westernized” with the increase of fast-food and other temptations .

Summary and Conclusion

Many organic products, and in particular the Japanese macrobiotic items, are expensive. Sea vegetables, for instance, are expensive, but you don't use them up really quickly and they are well worth it in terms of your health. Umeboshi plums and miso are also not cheap, but they are also like SUPERPOWER foods. On the other hand, any expensive macro food may be balanced by the low prices of grains and beans, your staples (depending on the trademark). If you are trading red meat and dairy for grains and beans, your overall food bill should go down. Thus, it could be an economical way of eating and staying healthy.

Organic food from reputable companies are sold in small corners at major supermarkets or at small independent shops, and could cost anywhere from 20% to 100% more (whether imported or local). Very few outdoor markets are available where vendors claim to have organic or natural produce (and many of them are not accredited as organic).

No doubt, organic and natural food need to be more accessible and feasible in the Middle East. This would definitely encourage those who want to follow macrobiotics (or any healthy lifestyle for that matter) but are afraid of its economical impact especially with big families. Healthy items that could replace “fast food” should also be more available and priced more reasonably.

The researcher also believes that it should be easier for the Lebanese to adopt organic food since their climate facilitates such an agriculture. People can even grow some of their vegetables on balconies and small backyards in Lebanon. This is not very doable in Gulf countries limited by the desert climate.

The people who get involved in macrobiotics are coming to it from a compulsion to heal, philosophical interest or because of celebrity driven PR that promotes well-being (Varona V). That is fine, but ultimately, the most inspiring factors that can sustain macrobiotics will be food availability, feasibility and its familiarity.

Another thing is the poverty mentality that is so rampant among macrobiotic institutions, organic food companies, etc. Few see the value of spending any money to attract new faces, print better marketing brochures, or sponsor events, etc. The reason they give is, “but, we have no money!” or “word-of mouth is better”. The researcher encourages them to become better marketers and to invest (even if minimally) in marketing healthy products, rather than allowing the unhealthy industries to brain wash our communities. They can also find sponsors, and pitch to people with money to chip in. It's all about marketing, ultimately.

Generally, you can expect to reduce your food bills from 20% to 50% by switching from a modern diet to a well-balanced macrobiotic diet and healthy overall lifestyle. And if you include the savings in medical costs because of enhanced health and well-being resulting from adopting a macrobiotic diet, the savings are multiplied. Governments can endorse a healthier lifestyle by decreasing taxes on organic/macrobiotic food and encouraging organic agriculture and wholesome “home-made” pantry items.

(References are on page 20)

Gestational weight gain and its adverse effects in a Saudi Obstetric population

ABSTRACT

Objective: To estimate gestational weight gain (GWG), and its effects on pregnancy outcomes among Saudi women.

Methods: This study involved 769 women registered for antenatal care at primary health care centers. Their body mass index was calculated at the initial visit. Maternal weight was measured at each visit and before delivery, and gestational weight gain was calculated. Obstetric outcomes of mother below and above the Institute of Medicine (IOM) GWG recommendations were compared to the outcomes in mothers with GWG within the IOM recommendations group.

Results: GWG was below and above the IOM recommendation in 16.4 and 47.3% of all mothers, respectively. Mothers above IOM recommendations were at increased risk of pregnancy-induced hypertension (relative risk (RR) = 4.9); gestational diabetes (RR = 3.8); preeclamptic toxemia (RR = 4.6); and Caesarean section (RR = 2.2). Neonates born to these women had an increased risk for postdate pregnancy, macrosomia, and admission to neonatal care units. Infants born to women with GWG below IOM recommendations were at increased risk of preterm delivery, low birth weight, low Apgar score and admission to neonatal care units.

Conclusion: Mothers with GWG beyond the normal range recommended by IOM are at increased risk of adverse pregnancy outcomes.

Key words: Gestational weight gain, Body mass index, Adverse pregnancy outcomes

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Introduction

Efforts to improve maternal and fetal nutrition during pregnancy have focused on achieving appropriate energy intake to meet maternal and fetal requirements. In 1990, the Institute of Medicine (IOM) of the United States of America (USA) released guidelines for weight gain during pregnancy(1). Since this time many aspects of the health of women of childbearing age have changed. There is an increase in the prepregnancy body mass index (BMI) and gestational weight gain (GWG)(2). Therefore IOM issued a new guideline for GWG formulated for each category of prepregnancy BMI based on the World Health Organization cutoff points for BMI categories. This new guideline includes a specific, relatively narrow range of recommended gain for obese women(2).

Gestational (maternal) weight gain refers to the amount of weight gain from conception to delivery and is determined by prepregnancy weight status(3). Studies showed that GWG within the IOM recommended range was associated with the best outcome for both mothers and infants. However, weight gain in most pregnant women is not within the IOM's range(3-11). GWG above the IOM guidelines was more common than GWG below these guidelines(12). Overweight women are more likely to gain above the guidelines and underweight women are more likely to gain below the guidelines(9).

Many studies reported that both excessive and unsatisfactory GWG were associated with adverse maternal and infant outcomes(12-22).

Unfortunately, information on GWG from developing countries is scarce. To the best of our knowledge no study on gestational weight gain has been done in the Kingdom of Saudi Arabia. Therefore, this study aims to estimate gestational weight gain, its variation according to body mass index in early pregnancy and its effects on pregnancy outcomes in Al-Hassa, Saudi Arabia.

Population and Methods

This is a prospective cohort study carried out in Al-Hassa, Saudi Arabia. The target population was women initiated into antenatal care in the first month of pregnancy during the year 2007.

Al-Hassa is the largest province, in Saudi Arabia's Eastern region having a population of 908,366. Maternity care is provided through a network of 47 primary health care centers (PHCCs) that cover urban, rural and Hegar (Bedouin desert collection) areas; in addition to the private sector, ARAMCO Petroleum Company, and the National Guard and Maternity Hospital provide maternity care. The implemented antenatal care is the classic schedule, with 13 visits throughout pregnancy.

Eligible candidates were all women, attending PHCCs within the first month of pregnancy and who were willing to come for regular follow-up throughout pregnancy. Exclusion criteria were any prepregnancy chronic medical diseases (e.g. hypertension, diabetes, renal, cardiac diseases and sickle cell disease) and multiple pregnancies.

The study was approved by the Local Directorate of Health and mothers gave their verbal consent to participate in the study.

Prevalence of obesity and its impact of body mass index on pregnancy outcome in this group of women was published in two previous articles(23,24). A total of 787 women were included in the second study. Of these women, 18 were excluded from the current study because their body weight was not recorded before delivery. Thus a total of 769 women were enrolled in the current study.

The women were interviewed at the PHCCs by Arabic-speaking female nurse interviewers who were oriented about the study and trained on data collection. A predesigned and tested questionnaire was used for the interview. Demographic and socio-economic data (age, gravidity, education, occupation, family income) were collected from women during the interview. Additional data (number of antenatal care visits, place of delivery and pregnancy outcome) were collected from the family file and the maternity cards maintained at the PHCCs and also from the hospital discharge form. The maternity card is shared by the health centers and the hospital. There is continuous stress on the need to keep this card complete and up-to-date(25).

The height (in meters) of the study participants was recorded at the first antenatal visit, while the weight (in kilograms) was recorded at each visit and just before admission to the delivery room. Height was measured with a stadiometer accurate to 0.1 cm, with the mother standing and without shoes. Body weight was measured with calibrated electronic Seca scales (Seca Ltd, Birmingham, UK) accurate to 0.1

kg, with the subject wearing the lightest possible clothes. The measurements were used to calculate Quetelet's index or the body mass index (BMI) using the formula $\text{weight (in kg)}/(\text{height in meters})^2$. According WHO, BMI values are classified into four categories: underweight: <18.5 , normal weight: $18.5-24.99$, overweight: $25-29.9$, and obese $\geq 30(26-28)$.

We calculated total gestational weight gain as the difference between the last weight recorded before delivery and weight at the first antenatal visit. We also categorized women as having gained below, within, or above weight recommended by the Institute of Medicine (IOM) modified guidelines(2). These guidelines recommend that underweight women (pregnancy BMI $<18.5 \text{ kg/m}_2$) should gain 12.5-18 kg; that normal weight women (pregnancy BMI $18.5 - 24.9 \text{ kg/m}_2$) should gain 11.5-16 kg;- that overweight women with (pregnancy BMI $25.0 - 29.9 \text{ kg/m}_2$) should gain 7-11.5 kg, and that obese women (pregnancy BMI $\geq 30.0 \text{ kg/m}_2$) should gain 5-9 kg.

The obstetric outcomes that we examined, included pregnancy-induced hypertension, gestational diabetes mellitus, preeclampsia, route of delivery, gestational age at delivery, stillbirth, birth weight, 1-minute Apgar score, and admission to neonatal intensive care unit. Low Apgar score is defined as <7 . Gestational age at birth was defined as the number of completed weeks of gestation based on the delivery date in the clinical record. The definitions employed were as follows: a preterm delivery was an infant delivered at <37 weeks' gestation, a postdate delivery was a live infant delivered at >42 weeks' gestation, low birth weight (LBW) was an infant weighing $<2500 \text{ g}$ at birth, and macrosomia referred to an infant weighing $>4000 \text{ g}$ at birth(29-30).

Categorical variables were presented as number and percent. Quantitative variables were presented as mean \pm SD. Women with gestational weight gain within the IOM recommendations were used as the reference or comparison group for the analysis. The chi-square test (χ^2) or Fisher's exact test was used for comparison of categorical variables, as appropriate. $P \leq .05$ was chosen as the level of statistical significance. We used the SPSS v. 11 (Statistical Package for Social Sciences, Chicago, USA) for the statistical analysis. To quantify the risk of bad antenatal or neonatal outcomes in the study groups we calculated the relative risk (RR) with 95% confidence intervals (CI).

Results

The gestational age at the first visit ranged from 2 to 4 weeks after the last menstrual period. The gestational age at delivery ranged from 32 to 43 with a mean of 37.6 ± 3.9 weeks (not shown in the tables).

Table 1 (next page) shows the socio-demographic characteristics of the studied women. About 8%, 23.5% and 29.0% were underweight; overweight and obese, respectively. The overall mean gestational weight gain was 11.6 kg. The mean gestational weight gain was 13.5, 14.1, 11.2 and 7.9 among underweight, normal weight, overweight and obese mothers, respectively (Table 2 - next page). The GWG was below and above the IOM recommendation in 16.4 and 47.3% of all mothers, respectively. The corresponding figures were

	Mean±SD
Age	27.7±6.5
Antenatal visits	8.4±2.1
Gravidity	3.2±2.5
Early pregnancy weight (kg)	64.6±16.7
Height (cm)	155.7±5.6
Early pregnancy BMI	26.7±6.7
	n(%)
<Secondary education	311(40.4)
Housewives	631(82.1)
Unsatisfactory family income	195(25.4)
Hospital delivery	763(99.2)
Early pregnancy BMI categories:	
Underweight (BMI<18.5)	64(8.3)
Normal (BMI 18.5–24.99)	301(39.1)
Overweight (BMI ≥25-29.99)	181(23.5)
Obese (BMI ≥30)	223(29.0)

Table 1: Maternal socio-demographic and anthropometric characteristics

	Min-Max	Mean±SD
Overall	3.5-18.6	11.6±3.7
Underweight	5.6-18	13.5±2.7
Normal weight	10.4-18.2	14.1±2.5
Overweight	5.8-18.6	11.2±2.4
Obese	3.5-15.6	7.9±2.9

Table 2: Overall gestational weight gain and its variation with early pregnancy body mass index

	Below IOM recommendations n(%)	Within IOM recommendations n(%)	Above IOM recommendations n(%)
Overall	126(16.4)	279(36.3)	364(47.3)
Underweight	22(34.4)	38(59.4)	4(6.3)
Normal weight	59(19.6)	109(36.2)	133(44.2)
Overweight	9(5.0)	61(33.7)	111(61.3)
Obese	36(16.1)	71(31.8)	116(52.0)

Table 3: Overall gestational weight gain and its variation with early pregnancy body mass index

34.4% and 6.3% for the underweight group; 19.6% and 44.2% for the normal weight group, 5.0% and 61.3% for the overweight group and 16.1% and 52.0% for the obese women (Table 3).

Table 4 reveals that pregnancy induced hypertension, gestational diabetes mellitus, preeclampsia, Caesarean section, postdate, macrosomia, and admission to neonatal care unit were significantly more frequent among women with GWG above the IOM recommendations. On the other hand preterm delivery, low birth weight infants, one minute Apgar score and admission to neonatal intensive care unit were significantly more frequent among women with GWG below the IOM recommendations.

Discussion

In this cohort study, we evaluated the GWG and its association with adverse pregnancy outcomes in a sample of pregnant women with singleton term births in a Saudi community. We found that 36% of women gained weight within the IOM modified range and 16.4% gained less weight. The majority of women (47%) gained weight above the IOM modified recommendations. These figures approach the figures of the developed world. Even with improved access to nutritious foods and nutrition education, approximately two-thirds of women participating in the 2006 Missouri Pregnancy Nutrition Surveillance System in USA showed unsatisfactory GWG (46.6% greater than ideal GWG and 20.3% less than the ideal GWG)(3). Another US study reported that GWG above the IOM guidelines was more

	Below IOM recommendations (126)		#Within IOM recommendations (279)	Above IOM recommendations (364)	
	n(%)	RR(95%CI)	n(%)	n(%)	RR(95%CI)
Pregnancy induced hypertension	2(1.6)	1.1(0.2-6.0)	4(1.4)	26(7.1) ^c	4.9(1.8-14.1)
Gestational diabetes mellitus	0	-	5(1.8)	25(6.9) ^b	3.8(1.5-9.9)
Preeclampsia	1(0.8)	0.7(0.1-7.0)	3(1.1)	18(4.9) ^b	4.6(1.4-15.5)
Caesarean section	8(6.3)	0.8(0.4-1.7)	23(9.3)	67(18.4) ^c	2.2(1.4-3.5)
Stillbirth	2(1.6)	2.2(0.2-22.4)	2(0.7)	4(1.1)	1.5(0.3-8.3)
Preterm delivery (<37 weeks)	13(10.3) ^a	2.2(1.1-4.6)	13(4.7)	20(5.5)	1.2(0.7-2.3)
Postdate (>42 weeks)	3(2.4)	2.2(0.5-10.8)	3(1.1)	16(4.4) ^a	9.1(1.2-13.9)
LBW (<2.5 kg)	39(31.0) ^c	3.9(2.4-6.3)	22(7.9)	22(6.0)	0.8(0.4-1.4)
Macrosomia (>4 Kg)	0	-	2(0.7)	14(3.8) ^a	5.4(1.2-23.4)
One-minute Apgar score <7	16(12.7) ^c	3.5(1.6-7.6)	10(3.6)	23(6.3)	1.8(0.9-3.6)
Admission to NICU	15 (11.1) ^a	2.2(1.1-4.4)	15(5.7)	39(10.7) ^a	2.0(1.1-3.5)

#Reference group

LBW = Low birth weight; NICU= Neonatal Intensive Care Unit.

RR = relative risk; CI = confidence interval.

^{a,b,c} Significant difference versus Within IOM recommendations at $p \leq 0.05$, $p \leq 0.01$, and $p \leq 0.001$, respectively

Table 4: Adverse pregnancy and neonatal outcomes by gestational weight gain categories

common than GWG below (43.3% compared with 20.1%)(12). The Colorado Pregnancy Risk Assessment Monitoring System (PRAMS) reported that between 1997 and 2000, 22% and 40% of women gained unsatisfactory and excessive weight during pregnancy, respectively(6). A relatively recent Canadian study found that 52% of women gained more than the recommended weight and 17% gained less than the recommended(21). On the contrary, a Brazilian study found that 38% of women studied gained less and 29% had more than the recommended total weight gain(10). Another recent Brazilian study reported that 41% of pregnant women had unsatisfactory GWG and 22% had excessive GWG. The more unsatisfactory GWG in the developing countries compared to the developing countries could be attributed to inadequate nutrition during pregnancy. It is clear that Saudi women are approaching the pattern of GWG of the developed countries rather than developing countries i.e. excess GWG is much more frequent than less weight gain. This reflects the pattern of nutrition and the lack of physical activity among Saudi women. This is alarming in a country in its early stage of development with better resources and affluence. If not considered seriously, it could be possible that inadequate weight gain will have such a negative effect on pregnancy that it may detract from any benefits from proper antenatal care. However, currently there is no study in Saudi Arabia to support this possibility. This possibility needs to be confirmed by large scale prospective studies to compare the effect of GWG in mothers receiving adequate antenatal care with those who have not received care.

Adequate GWG, based on prepregnancy weight status, is considered to be a major determinant of birth weight as well as infant morbidity and mortality(3). The present study showed that GWG varies greatly according to BMI. Among underweight women, 34.4% and 6.3% gained less than and greater than the recommended GWG, respectively. The corresponding figures are 19.6% and 44.2% among normal weight women; 5% and 61% among overweight women; and 16% and 52% among obese women. Thus low GWG is more frequent among underweight women and excess GWG is more frequent among overweight and obese women. This may reflect the lack of appropriate nutritional advice before and during pregnancy. This observed pattern was reported in most of the previous studies. In the 2006 Missouri Pregnancy Nutrition Surveillance System only 26.3% of women who were overweight before pregnancy gained ideal gestational weight, while a majority (64%) gained greater than the ideal weight. More than 42% of underweight women gained the ideal gestational weight(3). Chu et al reported that approximately 40% of normal weight and 60% of overweight US women who delivered live births in 2004-2005 gained excess weight during pregnancy(11).

In San Francisco, USA 51.2% of underweight women gained less than the ideal gestational weight. On the other hand, 24% and 16.9% of overweight and obese women gained excess weight, respectively(31).

Women whose weight gain during pregnancy is outside the recommended ranges may experience various adverse

maternal outcomes and postpartum weight retention and subsequent maternal obesity(2).

Our study revealed that pregnancy induced hypertension, gestational diabetes mellitus, preeclampsia, Caesarean section, postdate, macrosomia, and admission to neonatal intensive care unit were significantly more frequent among women with GWG above the IOM recommendations. Previous studies in different communities reported that excess weight gain in all BMI categories was associated with different maternal and neonatal adverse effects such as Caesarean section(13,17,19-22), pregnancy induced hypertension(17,21), preeclampsia(19,22), and macrosomia(12-14,17-22,32) with different degrees of risk.

We found that preterm delivery, low birth weight infants, low one minute Apgar score and admission to neonatal intensive care unit were significantly more frequent among women with GWG below the IOM recommendations. Previous studies reported that low weight gain in all BMI categories was associated with different neonatal adverse effects such as preterm delivery(32), low birth weight(12,14,17-20,32), and admission to neonatal intensive care units(12) with different degrees of risks.

From this study is not clear whether GWG is a direct cause of adverse pregnancy outcome or whether the association between GWG interacting with prepregnancy BMI and adverse outcome is due to factors or characteristics that are shared by the three entities, such as advanced maternal age, higher gravidity and associated pregnancy complications. However, in our study population there were only a few mothers with advanced age and high parity, as this group of mothers is less likely to attend antenatal care in the first month of pregnancy (an inclusion criterion). So, we do not have enough numbers to find a possible causal association.

This study adds to the increasing evidence suggesting that abnormal GWG is associated with numerous maternal and neonatal risks. Although the women with abnormal GWG included in our study were receiving adequate antenatal care, they experienced many adverse pregnancy outcomes.

A nationwide community-based prospective study may provide in-depth knowledge to establish a reference curve for GWG of Saudi women and the impact of different categories of GWG on pregnancy outcomes among different BMI categories. Also there is a need to shift research to predictors of abnormal GWG and its short- and long-term effects on women's and children's health. Awaiting the availability of such data, we should promote the use of modified IOM recommendations for the total GWG and the rate of weight gain and promote healthy eating during pregnancy.

Limitations

As mentioned in our previous articles(23,24) the study is clinic-based and included women attending PHCCs in only one region of the Kingdom. Late attendees, those who received care at other health sectors, and those receiving no care at all were not included. Weight and height were measured at the booking antenatal visit during the first month of pregnancy; prepregnancy measurements were not available. Furthermore, the stratified analysis of the adverse effects of different GWG categories within each BMI category are not adequate due to the sample size.

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