World Family Medicine Journal
incorporating the Middle East Journal of Family Medicine

ISSN 1839-0188

August 2013 - Volume 11, Issue 6

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# From the Editor

World Family Medicine Journal/Middle East Journal of family medicine has reached an excellent status with the help of all concerned and the number and quality of papers received has improved drastically. Currently the impact factor of the journal is around eleven and is going to continue climbing.

In this issue a cross-section study was carried out on 90 diabetic foot patients during 11 months in Erbil city, Iraq. The patients were clinically assessed, foot lesions were graded according to Wagner classification system and their serum had been estimated for procalcitonin by Vitek Immuno Diagnostic Assay System. Serum procalcitonin levels elevated significantly in diabetic foot patients with higher Wagner grades (III, IV and V) (0.28±0.04, 0.30 ±0.07 and 0.60 ±0.11) respectively compared with those with lower grades (I and II) (0.03± 0.00 and 14± 0.04). The authors concluded that procalcitonin may be a useful and new diagnostic marker in infected diabetic foot patients especially in those with higher Wagner grades and with polymicrobial infection.

A cross-sectional study was performed at the Family Medicine department, Suez Canal University (SCU), Egypt. The randomly selected prescriptions (n=532) were audited by the researchers regarding prescribing errors and WHO indicators using predesigned forms. All prescriptions had one or more omission errors. Errors of commission are not prevalent except wrong strength and dose of medicines that were detected in 10% of prescriptions. The authors concluded that a structured prescribing training program is needed to improve physicians' prescribing skills for children in family medicine

A paper from Amman Jordan investigated the prevalence of iron deficiency anemia in school children aged 6 to 18 years, who attended schools where two meals are offered. The study sample consisted of 186 children, 141 (75.8%) male students, and 45 (24.2 %) female students. Complete blood count (CBC) was performed for all children. The prevalence of iron deficiency was 4.3%. The prevalence of iron deficiency among females was 6.6%, and among males was (3.5%). The authors concluded that two meals school program mainly in rural area reduces the prevalence of iron deficiency anemia in school children.

A paper from Egypt looked at Promotion of inter-conception maternal health through child vaccination sessions This intervention study included 75 mothers coming to vaccinate their infants at two, four and six months at Heit family health unit (FHU). Interventions included health education (HE) and free iron supplementations. HE succeeded in increasing exclusive breastfeeding, decreasing the prevalence of anemia from 81.5 % in the first visit, to reach 7.4 % in the third visit, increased the use of contraceptives and the shift from inappropriate methods to a lactation-friendly method. The authors concluded that inter-conception care has a high potential in improving the health and behavior of postpartum mothers. It is recommended to include inter-conception care for all mothers attending with their infants in the first year of life.

A prospective clinical study of 33 patients injured with fireworks inYemen identified the age groups referred to hospital with fireworks related injuries , the devices most frequently causing injuries , the pattern and severity of the injury , and the site of the injury and the resulting disabilities. Most patients were male (93.9%). The majority were at age group 5-10 years (66.6%). The most frequent fireworks causing injuries were rockets and missiles(48.5% ) followed by homemade grenades (24.2 %). Hand injuries were the most common (63.3 %) followed by face and eye (12.1%) and (9%) respectively. One child with both eyes injured became blind. Three patients had amputated thumbs and 3 amputated hands from the wrist. None of the patients died due to these injuries. The authors concluded that fireworks injuries are serious injuries and dealing with them should be by expert doctors.

A Cross sectional descriptive study from Colombo assessed the food habits and factors associated with them among adolescent school children. Eight hundred students (525 from urban government schools, 200 from rural government schools, 75 from private international schools) came from eight randomly selected clusters in Colombo district. Most of the adolescents consumed homemade food for main meals with increase in breakfast consumption from shops. Only 34% had consumed 5 or more portions of fruits and vegetables for a day and fast food (43%) and sweets (61%) consumption was high. Fast food, sweets, soft drink consumption, eating from food outlets increased with the amount of pocket money received. The authors concluded that unhealthy food habits are on the rise among adolescents and amount of pocket money received was associated with many. Findings from this study can be used in designing interventions in order to promote adolescent food habits.

An observational non random therapeutic trail, was conducted in the consultation unit of otolaryngology center in surgical specializations Hospital in Medical city. The aim was to study short term effect of intranasal steroid in the management of otitis media with effusion. The study involved 60 children aged from 3 to 10 years diagnosed as having bilateral otitis media with effusion. Complete clinical and audiological assessment for all patients was done. Patients were divided into 2 groups: those taking intranasal steroids (an intervention) and the other group who received no steroid treatment. The measurement of reduction in the air bone gap is the desired response. Reduction in ABG in treatment group was significant with ($p<.005$) and this is consistent with other studies. The authors concluded that short term intranasal mometasone are likely to be effective in treatment of Otitis Media.

## Original Contribution / Clinical Investigation



## Medicine and Society



## Clinical Research and Methods

# Quality of Prescription writing for children in family medicine, Suez Canal University, Egypt

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## Abstract

**Background:** Worldwide prescribing errors are highly prevalent and patient safety should be a priority in different healthcare systems. Most prescribing errors are thought to be avoidable.

**Objectives:** Identification of types of prescribing errors for children, assessment of prescribing pattern based on core WHO prescribing indicators, as well as factors affecting the quality of prescriptions.

**Methods:** This cross-sectional study was performed at the Family Medicine department, Suez Canal University (SCU), Egypt. The randomly selected prescriptions (n=532) were audited by the researchers regarding prescribing errors and WHO indicators, using predesigned forms. The field work was conducted from February to March 2012, and the study was completed in September 2012.

**Results:** All prescriptions had one or more omission errors. Errors of commission are not prevalent except wrong strength and dose of medicines that were detected in 10% of prescriptions. The overall mean number of drugs prescribed per patient encounter was 2.1±0.5. The percentage of total prescriptions for drugs prescribed by generic name was 1.2% while that of encounters with prescription of antibiotics and injections were 52.8 and 17%, respectively. Only, the consultation time and place of treatment were found to have significant effects on the prescriptions' quality.

**Conclusion:** A structured prescribing training program is needed to improve physicians' prescribing skills for children in family medicine

**Key words:** Prescribing, errors, indicators, children, family medicine, Egypt

## Introduction

Worldwide prescribing errors are highly prevalent and patient safety should be a priority in different healthcare systems. Many patients appear to be harmed by errors every year, and around one third to one half of these errors are thought to be avoidable.(1-2) The published research has concentrated on medication errors and their prevention in adults. However, limited evidence suggests that incidence of medication errors and corresponding harm is higher in children than in adults.(2-3) There are several potential sources of errors in prescribing for children. For example, most drug doses in children are calculated individually, based on the patient's age, weight, body surface area, and their clinical condition. This increases the likelihood of dosing errors.(4)

The paper prescription form should be legible, precise, complete, and unambiguous in its interpretation to minimize drug errors. Prescribing errors are high in pediatric inpatients (4.2%).(3) However, limited work has been conducted to investigate the problem in pediatric outpatients.(5-8)

Errors in prescribing may be classified into two main types, errors of omission and errors commission. An act of commission (doing something wrong) or omission (failing to do the right thing) that leads to an undesirable outcome or significant potential for such an outcome. For instance, ordering a medication for a patient with a documented allergy to that medication would be an act of commission.(9) Errors of omission are defined as prescriptions with essential information missing while errors of commission involve wrongly written information in the prescriptions.(10) Errors of omission include absence or incomplete specification of dosage form or strength, dose or dosage regimen,

quantity or duration of drug to be supplied as well as prescriptions that are illegible and prescriptions that violate legal requirements. Whereas, errors of commission include wrong dose or dosage regimen, wrong drug or its indication, wrong quantity or duration of therapy, incorrect patient's name on the prescription, duplicate therapy and drug-drug interactions

World Health Organization (WHO) has developed a list of drug use indicators in primary health care to be used in evaluation of drug use pattern and comparison between different health facilities. The WHO Prescribing indicators are average number of medicines prescribed per patient encounter, percentage of medicines prescribed by generic name, percentage of encounters with an antibiotic prescribed, percentage of encounters with an injection prescribed, percentage of medicines prescribed from an EML (essential medicines list) or formulary.(11)

Considering the vital role of prescribing practices in pediatric practice, the present study was conducted to evaluate the quality of prescriptions based on study of prescribing errors in pediatric prescriptions as well as the core WHO indicators of prescribing in primary health care settings to be a baseline for further interventions.

## Aim and Objectives

**Aim:** evaluation of the quality of prescriptions for children in primary health care settings to be a baseline for further interventions.

**Objectives:** Identification of types of prescribing errors for children, assessment of prescribing pattern based on core WHO prescribing indicators, as well as factors affecting the quality of the prescriptions.

## Subjects and Methods

This cross-sectional study was performed at the Family Medicine Department, Suez Canal University (SCU) in Ismailia, Egypt. Ismailia governorate is located about 120 km from Cairo along the coast of Suez Canal, midway between Port Said and Suez. The target population consisted of all prescriptions for children attending family medicine clinics affiliated to SCU. There are 10 family medicine centers located in 3 governorates (Ismailia, Suez, Port Saied and North Sinai). The study population (sampled population) included patients attending the selected 3 centers that were located in Ismailia governorate because of relatively high flow rates of pediatric patients.

A sample size of 532 prescriptions was calculated and selected from the target population with an estimated prevalence of prescribing errors to be 8.4% (from a previous study) (12), 95% confidence coefficient and 5% Confidence interval. (13) The expected non-response rate of the participants was taken into consideration in sample size calculation. The patients' prescriptions were included in the study if the patient age was < 5 years; and the qualification of the ordering physician was < master's degree (i.e. residents) in family medicine. The follow-up visits without writing new medicine were excluded. The sample was selected by stratified random sampling technique with proportional allocation, based on the workload of the practice center, as follows. Firstly, physicians (n=32) were sub-classified by type of working place (n=3 PHC centers). The family physicians' prescriptions were selected by systematic random sampling, choosing every 3rd prescription/physician from the list of registered physicians at each PHC center, till the desired proportionate sample size was obtained.

Data regarding physician characteristics e.g. age, gender, years since graduation, postgraduate qualifications in family medicine, and duration of working in family medicine, as well as the duration of consultation/patient by documenting the time-in and time-out/consultation were collected by a pre-designed self-administered questionnaire.

The selected prescriptions were audited by the researchers regarding errors (omission and commission) and WHO indicators using predesigned forms (questionnaires). The 1st one was designed to collect data regarding errors of omission and commission. Errors of omission included missing on or more of the following variables: patients' name, age, sex, body weight, and medical file number; date of prescribing; physician's name, signature; diagnosis; and specification of medication name, dose, frequency, and duration of dug intake. Errors of commission included inappropriate selection of the drug according to physician's diagnosis; wrong dose, drug strength; frequency of intake; and drug-drug interactions. Each item was scored one or zero with a total score of 17 for the prescription form. If the omission item was present and clear, it was given a score of one. If it was absent or not readable, a score of zero was given. If the commission item was present, clear and appropriate regarding selection of the right choice for the prescribed drug e.g. appropriate dose and strength, it was given a score of one otherwise it was scored zero. The total score was converted into percent for statistical analysis. The 2nd one, was used to collect data from each prescription form regarding number of medications, antibiotics, drugs given in an injection form, drugs selected from the essential drug list, and drugs prescribed in generic name. The field work was conducted after we obtained the approval from the Ethics and Research Committee from February to March 2012, and the study was completed in September 2012.

All statistical analyses were performed using the SPSS software package-version-16. Descriptive statistics and measures of central tendency and dispersion, as well as, appropriate significance tests were applied according to the types of variables. Analysis of variance (general linear model) was performed with the total quality scores (%) of the prescriptions as dependent variable, gender and place of treatment as fixed effects; and consultation time, physicians' age, and number of pediatric patients seen per day per physician as covariates. Scheffe test was used for multiple comparisons

between the groups. The $p<0.05$ was considered the significance cut-off point.

## Results

Five hundred and thirty two prescribing forms were collected and investigated for the outcome variables of the present study. The mean age of the prescribing physicians (n=32) was 30.6±4.0 years, while that of years of experience since graduation was 4.6±1.5. They consulted 8.6±3.2 patients per day with a consultation time average of 13.6 ±5.03 minutes. All prescriptions had one or more of the omission errors. Errors of omission that were related to the patient or prescriber were more highly prevalent than Errors of omission that were related to the drug. The patients' weight, sex, and age were not detected in 92.3%, 91%, and 84% of prescriptions, respectively. Prescriber signature was not found in 97% of prescriptions. Errors of omission that are related to the drug were not prevalent except that of the duration of medicines intake (89%). Errors of commission are not prevalent in the present study except wrong strength and dose of medicines that were detected in 10% of prescriptions (Table 1) and were related to antibiotics and iron preparations under dose.

The overall mean number of drugs prescribed per patient encounter was 2.1±0.52, with a range of 1-4. The percentage of total prescriptions for drugs prescribed by generic name was 1.2% while that of encounters with prescription of antibiotics and injections were 52.8 and 17%, respectively (Table 2).

Analysis of variance (general linear model) was performed to determine the independent variables affecting the total quality scores (%) of the prescriptions. Only the consultation time and place of treatment were found to have significant effects on the prescriptions' quality (Table 3). Scheffe was used for multiple comparisons between the groups. Center-3 was found to have high quality scores that were significantly different from Center-1 and Center-2 (Table 4).

| | Center-1 (n=250) | Center-2 (n=106) | Center-3 (n=176) | Total (n=176) |
|---|---|---|---|---|
| Patient's name+ | 0.0 (0.00) | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) |
| Patient's age+ | 230 (92.0) | 106 (100) | 110 (62.5) | 446 (83.8) |
| Patients' weight+ | 236 (94.4) | 104 (98.1) | 151 (85.8) | 491 (92.3) |
| Patient's sex+ | 250 (100) | 106 (100) | 129 (73.3) | 485 (91.2) |
| Date+ | 3 (1.2) | 1 (0.9) | 5 (2.8) | 9 (1.7) |
| File number+ | 244 (97.6) | 106 (100) | 175 (99.4) | 525 (98.7) |
| Prescriber's name+ | 18 (7.2) | 3 (2.8) | 2 (1.1) | 23 (4.3) |
| Prescriber's signature+ | 237 (94.8) | 105 (99.1) | 174 (98.9) | 516 (97.0) |
| Diagnosis + | 3 (1.2) | 0.0 (0.0) | 0.0 (0.0) | 3 (0,6) |
| Drug name+ | 5 (2.0) | 2 (1.9) | 6 (3.4) | 13 (2.4) |
| Drug dose+ | 0.0 ( 0.0) | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) |
| Drug frequency+ | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) |
| Duration of treatment+ | 221 (88.4) | 91 (85.8) | 162 (92.0) | 474 (89.1) |
| Wrong selection of the drug** | 4 (1.6) | 0.0 (0.0) | 0.0 (0.0) | 4 (1.6) |
| Wrong strength ± dose** | 21 (8.4) | 12 (11.3) | 21 (11.9) | 5 4 (10.2) |
| Wrong dose frequency** | 0.0 ( 0.0) | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) |
| Drug-drug interactions** | 0.0 ( 0.0) | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) |

*, Values are the number and percent in parentheses, +, Errors of omission; **, errors of commission

**Table 1: Errors of omission and commission among the study group (n = 532)***

| FMC center** | N | Consultation time* | DPPE* | % of encounters with Prescription of | | % of drugs prescribed by generic name | % of drugs prescribed from EDL |
|---|---|---|---|---|---|---|---|
| | | | | Antibiotics | Injections | | |
| 1 | 250 | 15 (5.7) | 2.1 (0.48) | 57.6 | 16.4 | 1.2 | 62.5 |
| 2 | 106 | 13.2 (4.7) | 2.2 (0.60) | 46.2 | 17.0 | 0.0 | 45.4 |
| 3 | 176 | 11.7 (3.1) | 2.1 (0.53) | 50.0 | 18.2 | 0.0 | 56.3 |
| Total | 532 | 13.6 (5.03) | 2.1 (0.52) | 52.8 | 17.2 | **1.2** | 54.7 |

*, Mean and standard deviation in parentheses; **, Family medicine center (1=Fanara, 2=Abokhalifa and 3= Almahsma FMC); DPPE, drugs prescribed per patient encounter; N, number of prescriptions; and EDL, Essential drug list

**Table 2: WHO prescribing indicators for Family medicine centers in Suez Canal University**

| | Sum of Squares | DF | Mean square | F Ratio | P |
|---|---|---|---|---|---|
| Corrected Model | 5161.482[a] | 8 | 645.185 | 12.850 | 0.000 |
| Intercept | 132.797 | 1 | 132.797 | 2.645 | 0.104 |
| Consultation time | 468.102 | 1 | 468.102 | 9.323 | 0.002 |
| Physicians' age | 201.152 | 1 | 201.152 | 4.006 | 0.046 |
| Physicians' years of experience | 125.715 | 1 | 125.715 | 2.504 | 0.114 |
| Number of patients per day | 26.554 | 1 | 26.554 | 0.529 | 0.467 |
| Physicians' sex | 38.838 | 1 | 38.838 | 0.774 | 0.380 |
| Type of PHC center | 1005.129 | 2 | 502.564 | 10.010 | 0.000 |
| Physicians' sex * Type of PHC center | 392.046 | 1 | 392.046 | 7.808 | 0.005 |

**a, R Squared = 0.164 (Adjusted R Squared =0.151)**

**Table 3: General linear model: Effect of different independent variables on the total quality scores (%) of the prescriptions**

| | Male | | Female | | Total | |
|---|---|---|---|---|---|---|
| | N | Mean (SD) | N | Mean (SD) | N | Mean (SD) |
| Center-1 | 0.0 | - | 250 | 51.8 (7.5) | 250 | 51.8 (7.5) |
| Center-2 | 15 | 55.0 (4.2) | 91 | 50.3 (3.4) | 106 | 50.9 (3.9) |
| Center-3* | 60 | 53,8 (6.9) | 116 | 58.2 (8.8) | 176 | 56.7 (8.4) |
| Total | 75 | 54.1 (6.5) | 457 | 53.1 (7.9) | 532 | 53.2 (7.7) |

*, Scheffe test for multiple comparisons: Center-3 was significantly different from center-1 and center-3

**Table 4: Quality scores (%) of the prescriptions in different centers**

## Discussion

All prescriptions had one or more of the omission errors. Errors of omission that were related to the patient or prescriber were more highly prevalent than those related to the drug. The patients' weight, sex, and age were not written in 92.3%, 91%, and 84% of prescriptions, respectively. Drug doses in children and infants are often based on dose per kilogram of body weight, so it is good practice to record the child's weight on any prescription as this allows the pharmacist to check the dose as an extra safety precaution.(5) However, omitting the patient weight from the prescriptions is a highly prevalent problem in other research works that were conducted on pediatric outpatient prescriptions in developing and developed countries.(12, 14) Errors of omission that are related to the drug were not prevalent except duration of medicines intake (89%). Specifying the duration of the drug intake is important for the parents who will give the medicine to their children at home and the community pharmacist who will identify the quantity of medicine to be dispensed.(12) Errors of commission are not prevalent in the present study except wrong strength and dose of medicines that were detected in 10% of prescriptions (Table 1) and were related to antibiotics and iron preparations under dose. This figure is striking in comparison with reported figures in hospital based studies.(12,14,15) However, there is very little research dealing with medication errors in children in primary care and most of what is known is derived from hospital based research.(16) Antibiotics and analgesics are most commonly associated with errors in primary care.(5,17) Errors of commission of the present study is consistent with another primary care based study in which 15% of children were dispensed a medicine with a potential dosing error (8% were potential overdoses and 7% were potential under-doses).(5)

Using the WHO indicators, the overall mean number of drugs prescribed per patient encounter, which is considered as an indicator of the polypharmacy, was 2.1±0.52, with a range of 1 to 4. This figure is accepted when compared with a similar study that was conducted recently in Bahrain (3.3± 0.7).(18) The present study illustrated that the percentage of encounters with prescription of antibiotics and injections were 52.8 and 17%, respectively. The percentage of encounters with prescription of antibiotics (52.8) is relatively high when compared with other studies in Bahrain (45.8%)(18), Lebanon (17.5%)(19) and Europe (27%).(20) The WHO has reported that the inappropriate use of antibiotics in clinical medicine is widespread, sometimes at inadequate dosages and often used for nonbacterial infections such as upper respiratory tract infections and diarrheal diseases.(1, 11) The proportion of encounters resulting in injections is 17% higher than figures of Bahrain (9.3%)(18) and Jordan (1.2%). This high figure may be due to patient's preferences in different communities.(21) Prescribing by generic names of drugs was found, only in one out of the three centers and was very low (1.2%) in this study. This result may be explained by absence of essential drug lists in studied health centers and the patients purchased the medicines from private pharmacies that had medicines in trade names.

It can be concluded that lack of prescribing skills among residents has been widely reported(22) and is prevalent in the present study. A structured prescribing training program is needed to improve physicians' prescribing skills for children in family medicine.

The study has some limitations. Although the study sample was reasonably large, it was a cross sectional study and only 3 doctors, researchers, assessed the quality of prescriptions of the family physicians.

Acknowledgment: The researchers would like to thank the residents of family medicine department, SCU, who agreed to participate in the study. The cooperation of the nursing staff in data collection is highly appreciated.

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# Impact of school breakfast and lunch program on iron deficiency anemia in school children

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## Abstract

**Objective:** Iron deficiency anemia is a common health problem in children in Jordan so we addressed in our study the effect of the two meals program in school on iron deficiency anemia in children who attended these schools in a rural area in Jordan.

**Method:** This study was established in the southern mobile military hospital in Al-mdawara (rural area) in the second semester of the academic year 2010 in schools of education and military culture. The aim of this study is to investigate the prevalence of iron deficiency anemia in school children aged 6 to 18 years, who attended schools where two meals are offered.

The study sample consisted of 186 children, 141 (75.8%) male students, and 45 (24.2 %) female students. Complete blood count (CBC) was performed for all children. For those who had low haematocrit with low mean corpuscular volume according to age; ferritin was done for them for a definite diagnosis of Iron deficiency anemia.

School marks were recorded; income of the family, size of the family, education of the parents, and the days of absence from school for each child were collected by a structured questionnaire.

**Result:** The prevalence of iron deficiency was 4.3%. The prevalence of iron deficiency among females was 6.6%, and among males was (3.5%).

Median school degrees was 83, for the anemic 78 and for non anemic 85.5.

We found no effect of family income, size or the level of education of parents on the incidence of anemia between children who received two meals at school.

**Conclusion:** Two meals school program mainly in rural areas reduce the prevalence of iron deficiency anemia in school children.

**Key words:** iron deficiency anemia, school children.

## Introduction

Iron deficiency anemia is the most common forms of anemia and it is considered to be one of the world's most widespread health problems, mainly in children.

The global prevalence of IDA in all age groups was estimated to be 24.8% as shown by the WHO global database of anemia (1993-2005) and in the school age children 25.5% (1).

The prevalence of iron deficiency anemia in developing countries in children between 5-14 years was estimated to be 48.1% but in industrialized countries 5.9 %( 1990-1995) (2).

Here in Jordan it was found that approximately 34% percent of children age between 6-59 months are anemic, shown by a widespread survey of population and family health for the year 2009 by the Jordanian Department of Statistics.(3)

The proportion of the population covered by survey data as was shown by the WHO global database of anemia (1993-2005) to be high for preschool-age children (76.1%) and pregnant (69.0%) and non-pregnant women(73.5%), but lower for school-age children (33.0%), men (40.2%), and the elderly (39.1%)(1) and this shows the importance of addressing the age group of school children in more studies.

Iron deficiency anemia leads to weakness, poor physical growth, and a compromised immune system, decreasing the ability to fight infections and increasing morbidity, and is also thought to impair cognitive performance and delay psychomotor development.( 4-6)

In our study we addressed iron deficiency anemia in school children as it affects the learning ability and

school achievement which puts another burden on the economy of developing countries. This highlights the need for new effective sustainable strategies to control IDA.

One of the major risks for iron deficiency anemia in children is a low-iron diet and limited access to healthy food. So a sensible way to help prevent school children from becoming iron deficient or anemic is to provide a diet naturally rich in iron and it is best to control it at the school level.

## Methods

A prospective study was done over six months from January 2010 to June 2010.

This study took place in the Southern Mobile Military hospital in Almdawara area which is consider as one of the rural areas in Jordan, to determine the frequency of iron deficiency anemia in school children who attended the military schools where two meals are offered by the school.

Our study involved 186 children aged between 6 -18 years with 141 (75.8%) male students, and 45 (24.2 %) female students.

Data were collected using a structured questionnaire and standardized tests.

Complete blood count (CBC) with differential was performed for all children, who have low packed corpuscular volume PCV (PCV less than 34 in 6-11 years and less than 36 in 12-18 years, considered anemia according to WHO) (7) and low mean corpuscular volume MCV according to age and gender; ferritin were done for them for definitive diagnosis of IDA.

Serum ferritin level less than 7ng/ml (normal references range 7-140ng/ml) is needed for the diagnosis of IDA.

We excluded from the study children who have a family history of hemolytic disease, splenectomy, chronic illnesses, or who are on iron treatment.

The school marks of the first trimester were recorded for each student.

A structured questionnaire about the average income of the family, number of children in the family, the education level of the parents and the days of school absence was collected for each child.

The Jordanian Royal Medical Services Ethics Committee approved the study.

## Results

The study sample included 186 children, 141 (75.8%) male students, and 45 (24.2 %) female students.

The prevalence of iron deficiency was 4.3%. The prevalence of iron deficiency among females was 6.6%, and among males was (3.5%).

Iron deficiency was found to affect the age group below 11years in both boys and girls as we did not observe anemia in the age group above 11 years.

The prevalence of 14.8% was observed among the age group 6- 7 years, 8.3% among age group 7-8 years, 10% among 9-10 year old and 6.2% among 10-11 year old.( Table 1).

As you can see in Table 2 there is no difference in the family income in anemic and non anemic children.

The average family size observed was about 8 members. And the prevalence of iron deficiency was 4.7%, 4.8%, 4.3% and 2.8% among families with 1-3 children, 4-6 children, 7-9 children and more than 10 children, respectively.

The average school marks were higher in non anemic compared to anemic children, 85.5 and 78 respectively.

| Age(years) | No of children | % of anemia |
|---|---|---|
| 6-7 | 54 | 14.8% |
| 7-8 | 12 | 8.3% |
| 8-9 | 2 | 0% |
| 9-10 | 20 | 10% |
| 10-11 | 16 | 6.2% |
| 11-12 | 5 | 0% |
| 12-13 | 3 | 0% |
| 13-14 | 8 | 0% |
| 14-15 | 3 | 0% |
| 15-16 | 28 | 0% |
| 16-17 | 22 | 0% |
| 17-18 | 9 | 0% |
| 18 y | 4 | 0% |

**Table 1: the percentage of IDA in different age groups**

| | Anemic children | Non anemic |
|---|---|---|
| Average income of the family | 250 dollars/month | 260 dollars/month |
| No. of children in the family | 6±3 | 6±3 |
| Education of the parents (mean) | Low school education | Low school education |
| Average school marks | 78 | 85.5 |
| Marks in maths | 69 | 77 |
| No. of days of school absence | 17/186 | 8/186 |

**Table 2: the questionnaire results**

The absent days from school were 17 for anemic and 8 for non anemic children of a total 186 days.

## Discussion

Iron deficiency anemia is considered to be a significant problem in our region as was showed by a high prevalence of IDA in school children in Palestine, the Arab gulf (26.7, 12.6% to 50%) (8,9) and in Jordan we have a high prevalence of IDA; one of every three children will have IDA between the age of 6-59 months as this was shown by a widespread survey done by the Jordanian department of statistics in 2009.

Our study was conducted in one of the poorer areas of Jordan where the average income of the family is 250 dollars per month (35 dollars per capita per month) but the prevalence of IDA (4.3%) resembles those of industrialised countries (5.9%)(1990-1995). (2)

We found that the highest prevalence of anemia was between the age group of 6-7years, both in males and females, which is a different result from other studies ( 9,10 ) and this can be explained by a high prevalence of IDA in the children less than 6 years in this poor area where unbalanced diets are offered in the home and the school age of 6 years is considered to start grade one. And this supports the conclusion that offering two meals in the school decreases the incidence of IDA in those who were anemic before starting school.

The prevalence of IDA was slightly higher in females than males in Pre-pubescent children even in adolescents there was no gender differences in the prevalence of IDA as after 11 years the prevalence of IDA was 0%.

In our study we found no significant difference in the income of families between anemic and non anemic children. This result agrees with the results of a few studies(1,9, 11, 12) and conflicts with World Health Organization's (WHO's) global database on anemia and other international research and experiences which consider poor families one of the risk factors. This obviously can be explained by the children receiving two of the three meals at school which is considered to be enough to offer a significant iron requirement to prevent IDA.

Many studies emphasized the importance of a breakfast program in school on improvement of academic function (13, 14, 15), and the effect of anemia on school achievement (16, 17). This was shown in our study by the better school performance in non anemic children than anemic, mainly in mathematics.

The family size and the education level of the parents had no effect on the prevalence of anemia. This result correlates with the study done in Palestine on the school children and another one done on school children in urban areas in China and Korea (9, 12, 18).

Days of absence from school were higher in anemic children than non anemic which could be explained by more susceptibility to illness, poor task performance, and aggression. (14,19, 20)

In our study we didn't define the amount of iron supplement in the meals that were offered to the school children as to if it is sufficient or not, but it seemed to be enough due to the low prevalence of IDA in one of the poor areas. The importance of this point can be shown by a higher prevalence of IDA in children who lived and ate at school than those who lived at home, by a study done on school children in a China rural area (12).

Introducing a school breakfast program mainly in urban areas maybe considered to be costly for the poor countries but if the schools do not provide breakfast for children, the loss of return on educational investment becomes a hidden tax paid by the local district and community.

A study done by S. Hortona, J. Ross suggests the median total losses (physical and cognitive combined) are $16.78 per capita from the impact of IDA by illustrative calculations for 10 developing countries (21)

## Conclusion

The two meals school program, mainly in rural areas, reduces the prevalence of iron deficiency anemia in school children.

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# Firework injuries. War injuries in peace time

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## Abstract

**The aim of the study was to identify the age groups referred to hospital with fireworks related injuries , the devices most frequently causing injuries, the pattern and severity of the injury, the site of the injury and the resulting disabilities.**

**Material and methods: This is a prospective clinical study of 33 patients injured with fireworks. Patients were studied for the years 2008, 2009 and 2010, during the celebration of Eid alFater, and Eid Al-adha. Patients were treated and followed up in our clinic Amansoura district, Aden city, Yemen.**

**The studied variables were: age and sex groups affected, disability and mortality, types of the fireworks, the date and the place of injuries.**

**Results: Most of patients were male ( 93,9%). The majority were in age group 5-10 years (66.6%). The most frequent fireworks causing injuries were rockets and missiles(48.5% ) followed by homemade grenades (24.2 %) . Hand injuries were the most common (63,3 %), followed by face and eye (12.1%) and (9%) respectively. One child with both eyes injured became blind. Three patients had amputated thumbs, and 3 amputated hands from the wrist. None of the patients died due to these injuries.**

**In conclusion: Fireworks injuries are serious injuries and treatment should be by expert doctors.**

**Key words: fireworks; Aden; Yemen**

## Introduction

Fireworks are commonly used in different ceremonies around the world. They are used worldwide for their visible and audible effects and are an integral part of natural and cultural celebrations.

They are also explosive devices capable of inflicting great harm, considering the heavy burden of care provided by the families , medical staff and individual society.

The extent of the trauma due to fireworks has been highlighted by a number of authors, and annually accounts for over 12,000 emergency room attendances in the United States.(1)

In Greece, in a 5-year conducted study, firework related injures comprised 7 out of 100,000 annual childhood injures. (2)

In Yemen, however, to our knowledge no studies have been conducted on this subject.

In our city, Aden, Yemen, for the last ten years, the use of fireworks has become unusually popular. Firstly, because the people start using them in national or personal celebrations (males - Babies circumcision days, wedding celebrations , meeting one of the family who has came back home from abroad, national days, religious celebration days); secondly, because they have become available and their sale has become too easy (children can get them from any mini market, supermarket and even in newspaper kiosks) and thirdly, because despite there being rules and regulations restricting and prohibiting their sale and use under the law, none of the officials are supervising that.

The aim of the study was to identify the age groups referred to hospital with fireworks related injuries, the devices most frequently causing injuries, the pattern and severity of the injury, the site of the injury and the resulting disabilities and to highlight the situation on causalities induced by Fireworks use in order to bring to the attention of the authorities to take action in this direction.

## Materials and Methods

This is a prospective clinical study of 33 patients injured with fireworks. Patients were studied for the years 2008, 2009 and 2010 during the celebration of Eid alFater (Muslim festival and holy day at the end of the fasting Muslim month - Ramadan, and Eid Al-adha (The Muslim festival and the holy days of Alhaj). Patients were treated and followed up in our clinic in Amansoura district, Aden city, Yemen.

The studied variables were: age groups effected, disability and mortality, demographic information, types of the fireworks most frequently causing injury, the date and the place of injuries, the clinical pattern and the severity of the injury.

The site and the type of the injured patient were classified as burn, contusion, soft tissue injury, ulcers, bone injuries, and amputation of the hand or fingers. The patients were treated in the clinics inpatient ward and followed up for at least 3 months in the out patients department.

The fireworks more frequently causing injuries were directly collected from the patients themselves or from the parents and then classified as follows :

1. Fuse - detonated noise makers, consisting of fireworks (also known as a crackers or noise makers) and bangers ,which are small explosive devices primarily designed to produce a large amount of noise, specifically in the form of a loud bang. They have fuses and are wrapped in a heavy paper casing, to contain the explosive compound.

2. A home- made grenade, a home-made shell containing an explosive, which is thrown by hand to make a loud sound (encased in a plastic water bottle ,or metallic tin)

3. Sparklers are a type of handheld firework that burn slowly and give off a shower of colored sparks from the burning tip.

4. Rockets and missiles, stabilized by a long stick, blast up into the sky and eject some kind of explosive material such as a report, crackle, or sparks (usually by mistake children hold them by hands directly ).

5. Fountains are devices that sit on the ground and emit showers of colored sparks upwards (children hold them in hands)

6. Ground spinners spin around randomly at ground level , shooting out colored sparks and flames.

## Results

There were 33 patients with fireworks injuries admitted to our clinic. The patients were admitted during one week of each festival (holy event), 8 patients in 2008(2 in Ramadan Eid and 6 in Al-Adha Eid). Eleven patients in 2009 (4 in Ramadan Eid and 7 in al-adha Eid) and 14 patients in 2010 (5 in Ramadan Eid and 9 in Al-adha Eid) . Thirty one patients were male (93,9%) and 2 were female (6.1%). Twenty patients were at age group 5-10 years (66.6%), 7 were at 11-15 years (21.2%) and 6 were > 16 years (12.1%). Table 1 (next page).

Thirty patients (90.9%) were fireworks users and 3 were bystanders (9.1%).

Most of the injuries occurred in the street, 30 (90.9%) while home injures occurred in 3 (9.1%).

The most frequent fireworks injuries were caused by rockets and missiles (48.5%) followed by homemade grenades (24.2 %). Table 2. (next page).

Hand injuries were the most common forms of trauma reported in 21 patients (63,3 %). Of these, 2 were left hand (9.5 %), 14 right hand (the dominant hand - 66,6%) and 5 with both hands (23.8%). Table 3.

Face injuries were in 4 patients (12.1%) and 3 had eye injuries (9%); one of them with both eyes injured. Table 3.

| Age group | No of patients | | | | Total | |
|---|---|---|---|---|---|---|
| Years | Male | | Female | | No | % |
| | No. | % | No | % | | |
| 5-10 | 18 | 54.5 | 2 | 6 | 20 | 60.5 |
| 11-15 | 7 | 21.3 | 0 | | 7 | 21.3 |
| >16 | 6 | 18.2 | 0 | | 6 | 18.2 |
| Total | 31 | 94 | 2 | 6 | 33 | 100 |

**Table 1: Distribution of the patients according to sex and age group**

| Type of firework | No. of patients | % |
|---|---|---|
| Rocket and missile | 16 | 48,5 |
| Home-made grenade | 8 | 24,2 |
| Fountains | 3 | 9 |
| Sparklers | 2 | 6 |
| Ground spinners | 2 | 6 |
| Others | 2 | 6 |
| Total | 33 | 100 |

**Table 2: Distribution of the patients according to the type of fire work**

| Type of firework | Site and no of patients | | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| | Hand | | | face | chest | Eyes | | | trunk and leg | |
| | Lt | Rt | both | | | Lt | Rt | both | | |
| Rocket missile | 2 | 8 | 4 | | | | | | | |
| Homemade grenade | | 4 | 1 | | 1 | | | | | |
| Fountain | | 1 | | 2 | | | | 1 | | |
| Sparklers | | 1 | | 2 | 1 | 1 | 1 | | | |
| Ground spinners | | | | | | | | | 3 | |
| Others | | | | | | | | | | |
| Total | 21 | | | 4 | 2 | 3 | | | 3 | 33 |

**Table 3: Distribution of the patients according to the site of injury and type of firework**

**Figures 1: A,B,C,D,**

**A - Burn**

**B - Soft tissue injuries**

**C - Amputated fingers**

**D - Severe injury with amputation**

**Figure E - Severe injury with amputation**

| Type of injury | No of patients | % |
|---|---|---|
| Burn | 5 | 15.2 |
| Contused wounds | 9 | 27.2 |
| Soft tissue injury | 8 | 24.3 |
| Finger amputation : | | |
| Thumb | 4 | 12.1 |
| Others | 4 | 12.1 |
| Hand amputation : | | |
| (Lt) | 0 | 0 |
| (Rt) | 2 | 6 |
| Both | 1 | 3 |
| Total | 33 | 100 |

**Table 4: Distribution of the patients according to the type of injury**

Burns, contused wounds, soft tissue injuries (avulsed and crushed tendons, neuromuscular injuries) and bony injuries were the most common types of injury among the study patients.

Burns were seen in all patients, in association with all other injuries, with different degrees and extent. Five patients (15,1%) had all different degrees of burn ( first, second and third degree).

Seven patients (21.2%) were admitted with burn and hand contused wound; they were treated by surgical toilet and the wounds were closed by delayed or secondary closure.

Six patients (18.1 %) had tendon ruptures of the thumb-flexor tendon which were repaired after the wound became clean (10- 14 days).

One child with both eyes injured became blind and was transferred abroad for further management. Three patients had amputated thumbs and 3 amputated hands from the wrist, two right hands and in one, both hands. All were above 16 years old and injuries were caused by rockets . Table 3 (previous page).

None of the patients died due to these injuries.

Three patients with 3rd degree burns of the forearm and hand developed contracted scars after 3 months; they were sent for cosmetic plastic surgery. Four patients had deformity of the thumb and index fingers . Table 4.

## Discussion

This study shows that firework injuries are more prevalent among males with age group between 5-15 years; children and teenagers are considered to be the highest -risk group of population which was supported by many other studies. (2,3,4,5)

In our study, rockets and missile were found to be the type of fireworks most frequently causing injuries with the majority of injuries occurring in the streets.

Hassan Tavakol(3) from Iran indicates that the most common cause, in his series, is fuse - detonated noise makers and Vinita Puri(4) from India indicates flare fountains as the commonest cause. This depends on the type of firework which is more popular in each country.

In the present study burns and contusions of the soft tissue were the main type of injuries. These findings are in concordance with the result of Hassan Tavakol from Iran(3) , Vinita Puri from India (4) and M . Al. Gattan from Saudi Arabia.(6)

The most common sites of injuries were the hand (63.3%) then the face and eye 21.1%. This can be explained by children holding the rockets by hand with pressure on the bottom so the last Rockets bomb exploded in their hands. Hand is reported in many studies to be the most common site of explosion injuries, Greece(2), Iran (3), India (4) and Saudi Arabia (6).

Konte Vasslia et al (Greece)(2) , reported eye trauma as the most common type, while Vinita Puri from India (4) reported that the face and eye injuries were the second frequent type.

In our study 5 patients lost their fingers and 3 lost their hand or both hands from the wrist. This is similar to what has been reported by others. (3,4)

In our study, none of the patients died; while S.N Kunz (7) from Germany, reported a case about a patient who died due to the use of self-made fireworks.

It is obvious that most of the injuries caused by rockets and missiles and other firecrackers, were around the celebrating days and were most common in the 5- 15 years age group. This finding suggests that educating teenagers and children in the schools or through television programs could considerably reduce the number of such injuries.

Sheller et al( 8) noted the prophylactic effect of a campaign informing the population of the dangers of fireworks which are held at events every year in Denmark during November and December (before the celebration days of new year) of campaigns to inform the school children about the safe use of fireworks.

The children are warned about the danger of igniting hand-held fireworks; they are also urged to wear protective glasses in the vicinity of ignited fireworks, warning about carrying fireworks close to the body by filming and interviewing children who had sustained fireworks injuries in the previous years. These measures do not eliminate the fireworks injuries but it may encourage that, as well as a reduction in the incidence of injuries; their severity was also lowered. A combined effect of a prophylactic action (information, new legislation, increased vigilance by the police) has been effective in reducing the number and the severity of the injuries caused by fireworks(8,9).

In conclusion most of the fireworks -related injuries were usually seen around national and religious celebration days. Most firework-related injuries were usually seen in young children and teenagers.

The common sites affected were hands, face and eyes which ended with partial or complete loss of organ functions (blindness, handicap).

While fireworks related injuries are regarded as civilian injuries, their victims are many, because they may happen at any time during the whole year and usually at peace time. As a recommendation we think that organizing a public continuous educational program about the dangers of fireworks, supervised by doctors and addressed toward parents, children, community leaders and others, using media (TV, Radio, newspapers , social communication tools e.g. Facebook and Twitter), is of great importance. Close and strong observation by parents is needed. Public sales of all fireworks should be prohibited. Registration of all firework injuriesis needed and the use of this information in the local public educational program. Fireworks injuries are serious injuries and treatment should be by expert doctors. Reduction of the number of the fireworks injuries is a duty of every person in the community.

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# Promotion of inter-conception maternal health through child vaccination sessions

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## Abstract

**Background and objectives:** Inter-conception care is a chance to promote the health and nutritional status of the mothers, to identify risks both for the mother and the future children, and appropriately deal with them. The aim of this work was to improve the health of the mothers and children through providing inter-conception care through vaccination sessions.

**Methods:** This is an intervention study. It included 75 mothers coming to vaccinate their infants at two, four and six months at Heit family health unit (FHU), Menofeya Governate. Interventions included health education (HE) and free iron supplementations.

**Results:** HE succeeded in increasing exclusive breastfeeding, decreasing the prevalence of anemia from 81.5 % in the first visit, to reach 7.4 % in the third visit, to increase the use of contraceptives and to shift from an inappropriate method to a lactation-friendly method.

**Conclusion:** Inter-conception care has a high potential in improving the health and behavior of postpartum mothers. It is recommended to include inter-conception care for all mothers attending with their infants in the first year of life.

**Key Words:** Inter-conception care, maternal health, contraception, family practice, exclusive breast feeding.

## Introduction

The Center for Disease Control (CDC) developed recommendations for physicians and public health officials to improve women's health before conception, which in turn improves pregnancy outcomes. These include helping mothers with reproductive planning, increasing women's awareness about the importance of preconception health care, providing preventive care and interventions for mothers with identified risks, providing preconception care and performing pregnancy checkups(1) . Changes in the knowledge, attitudes and behaviors related to reproductive health among both men and women need to be made to improve inter-conception health (2). Preconception health can be promoted at work-places, at schools, and in the community (3).

Incorporating preconception health promotion into routine care is a proactive approach that could be termed "opportunistic". Every clinical encounter before pregnancy offers an opening to explore and reinforce health promotion by addressing such topics as weight management, dietary supplementation, exercise, immunization status, benefits of deliberate decisions regarding pregnancy and contraceptive options, protection against sexually transmitted infections (STIs), and avoidance of exposures that include tobacco, alcohol, and other drugs(4).

Though very important, Egypt Health Reform missed including preconception and inter-conception care in the Basic Benefits Package (5). Recognizing its value, preconception care has been included in the "Practice Guidelines for Family Physicians (6); however, as for now it has not been really implemented. The aim of this study is to demonstrate the feasibility and benefits of implementing inter-conception care through the routine family physician services.

## Methods

This is an intervention study conducted over a period of 6 months from October 2010 to March 2011. The study was implemented in the FHU of Heit village, Menofeya Governorate. The target population for the FHU is 6,464.

**Sampling Technique and Procedures:**

All mothers attending the main vaccination sessions with their children at the age of two, four and six months were asked to participate in the study. It ended up with 75 mothers who accepted to participate: 27 came three times at two, four, and six months; 27 came twice at four, and six months; and 21 were seen only at six months. Interventions included HE and free iron supplementations.

When the mother attends for the session; the nurse retrieves her file and sends her to immunize her child. She is then directed to the family medicine clinic to meet the physician, who explains the study to the mother and asks for her consent. Basic principles of client-provider interaction were followed. The participant was supported to feel comfortable enough to ask the researcher to slow down, repeat a question, speed up or stop so that she can have time to think.

Then the nurse measured weight and height to calculate the body mass index (BMI). Hemoglobin was estimated using Sahli hemoglobin meter which may not be the ideal, but it is the method available at the level of the FHU. Anemia was diagnosed at a cutoff point of 12gm/100ml. If examination showed that there was evidence of anemia, iron supplementation were prescribed and given to the mother for free. An interview with the mother was then conducted to collect data related to knowledge, attitude and practice (KAP) using a predesigned short questionnaire covering the areas related to care of own health, nutrition, family planning and breast feeding. Accordingly the physician decides the HE messages needed for each mother and a counseling session starts.

If time was not enough to have counseling sessions on the same day of examination, mothers were given an appointment to come within one week to receive counseling. Mothers did comply with appointments.

The same process is repeated in the following vaccination sessions for her child. HE messages included dietary advice, breast feeding, lactation-friendly contraceptives, hazards of passive smoking, and other as needed.

**Statistical Analysis:**

The data was summarized using descriptive statistics and percentages. Statistical differences between groups were tested using Chi Square test and t test. P-values less than or equal to 0.05 were considered statistically significant.

**Ethical Considerations:**

The aim of the research was explained to the participants and verbal consent was obtained from each participant. All interventions are part of Basic Benefits Package of the FHU.

## Results

Mothers' age ranged between 19 and 36 years and most of them (82.7%) were in the age group 20-34 years. Pregnancy history showed that two thirds of participating mothers had either one or two children. Eight percent only had four or more children. The mother health records showed that 12.0 % were Rh negative.

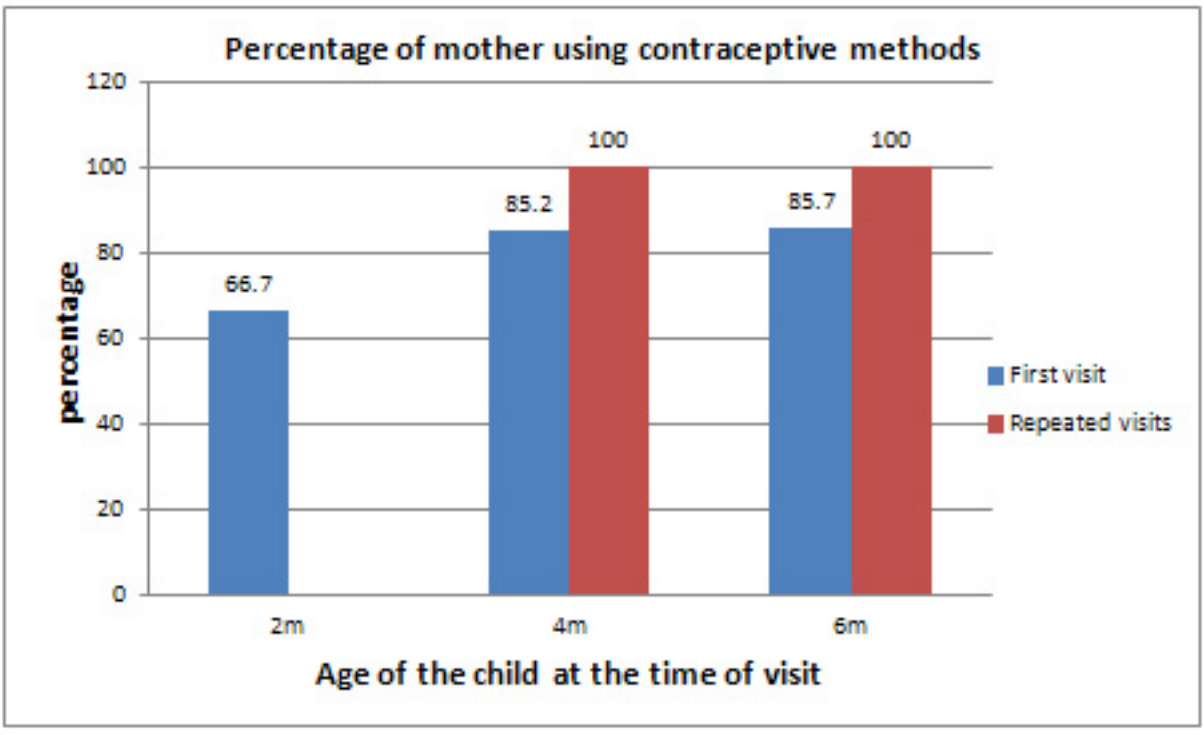


**Figure 1: Comparison between mothers using contraceptive methods in the first visit and repeated visits**

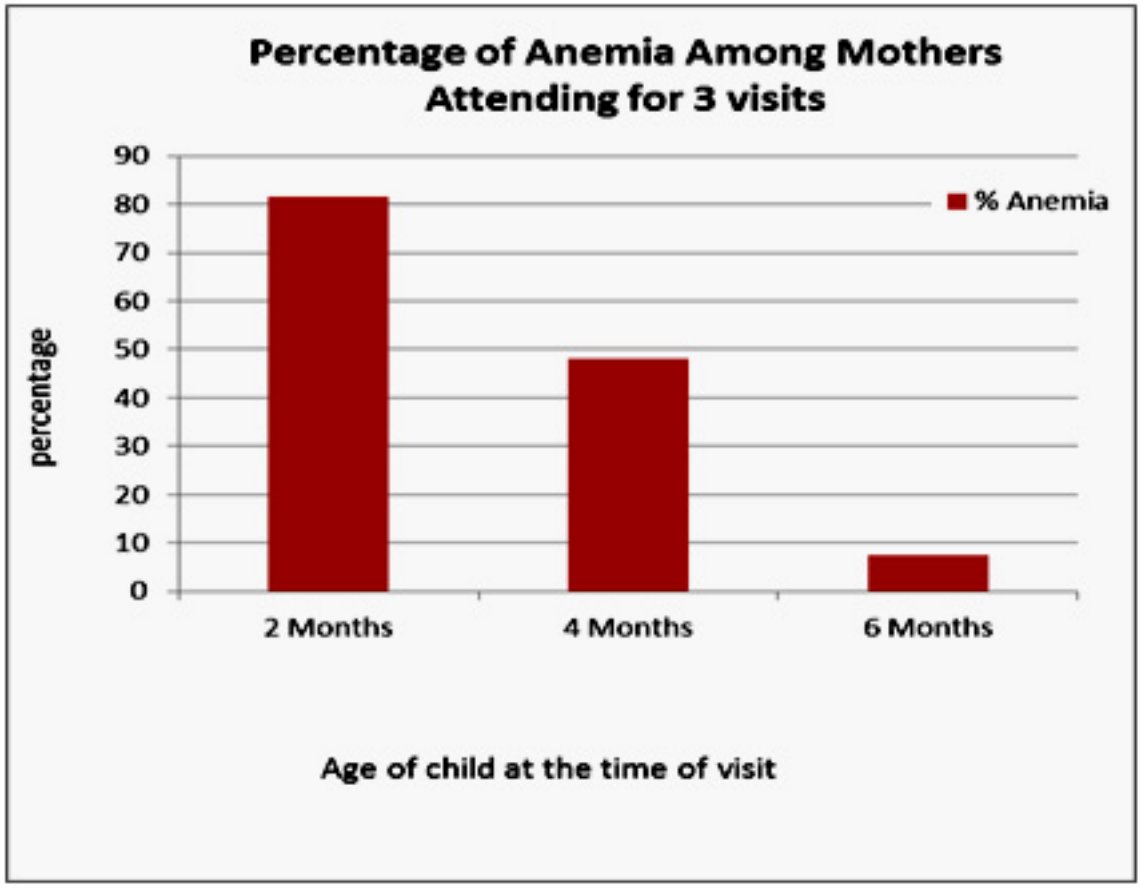


Figure 2: Percentage of anemia among mothers attending for three visits

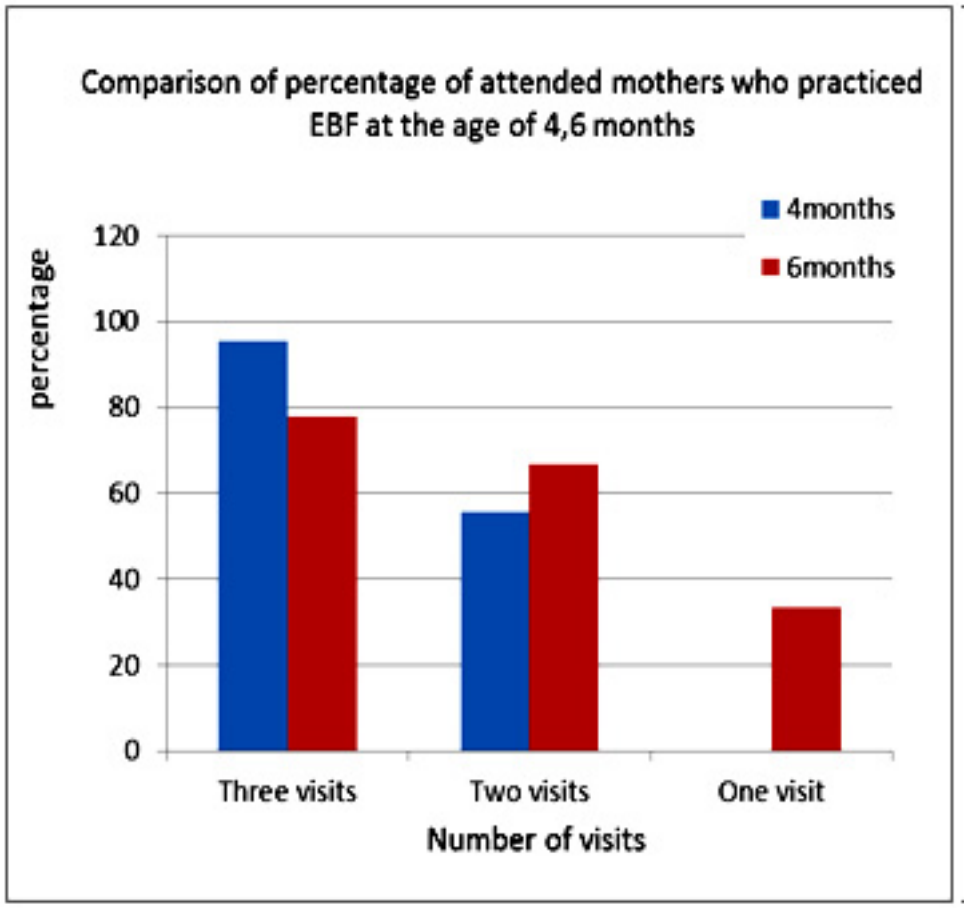


Figure 3: Comparison of percentage of attended mothers who practiced exclusive breastfeeding at the age of 4 and 6 months

Mothers coming for the first time at two, four or six months were using contraceptives at a rate of 66.7 %, 85.2 % and 85.7 % respectively. HE succeeded in eliminating the use of combined oral contraceptives (COC). It also succeeded in increasing contraceptive use to 100.0 % at four and six months Figure (1).

The prevalence of overweight was 26% and the prevalence of obesity was 35%. Two cases improved from over-weight category to normal, while one case improved from obesity category to over-weight. Anaemia was diagnosed at haemoglobin level less than 12gm/100ml. Mothers seen for the first time at two, four and six months postpartum presented with anemia prevalence of 81.5%, 70.4%, and 71.4% respectively. Mothers seen three times show marked improvement, where anaemia decreased from 81.5 % at two months to 7.4 % at six months (P ≤0.001) Figure (2).

Exclusive breastfeeding was practiced by all mothers attending with their children at two months and by 55.6% of mothers coming at four months. This percentage was 95.6 % among those who received HE at the first visit (P ≤0.01). Among mothers attending for the first time at six months only 33.3 % were practicing exclusive breastfeeding compared to 66.7 % among those attending for the second visit and 77.8 % among those attending for the third visit (P ≤0.01) Figure (3).

Intake of milk as an important practice for lactating mothers was stressed in the nutrition education message. Nutrition education improved milk/ milk products intake among mothers attending at two, four and six months.

At four months milk intake was 55.6 % among mothers coming for the first time compared to 92.6 % for those who attended nutrition education (P≤ 0.01). At six months milk intake was 61.9 % among mothers coming for the first time compared to 88.9 % and 96.2 % for those who attended nutrition education once and twice respectively (P≤ 0.01).

Smoking was not practiced by any of the attending mothers; however, passive smoking was practiced by about 40% of mothers attending at two months, and decreased to 7.4% in their third visit (P≤0.01).

## Discussion

CDC defined preconception care as “a set of interventions that aim to identify and modify biomedical, behavioral and social risks to a woman’s health or pregnancy outcome through prevention and management” (7).

Egypt Practice Guidelines set the objectives, defined the inter-conception care package and identified the opportunities to reach target women; one of these opportunities was “mother attending for her child health care” (6). Routine child immunization is the most regular encounter for the infant in the first year of life. Egypt Demographic and Health Survey (EDHS) 2008 reported a very high coverage by DPT vaccination given at the second, fourth and sixth months of age: 99.8%, 99.7% & 97.6% respectively (8). This is an excellent opportunity to reach all target mothers for inter-conception care.

The present study was implemented by a family physician who has been working in the same unit for more than two years before the start of this intervention. He already had established a rapport with the clients who did trust him. This would explain some of the relatively rapid achievements observed in our results.

Interventions tested in this study covered priority health issues that should be routinely addressed by the family physician. Other components of the inter-conception care package, as mentioned by the “Practice Guidelines” (6), are to be included according to individual needs.

Base line information suggests that attending clients are at a better status compared to several previous studies. Our clients were mostly in the age group 20 - 34 (82.7%) which is the optimum age for reproduction.

Eight percent only had four or more children. Both these facts reflect community behavior which is aware of the importance of a lifetime reproductive health plan. Mothers coming with their infants at two, four, and six months postpartum were using a contraceptive at a rate of 66.7%, 85.2%, and 85.7%. This gradual increase could be due to the counseling provided by the nurses (or the extension worker / Raeda Rifeya [RR]) as part of the family planning program implemented in all primary health care (PHC) services in Egypt. For the use of modern contraceptives, EDHS 2008 (8) mentioned a rate of 40.9% at the age of 20 - 24, 56.3% at the age of 25 - 29 and 64.8% at the age of 30 - 34 years, which is still less than the two months postpartum use rate in the present study. In general, Menofeya governorate had 66.1% use rate for modern contraceptives compared to a national figure of 57.6% (8).

Counseling by the physician succeeded in reaching a 100% use rate. It also succeeded in converting users of COC, which would affect milk secretion, to use a lactation-friendly method. The family physician is expected to be more effective in behavior change communication. We can start by the RR at home, and the nurse in the routine family planning service to be followed-up by the family physician as part of the integrated holistic approach in family practice. The use of contraception for spacing would encourage more mothers to use it later for limiting after having the desired number of children.

Behavior change was also demonstrated by compliance to the nutrition education messages as reflected in the increase in the percent of mothers consuming milk and milk products which are very important to the lactating mother. Dietary advice was also directed to weight control which is very important for the health of the mother and the safety of the next pregnancy; however, as this is a relatively difficult issue to address in such a short time, limited success was observed.

Another very important success for the present study was the decrease in anemia prevalence. Anemia is a very important public health problem in Egypt. The EDHS 2005 and 2000 (10 & 11) reported anemia prevalence to be 34.2% and 45.4% among pregnant mothers; and 43.6% and 32.5% among lactating mothers. The marked decrease among pregnant mothers is attributed to the routine iron/folic supplementation during pregnancy, which is not provided after labor and is thus reflected in the increase in anemia prevalence among lactating mothers. In general there has been a trend for increase in anemia prevalence which was 26.3% among non-pregnant non-lactating in the 2000 survey and increased to 38.8% as reported by the 2005 survey. In the present study anemia prevalence was found to be 81.5%, 70.4% and 71.4% among mothers attending for the first time at two, four and six months.

These are very high figures compared to the above mentioned national rates. It may be due to a defect in iron supplementation during pregnancy; however, this was not investigated in the present study. Intervention included nutrition education and iron supplementation for anemic mothers. These interventions succeeded in decreasing the prevalence of anemia over a period of four months, from 81.5% at two months after delivery to 7.4% at six months postpartum. This finding reflects the high effectiveness of a simple intervention as iron supplementation which is already part of the inter-conception care package included in the "Practice Guidelines" (6); however, it needs to be put into action.

Breast feeding is the norm in Egypt, especially in rural areas. The EDHS 2008(8) reported ever breast feeding in rural Lower Egypt at a rate of 96.1%. All studied children are breast fed. Exclusive breast feeding was practiced by all mothers at two months of age. The EDHS 2008 reports a rate of 78.9% for the less than two months. Before receiving the HE messages by the family physician the rate of exclusive breast feeding at the age of four and six months was 55.6% and 33.3% respectively. After being counseled exclusive breast feeding was 95.6% at four months, indicating that only 4.4% of those who were exclusively breast fed at two months started to have supplement compared to 44.4% before the intervention. An interesting finding is that 55.6% of infants seen for the first time at the age of four were on exclusive breast feeding, when seen again at the age of six months 66.7% were on exclusive breast feeding, indicating a revert from supplementation to exclusive by 11.1% of mothers. This represents a real success in communication for behavior change.

At six months 77.8% of mothers who had two contacts with the family physician practiced exclusive breast feeding compared to the base line figure which was 33.3%. Preparation for promotion of breast feeding should start during pregnancy, and even before that through community-based efforts and political support. In general the situation in Egypt is better than many other places, even in the Arab world. In a study carried out in Sakaka city, Saudi Arabia, the researchers reported exclusive breast feeding among 23.8%, 16.9%, and 9.2% in the age groups less than 2 months, 2-4 months and 4-6 months respectively (9). This is much less than our rates even before the intervention.

In a holistic approach the family physician addressed the problem of passive smoking. He succeeded in empowering women as to their right for a smoke free environment for their health and that of their infant. His efforts succeeded in decreasing passive smoking from 40%, to become only 7.4%. The results achieved indicate that there is a missed opportunity in our family practice.

Implementation of inter-conception care is feasible and effective. The package suggested in the "Practice Guidelines" (6) needs to be actually provided in a continuum of care that starts from the premarital stage and all through the life cycle. Development of an inter-conception care form to follow on the postpartum care activities, the design of educational messages, integrating the inter-conception care services within the ongoing daily family health unit services and training of health care providers would support effective implementation for the welfare of the mother and the future offspring.

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# Food habits among adolescents in Colombo, Sri Lanka

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## Abstract

**Objectives:** To assess the food habits and factors associated with them among adolescent school children in Colombo district, Sri Lanka.

**Design:** Cross sectional descriptive study

**Participants:** Eight hundred students (525 from urban government schools, 200 from rural government schools, 75 from private international schools) from eight randomly selected clusters in Colombo district.

**Data collection:** Self administered questionnaire to obtain socio demographic data, sources of main meals, food preferences, food frequencies and 24 hour dietary recall.

**Analysis:** Multiple logistic regression to analyse variables associated with food habits. Associations were identified with odds ratios and 95% confidence intervals. P<0.05 was considered statistically significant.

**Results:** Most of the adolescents consumed homemade food for main meals with increase in breakfast consumption from shops. Only 34% had consumed 5 or more portions of fruits and vegetables for a day and fast food (43%) and sweets (61%) consumption was high. Fast food, sweets, soft drink consumption, eating from food outlets increased with the amount of pocket money received.

**Conclusions and implications:** Unhealthy food habits are on the rise among adolescents and amount of pocket money received was associated with many. Findings from this study can be used in designing interventions in order to promote healthy adolescent food habits.

**Key words:** adolescents; food habits; Sri Lanka

## Introduction

Adolescence is an important time for the acquisition of dietary habits that likely persist into adulthood influencing health and wellbeing as adults.(1) The physical, psychological and behavioural changes during adolescence will have long term consequences. There is a worldwide increase in the prevalence of obesity among adolescents, especially in urban areas.(2-4) Although under nutrition among children was a problem in Sri Lanka until the seventies(5), it is now gradually decreasing and the increasing prevalence of obesity and resulting complications have become a concern. (6-9) As a country facing a rapid rise in the prevalence of non communicable diseases (10, 11), knowledge of undesirable dietary practices and changing adolescents' food habits and lifestyles accordingly will be of prime importance in view of reducing the burden of non communicable diseases in the future.

Meal patterns in urbanized areas in both developing and developed countries appear to be similar among adolescents. Studies on adolescent food habits have revealed a high intake of snacks,(1, 12-14) lowered intake of fruits and vegetables (12, 14-16) and an association of different food habits with the socioeconomic variations, (12, 17) gender (12) and urbanization.(18)

The rapid globalization of food production and distribution which resulted in flooding of the markets with a variety of food, changed the consumption patterns of people even in the third world countries like Sri Lanka, especially the urbanized districts like Colombo. Food shops everywhere with ready to eat food and busy life style encourage people to buy something on the way for main meals rather than making meals at home.

It is therefore important to understand the changes that have

occurred in the food consumption patterns and preferences especially by vulnerable groups such as teenagers. This knowledge can be used to modify the harmful food habits at the family level. In view of this, the current study aimed to assess the dietary habits among adolescents and the factors associated with these.

## Method

A cross sectional descriptive study was carried out using a self administered questionnaire to the students in year 10 classes in the Colombo district between January and June of 2007. Colombo is the most urbanized and populated district in Sri Lanka. According to the administrative structure, a district is subdivided into small divisions. Depending on the population and the facilities available these administrative areas are categorised as urban or rural. In this study one such administrative area was considered as a cluster. In the district of Colombo the urban to rural population ratio was 3:1, therefore 6 clusters from urban and 2 clusters from rural areas were selected randomly and it was decided to take 600 students from urban schools and 200 students from rural schools. Two schools were randomly selected from a cluster and the students in year 10 classes were invited to participate.

In Sri Lanka the free education is provided by the government, however all the government schools are not of the same standard. There are private international schools in the urban areas, which are chosen by parents who can afford to pay the fees and when their children cannot get a place in a better ranked school or when they want to educate children in English. In this study, out of the 600 urban sample, 75 were selected from private international schools. Informed written consent was obtained from the head teachers of the selected schools. The option of participation was given to all the students in a class. Investigators explained the study and the students who volunteered following this were enrolled into the study. About 50 students were taken from a school. Institutional Review Board Approval (IRB) was obtained prior to the study.

**Data Collection:**

The questionnaire included three main sections. Part 1 was based on demographic data of the student including parent's occupations, education and the socioeconomic status of the family. The latter was assessed by asking students about average family incomes, as this may not be forthcoming, a question on ownership of a family vehicle/s was included.

Part 2, consisted of the source of main meals, whether homemade or purchased most of the time. Food preferences and questions on frequency of soft drinks use and eating out from popular food outlets were also included.

Part 3, was a 24 hour dietary recall with the types of food consumed and frequency of consumption for the day before administering the questionnaire.

Questionnaire was pre tested in a pilot study using school children from a year 10 class. This was done prior to the study and adjustments were made to improve the validity and reliability of data.

**Data Analysis**

Data were analysed using statistical package STATA 11.0MP. (version 11.2 MP, Stata Crop LP, Texas, 2009). Chi square test was performed to analyse the categorical demographic and family data. Multivariate logistic regression analysis was used to assess associations between food habits and potential risk factors. This method was used to examine trends across categorical variables. Odds ratio (OR) and 95% confidence intervals (CI) were used to describe associations. Associations were considered significant if P value was $\leq 0.05$.

## Results

Eight hundred students participated in the study and the mean age of the study population was 14.6 years (range 13.3 -16.9) with 52% males. Socio demographic factors included 95% Sinhalese, 92% Buddhists. Parental level of education, occupational status family income and ownership of vehicles are described in Table 1 (next page). A significantly higher percentage of parents of private school students were more educated and held professional occupations.

The majority of students received pocket money ranging from Rs 5 to Rs 300 a day. Therefore this was divided into quintiles for further analysis. Children receiving more pocket money were more often boys, attending private school, with more educated parents in better occupations.

Table 2 (page 30-31) shows the consumption of three main meals, breakfast lunch and dinner from home and associations with socio demographic variables. Only 69% of the students from the entire sample stated that they had their breakfast from home most of the time. A significantly higher proportion (88%) of students from the private school had their breakfast from home compared to urban (66%) and rural (69%) school students. Having homemade breakfast was significantly associated with higher levels of parental education ($P < 0.001$ for mother's and father's education) and better father's occupation ($P<0.05$). Most of the students (96%) had their lunch from home however this was significantly higher among urban school students ($P=0.01$). More than 90% of the students from rural and urban schools had dinner prepared at home whereas a significantly higher proportion in the private school had purchased dinner from shops ($P<0.001$). Purchasing lunch and dinner from shops was significantly associated with the father having a better occupation ($P=0.05$). Compared to males, a higher percentage of female students had consumed homemade food for all 3 meals ($P=0.05$ for lunch).

Data on the types and frequency of foods consumed the day before participating in the study are given

| | Urban (n=525) | | Rural (n=200) | | Private (n=75) | | |
|---|---|---|---|---|---|---|---|
| | No. | (%) | No. | (%) | No. | (%) | P value |
| **Father's level of education (n=535)** | | | | | | | |
| Grade 10 or less | 124 | 32.6 | 26 | 24.3 | 0 | 0 | p<0.001 |
| Up to O Level | 114 | 30 | 52 | 48.6 | 10 | 20.8 | |
| Up to A Level | 101 | 26.6 | 27 | 25.2 | 18 | 37.5 | |
| Higher education | 41 | 10.8 | 2 | 1.9 | 20 | 41.7 | |
| **Mother's level of education (n=586)** | | | | | | | |
| Grade 10 or less | 137 | 33.2 | 31 | 25.2 | 1 | 2 | p<0.001 |
| Up to O/L | 138 | 33.4 | 56 | 45.6 | 10 | 20 | |
| Up to A/L | 108 | 26.2 | 33 | 26.8 | 25 | 50 | |
| Higher education | 30 | 7.3 | 3 | 2.4 | 14 | 28 | |
| **Father's occupation (n=784)** | | | | | | | |
| High | 100 | 20.7 | 26 | 13.5 | 36 | 48.6 | p<0.001 |
| Middle | 331 | 63.3 | 132 | 68.8 | 33 | 44.6 | |
| Low | 87 | 16 | 34 | 17.7 | 5 | 6.8 | |
| **Mother's occupation (n=800)** | | | | | | | |
| High | 48 | 9.1 | 11 | 5.5 | 15 | 20 | p<0.01 |
| Middle | 61 | 11.6 | 32 | 16 | 7 | 9.3 | |
| Low | 35 | 6.7 | 17 | 8.5 | 2 | 2.7 | |
| Housewives | 381 | 72.6 | 140 | 70 | 51 | 68 | |
| **Ownership of vehicles (n=800)** | | | | | | | |
| Owns a vehicle/s | 273 | 52 | 84 | 42 | 65 | 86.7 | p<0.001 |
| No vehicle | 252 | 48 | 116 | 58 | 10 | 13.3 | |

**Table 1: Parents Education, Occupation and Ownership of Vehicles by School type**

in Table 3. Rice was the most commonly taken food item in all three settings. Overall consumption of bread was also high but compared to rural and urban children, private school children consumed more bread (P=0.001). Main source of animal protein was fish. Chicken, egg and processed meat consumption was significantly higher among private school students. Overall consumption of meats other than chicken was low, however comparatively higher among private school students. Consumption of dried fish was markedly higher among rural students (P<0.001). Consumption of milk was low among private school students (P<0.05).

According to the 24 hour recall, 43% of the students had consumed fast foods and 61% had taken sweets. Fast food and sweet consumption significantly increased with the increasing amount of pocket money received (P < 0.001) and fast food consumption was significantly higher among males (P<0.05) (Table 4).

92% of the students had consumed vegetables and 89% had consumed fruits, at least one type a day (Table 3). Considering one type of fruit or vegetable as one portion, the adequacy of total consumption was looked into. Only 34% of the students had consumed 5 or more portions of fruits and vegetables according to the recall and this was associated with male gender and highest pocket money quintile. (Table 4) Increasing level of parent's education was positively associated with fruit and vegetable consumption among children (Analysis not shown).

food outlets were significantly higher among private school students, males and students receiving the highest quintile of pocket money (Table 4).

Students were asked to list five mostly preferred and five mostly disliked foods. Preference towards high calorie and processed foods like pizza was higher among private school students whereas rural and urban student's favorite food was rice and curry. Vegetables were among the most disliked foods and most unpopular food among private school students were green leaves.

## Discussion

Males and females are represented in nearly equal proportions and therefore the results will be a good reflection of the food habits of both sexes, however the results mainly describe the food habits of Sinhalese Buddhist children rather than of a mixed ethnic or religious group. Considering the parent's occupation and ownership of vehicles, private school students belonged to the highest social group followed by the students of the urban schools.

According to the study by Kumarapeli in 2001,(18) nearly all the students (99.6%) had their breakfast prepared at home whereas only 69% did so in the present study. This alarming reduction cannot be attributed to mothers, who tend to be the main carers, becoming busier in the mornings as there was no significant difference between employed and unemployed mothers. Increased breakfast consumption from home with increasing level of parent's education may be due to the understanding of importance of a healthy breakfast.

Traditionally in Sri Lanka, lunch is regarded as the main meal. This may be the reason for lunch to become the mostly consumed meal that was prepared at home (Table 2). Frequenting fast-food outlets or restaurants for dinner appeared to be common and significantly high for students from the affluent social groups. However, compared to the rates in the present study, eating food from shops (91.6% at least once a week) and dependency on fast food (84.9%) had been very high among adolescents in a study done in Jeddah.(14)

Rice is the staple food in Sri Lanka. However, consuming rice several times a day shows a decline when compared to the study by Jayatissa and Ranbanda in 2002 (6) where the figure was 91% (79% in the present study). In contrast, bread consumption has increased in general and even more so amongst the private school students ($P<0.001$). This may be because it is more convenient to prepare a meal using bread. There also seems to be a decline in the consumption of legumes (61%), compared to the study by Kumarapeli (80%). (18) These practices have to be discouraged and awareness should be created about the beneficial effects of high fibre containing diets, that homemade meals are likely to contain.

Jayatissa and Ranbanda in 2002, (6) had revealed the consumption of fish to be high and this still appears to be the same. Higher consumption of dry fish by rural school students compares well with the finding of Kumarapeli in 2001. (18) Although dry fish is not cheap the quantity needed for a meal is less and therefore economical and may explain repeated popularity among the rural setting. Overall consumption of meats was low and this may be due to the fact that the majority of the students were from Buddhist families who tend to avoid eating meat. Consumption of meat and meat products were relatively higher among the private school students who came from a higher socio economic background and studies done in Sri Lanka by Cullumbine as early as 1948 (19) and more recent studies by Kumarapeli in 2001(18) and Shi et al in China in 2002 (17) also had shown similar findings.

According to the food guidelines, it is recommended to consume five or more portions of fruit and vegetables a day. Sri Lanka being a country with a large variety of fruits and vegetables and most of them being relatively cheap, it is very disheartening to see that the majority of these adolescents were not taking them adequately. According to the findings from the other countries, this seems to be a universal problem.(12, 14, 20) However, increased consumption among private school students and the highest pocket money quintile imply the increase in vegetable and fruit consumption among the higher socio-economic groups and this compares well with other studies done in different parts of the world. (12, 17, 21). Parent's knowledge on nutrition and health and diseases may account for the significant increase in fruit and vegetable consumption with education and this had been reported elsewhere as well.(21) In contrast to the findings in other studies where fruit and vegetable consumption had been significantly higher among females,(21) in the present study it was higher among males. In the study by Jayatissa and Ranbanda in 2002 (6), the overall consumption of vegetables and fruits was fairly low compared to the present study (24% to 27% never during a week vs. 92% and 89% at least once a day). Differences in these findings may be due to the different sample characteristics, however, the increase in vegetables and fruit consumption is encouraging.

In Sri Lanka food items like pastries, rolls and cutlets are readily available and eaten as a snack or even as breakfast. High consumption of fast food and sweets by the students in this study show the trend to eat calorie dense, low nutrient value, salt, sugar and fat rich food by the adolescents. More frequent eating from popular food outlets like KFC, Mc Donald's and Pizza Hut was seen among private school, boys. According to studies done in other countries, increasing fast food consumption among adolescents seems to be a global problem.(12-14, 22) With an emerging trend of obesity and chronic diseases in the general population, this is not desirable and is of much concern.

Table 2: Socio Economic Factors Associated with Consumption of Main Meals from Home (Part A)

| | | Breakfast | | | | Lunch | | | | Dinner | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | % from home | OR | CI | P | % from home | OR | CI | P | % from home | OR | CI | P |
| **School type** | | | | | | | | | | | | | |
| Private | 75 | 88 | 1 | | | 90.7 | 1 | | | 78.7 | 1 | | |
| Rural | 200 | 69 | 0.3 | 0.1-0.7 | 0.002 | 89.5 | 0.9 | 0.4-2.2 | 0.78 | 94 | 4.3 | 1.9-9.5 | <0.001 |
| Urban | 525 | 66 | 0.3 | 0.1-0.6 | <0.001 | 97.3 | 3.8 | 1.5 | 0.01 | 92.4 | 3.3 | 1.7-6.2 | <0.001 |
| **Sex** | | | | | | | | | | | | | |
| Male | 415 | 67.5 | 1 | | | 93.3 | 1 | | | 90.1 | 1 | | |
| Female | 385 | 70.4 | 1.2 | 0.9-1.6 | 0.89 | 96.4 | 1.9 | 0.9-3.7 | 0.05 | 93 | 1.5 | 0.9-2.4 | 0.15 |
| **Father's education** | | | | | | | | | | | | | |
| Grade 10 or less | 148 | 57.4 | 1 | | | 95.3 | 1 | | | 90.5 | 1 | | |
| Up to O/L | 177 | 63.8 | 1.3 | .8-2.0 | 0.239 | 96.1 | 1.2 | 0.4-3.5 | 0.73 | 93.2 | I.4 | 0.6-3.2 | 0.38 |
| Up to A/L | 146 | 87.7 | 5.3 | 2.9-9.5 | <0.001 | 96.6 | 1.4 | 0.4-4.5 | 0.57 | 89.7 | 0.9 | 0.4-1.9 | 0.82 |
| Higher education | 63 | 92.1 | 8.6 | 3.3-22.7 | <0.001 | 93.7 | 0.7 | 0.3-1.6 | 0.63 | 93.7 | 1.5 | 0.5-4.9 | 0.46 |
| **Mother's education** | | | | | | | | | | | | | |
| Grade 10 or less | 169 | 53.3 | 1 | | | 93.5 | 1 | | | 91.7 | 1 | | |
| Up to O/L | 204 | 67.2 | 1.8 | 1.2-2.7 | 0.01 | 95.6 | 1.5 | 0.6-3.7 | 0.37 | 91.7 | 0.9 | 0.5-2.1 | 0.99 |
| Up to A/L | 166 | 84.3 | 4.7 | 2.8-7.9 | <0.001 | 96.4 | 1.9 | 0.7-5.1 | 0.23 | 92.2 | 1.1 | 0.5-2.3 | 0.89 |
| Higher education | 47 | 93.6 | 12.8 | 3.9-43.1 | <0.001 | 93.6 | 1 | 0.5-2.5 | 0.96 | 87.2 | 0.6 | 0.2-1.7 | 0.35 |
| **Father's Occupation** | | | | | | | | | | | | | |
| Low | 395 | 62 | 1 | | | 95.7 | 1 | | | 92.9 | 1 | | |
| Middle | 228 | 69.3 | 1.4 | 0.9-1.9 | 0.07 | 95.2 | 0.9 | 0.4-1.9 | 0.76 | 92.1 | 0.9 | 0.5-1.7 | 0.71 |
| High | 162 | 84.6 | 3.4 | 2.1-5.4 | <0.001 | 91.4 | 0.5 | 0.2-0.9 | 0.05 | 87.7 | 0.5 | 0.3-0.9 | 0.05 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Mother's Occupation** | | | | | | | | | | | | | | |
| Low | 113 | 68.1 | 1 | | | 93.8 | 1 | | 93.8 | 1 | | | | |
| Middle | 41 | 58.5 | 0.7 | 0.3-1.4 | 0.269 | 92.7 | 0.8 | 0.2-3.4 | 0.8 | 92.7 | 0.8 | 0.2-3.4 | 0.8 | |
| High | 74 | 87.8 | 3.4 | 1.5-7.5 | 0.003 | 91.9 | 0.8 | 0.2-2.3 | 0.62 | 87.8 | 0.5 | 0.2-1.3 | 0.16 | |
| **Mother's employment status** | | | | | | | | | | | | | | |
| Not employed | 572 | 67.6 | 1 | | | 95.2 | 1 | | | 91.5 | 1 | | | |
| Employed | 228 | 71.8 | 1.2 | 0.9-1.7 | 0.238 | 94.8 | 0.8 | 0.4-1.4 | 0.39 | 91.6 | 1 | 0.6-1.8 | 0.95 | |

Part B

Ascending incidence of soft drinks, fast food and sweet consumption and eating from popular food outlets with the amount of pocket money received show the adverse effects of giving more money to students. It is likely that the students who received more pocket money came from a higher socioeconomic group and a similar pattern of food consumption have been found by Shi et al in China (17) where students from urban high socioeconomic class consumed more western style food and boys of high socioeconomic group consumed more soft drinks. However, a study in Minnesota showed that even though fast food consumption among males was high; there was no association with the socioeconomic status. (23) Disliking vegetables, especially greens, among adolescents has been found in studies even in mid 90's. (24)

Several limitations deserve mention. The main ethnic and racial groups were not represented adequately in the sample. Due to practical reasons investigators could not visit the Tamil medium schools and this difference would have been minimized if the investigators did so. Closer to 50 percent of the students had no idea about the family income and couldn't use this in the analysis.

In conclusion, results of this study indicate that the majority of adolescents consume homemade food for main meals with an increase in breakfast consumption from shops. Fruit and vegetable consumption is not adequate for most students. Moreover, undesirable food habits like fast food and sweet consumption as well as eating from popular food outlets and consuming a large number of soft drinks seems to be associated with increase in the amount of pocket money received. Better understanding of the adolescent's food habits and associated factors by primary care professionals will enable them to educate vulnerable adolescents as well as their parents more effectively. Strengthening of nutrition education as a continuous and practical part in the school curriculum will improve healthy eating. Knowledge on unhealthy food habits and their effects on health and the promotion of good dietary habits for adolescents can improve healthy food consumption by adolescents and their families and this will in turn prevent or delay the occurrence of non communicable diseases in the future.

**Acknowledgements :**
The authors wish to thank the University of Sri Jayewardenepura for funding the study, Prof Rajitha Wickramasinghe, Prof Martin C Gulliford for advice and guidance on statistical analysis, Prof Gulliford and Miss Kethakie Sumathipala for support extended in editing, research assistants and the staff of the Family Practice Centre, University of Sri Jayewardenepura for all their support throughout the study period and all the students who participated in this study.

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Table 3: Twenty-four hour dietary recall

| Food item | Urban n=525 | | | Rural n=200 | | | Private n=75 | | | Total N=800 | | | P for consumed or not |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | NC % | OD % | >OD % | NC % | OD % | >OD % | NC % | OD % | >OD % | NC % | OD % | >OD % | |
| Rice | 3 | 19 | 78 | 0.5 | 6 | 93.5 | 4 | 48 | 48 | 2 | 19 | 79 | 0.1 |
| Bread | 36 | 57 | 7 | 51 | 45 | 4 | 35 | 50 | 15 | 40 | 53 | 7 | 0.001 |
| Rice products | 77 | 20 | 3 | 71 | 28 | 1 | 77 | 23 | 0 | 75 | 23 | 2 | 0.27 |
| Legumes | 39 | 33 | 28 | 36 | 36 | 28 | 39 | 44 | 17 | 39 | 33 | 28 | 0.82 |
| Fish | 41 | 26 | 33 | 47 | 34 | 19 | 55 | 32 | 13 | 44 | 28 | 28 | 0.04 |
| Dry fish | 70 | 18 | 12 | 43 | 32 | 25 | 84 | 15 | 1 | 65 | 21 | 14 | <0.001 |
| Eggs | 67 | 27 | 6 | 69 | 28 | 3 | 44 | 50 | 6 | 64 | 30 | 6 | <0.001 |
| Chicken | 69 | 18 | 13 | 80 | 14 | 6 | 44 | 27 | 29 | 70 | 17 | 13 | <0.001 |
| Red Meat | 96 | 2 | 2 | 95 | 4 | 1 | 81 | 12 | 7 | 95 | 3 | 2 | <0.001 |
| Processed meat | 87 | 10 | 3 | 88 | 7 | 5 | 65 | 24 | 11 | 85 | 10 | 5 | <0.001 |
| Milk | 10 | 27 | 63 | 11 | 37 | 52 | 20 | 31 | 49 | 11 | 30 | 59 | 0.04 |
| Milk products | 41 | 44 | 15 | 57 | 36 | 7 | 41 | 20 | 39 | 45 | 40 | 15 | <0.001 |
| Green leaves | 30 | 37 | 33 | 33 | 35 | 32 | 39 | 44 | 17 | 32 | 37 | 31 | 0.1 |
| Vegetables* | 7 | 17 | 76 | 5 | 16 | 79 | 15 | 1 | 84 | 8 | 15 | 77 | 0.04 |
| Fruits* | 10 | 42 | 48 | 12 | 44 | 44 | 10 | 37 | 53 | 11 | 42 | 47 | 0.75 |
| Sweets | 40 | 34 | 26 | 38 | 41 | 21 | 32 | 37 | 31 | 39 | 36 | 25 | 0.34 |
| Fast foods | 57 | 28 | 15 | 59 | 34 | 7 | 60 | 23 | 17 | 58 | 29 | 13 | 0.76 |

| | n | Soft Drinks consumption > 5 bottles / week | | | | Eating from food outlets > 4times/ Month | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | % | OR | CI | P | % | OR | CI | P |
| School type | | | | | | | | | |
| Private | 75 | 31 | 1 | | | 20 | 1 | | |
| Rural | 200 | 7 | 0.2 | 0.1-0.4 | <0.001 | 6 | 0.3 | 0.1-0.6 | 0.001 |
| Urban | 525 | 7.2 | 0.2 | 0.1-0.3 | <0.001 | 7.4 | 0.3 | 0.17-0.6 | 0.001 |
| Sex | | | | | | | | | |
| Male | 415 | 13 | 1 | | | 11.3 | 1 | | |
| Female | 385 | 6 | 0.4 | 0.3-0.7 | 0.002 | 4.9 | 0.4 | 0.2-0.7 | 0.001 |
| Pocket money | | | | | | | | | |
| Q1 (lowest) | 224 | 1.8 | 1 | | | 2.7 | 1 | | |
| Q2 | 182 | 6 | 3.5 | 1.1-11.3 | 0.03 | 5 | 1.9 | 0.7-5.4 | 0.24 |
| Q3 | 270 | 8.9 | 5.4 | 1.8-15.7 | 0.002 | 9.6 | 3.8 | 1.5-9.6 | 0.003 |
| Q4 (highest ) | 124 | 29 | 22.5 | 7.8-65.1 | <0.001 | 20.2 | 9.2 | 3.7-23.1 | <0.001 |

**Table 4: Associations between eating from food outlets, soft drinks, fast food, sweets and fruit and vegetable consumption (Part A)**

| | Fruit and vegetable consumption > 5 types/ previous day | | | | Sweets consumption - previous day | | | | Fast food Consumption - previous day | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | % | OR | CI | P | % | OR | CI | P | % | OR | CI | P |
| School type | | | | | | | | | | | | |
| Private | 46.7 | 1 | | | 68 | 1 | | | 40 | 1 | | |
| Rural | 33 | 0.6 | 0.3-0.9 | 0.04 | 62.5 | 0.8 | 0.5-1.4 | 0.4 | 41 | 1 | 0.6-1.8 | 0.88 |
| Urban | 33.1 | 0.6 | 0.4-0.9 | 0.02 | 59.6 | 0.7 | 0.4-1.2 | 0.17 | 43.4 | 1.2 | 0.7-1.9 | 0.58 |
| Sex | | | | | | | | | | | | |
| Male | 39.3 | 1 | | | 59 | 1 | | | 48 | 1 | | |
| Female | 29.1 | 0.6 | 0.5-0.9 | 0.003 | 63.4 | 1.2 | 0.9-1.6 | 0.21 | 36.6 | 0.6 | 0.5-0.8 | 0.001 |
| Pocket money | | | | | | | | | | | | |
| Q1 (lowest) | 29 | 1 | | | 51.3 | 1 | | | 28.6 | 1 | | |
| Q2 | 27.5 | 0.9 | 0.6-1.4 | 0.73 | 63.7 | 1.7 | 1.1-2.5 | 0.01 | 43.4 | 1.9 | 1.3-2.9 | 0.002 |
| Q3 | 38.5 | 1.5 | 1.1-2.2 | 0.03 | 63.3 | 1.6 | 1.1-2.4 | 0.01 | 47.8 | 2.3 | 1.6-3.3 | <0.001 |
| Q4 (highest ) | 45.2 | 2 | 1.3-3.2 | 0.003 | 70.2 | 2.2 | 1.4-3.6 | 0.001 | 54.8 | 3 | 1.9-4.8 | <0.001 |

**(Part B)**

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# Procalcitonin as a new marker in Diabetic Foot Infection Grades

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## Abstract

**Background and objective:** Diagnosis of diabetic foot infection is usually a challenge to the clinician. Procalcitonin, a 116-amino acid peptide of calcitonin, is a new diagnostic marker of bacterial infections. We evaluated procalcitonin in grades of diabetic foot and assessed the microbial isolates of patients with diabetic foot infections and their relation with procalcitonin level in their sera.

**Methods:** A cross-section study was carried out on 90 diabetic foot patients during 11 months in Erbil city, Iraq. The patients were clinically assessed, foot lesions were graded according to Wagner classification system and their serum had been estimated for procalcitonin by Vitek Immuno Diagnostic Assay System (VIDAS® B·R·A·H·M·S PCT). Bacteriological specimens were obtained and processed using standard procedure for microbiological culture and diagnosis.

**Results:** Serum procalcitonin levels elevated significantly in diabetic foot patients with higher Wagner grades (III, IV and V) (0.29±0.04, 0.30 ±0.07 and 0.60 ±0.11) respectively, compared with those with lower grades (I and II) (0.04± 0.00 and 0.16± 0.04). A total of 130 pathogens were isolated from 90 diabetic foot patients; 46 (51%) of the patients had polymicrobial infection, 37 (41%) had monomicrobial infection and 7 (8%) had no growth. Procalcitonin levels were 0.35±0.04 in patients with mixed infection compared with 0.18±0.05 and 0.23±0.03 in patients with Gram-positive and Gram-negative bacteria respectively.

The difference reached statistical significance (p=0.006).

**Conclusion:** Procalcitonin may be a useful and new diagnostic marker in infected diabetic foot patients especially in those with higher Wagner grades and with polymicrobial infection.

**Key words:** Diabetic Foot; Procalcitonin, Gram positive, Gram negative

## Introduction

Diabetes mellitus (DM) is a serious health problem that is rapidly expanding worldwide (1). One of the more frequent diabetic complications is diabetic foot, which results from a complex interaction between a numbers of risk factors. Neuropathy has a central role, causing ulcerations because of trauma or excessive pressure on deformed feet that lack protective sensitivity (2). Infections are facilitated by immunological deficits, which are related to DM, and they rapidly progress to the deep tissues (3).

Diabetic foot infection (DFI) can be a challenge to diagnose; evaluation of infection should involve a thorough examination of the extremity for clinical signs of infection along with laboratory markers of inflammation (4). Procalcitonin is a 116-amino acid peptide, which has been recently introduced as an inflammatory marker in order to detect bacterial infections (4-6). Based on PCT's specific response to bacterial infections, it was suggested that PCT could be used to distinguish bacterial from viral infections and noninfectious inflammatory response (6).

Different microbes might induce distinct responses, resulting in a variable upregulation of circulating biomarkers and mediators. Nevertheless, the likelihood for bacterial infections increases gradually with increasing serum levels of PCT (7). Recently, several studies focusing on new markers, have been undertaken. PCT is such a new marker, about which a number of clinical studies have been published. It is a specific marker of bacterial infection in different patient groups (8).

To our knowledge, our study is the first aiming to determine the value of procalcitonin in our region. We evaluated the value of PCT as a marker of bacterial infection in diabetic patients with foot ulcers and its relation with severity of diabetic foot according to Wagner grading.

## Methods

In this cross-sectional study, a total number of 90 patients with documented diabetic foot ulcer, referred to different public and private hospitals in Erbil city, Iraq between June 2011 and May 2012, were enrolled in the study. Serum PCT was evaluated among 5 groups of diabetic foot patients who were classified according to Wagner classification system. Foot lesions were classified as follows: grade 0, risk of foot ulcer; grade 1, ulcerated skin and subcutaneous tissue; grade II, deeper lesions may penetrate to tendon, bone, or joint capsule, without abscess or osteomyelitis; grade III, deep tissues are involved, and abscess, osteitis, or osteomyelitis is present; grade IV, local gangrene; and grade V, diffuse gangrene (9).

Demographical data that included age, sex, duration of diabetes, type of diabetes and Wagner's grade were recorded for every case. DF patients had been tested for both serologic and bacteriologic investigations by quantitative determination of PCT concentration in human serum by using VIDAS kits (VIDAS® B·R·A·H·M·S PCT) provided by Biomerieux (France) and the isolation and identification of the causative microorganism by using the API system. The study was approved by Ethics Committee in the college of medicine, Hawler Medical University. SPSS was used for statistical analyses. Difference between two groups was analyzed using independent sample t-test. F-test was used to analyze differences among more than two groups. A difference was considered significant at $p < 0.05$.

## Results

Of the 90 patients with diabetic foot, 51 (57%) were male and 39 (43%) were female. The age ranged from 35 to 85 years with mean age being 58.5 years. The majority of patients had type 2 DM 85 (94.4%). According to the Wagner classification, most of the DF patients were either grades II (26.6 %) or III (27.7%), while grade V was the least common (13.3%), Table 1.

Table 2 shows the mean serum concentration of PCT in diabetic foot patients among different Wagner grades. High significant differences ($p<0.01$) were revealed among different grades. Patients with higher Wagner grades had significantly higher PCT levels. G V was increased significantly ($p<0.01$) compared with G I, G II and G III.

A total of 130 bacteria were isolated, resulting in an average of 1.44 organisms per patient. The bacteria isolated from the diabetic foot ulcers are summarized in Table 3. Staphylococcus aureus (20%), Escherichia coli (l5.3%), and Coagulase Negative Staphylococci (l3%) were the bacterial species most commonly isolated from the patients with DFI. In 37 (41%) patients only one pathogen was isolated (monomicrobic), while in 46 (51%) patients more than one pathogen (polymicrobic) was isolated. In 7 (8 %) patients, no isolate was obtained. Anaerobes were almost always isolated in mixed culture.

The mean serum concentration of PCT increased significantly in patients infected with mixed growth compared with G+ve (0.02), G -ve (0.01) and no growth ($p=0.001$). Although mean serum concentration of PCT in patients infected with G-ve was higher (0.23±0.03) than those infected with G+ve (0.18±0.05), differences were not significant ($P>0.05$) (Table 4).

## Discussion

Foot infection is one of the leading causes of morbidity and mortality in diabetic patients and its assessment needs clinical and paraclinical evaluations (10). A wide range of bacteria can cause infection in DF patients (11). PCT has been shown to be superior to other infection markers in the diagnosis of both systemic and localized bacterial infection(5); also PCT could be used to distinguish bacterial from viral infections and noninfectious inflammatory response (8). However the diagnostic role of PCT in DFI is uncertain as well and limited number of studies are available in this regard.

| Features | Number of patients (%) |
|---|---|
| | |
| Age (years) | 58.5 (35-85) |
| Sex (male/female) | 51 (57) / 39 (43) |
| Diabetes mellitus: Type 2/type 1 | 85 (94.4) /5 (5.6) |
| Wagner's grade | |
| Grade I | 14 (15.5) |
| Grade II | 24 (26.6) |
| Grade III | 25 (27.7) |
| Grade IV | 15 (16.6) |
| Grade V | 12 (13.3) |
| Culture result | |
| Positive culture/Negative culture | 83 (92) / 7 (8) |

**Table 1: General clinical features of 90 consecutive diabetic patients with infected foot ulcers**

A study performed by Uzun and colleagues in Turkey, revealed the potential role of PCT in detecting the DFI (5). While Jeandrot et al, (4) revealed that the measurement of CRP and PCT might be noteworthy to distinguish between infected and uninfected diabetic foot ulcers. In the present study, serum PCT was being compared among the five Wagner grades. Our study showed that patients with higher Wagner grades had significantly higher PCT levels. There was a linear increase in the PCT level with increase in Wagner's grade. This is in contrast to the findings of several other studies (6, 10), possibly because of suboptimal study protocols like small sample size and lack of bacteriological finding in these studies.

In this study, Gram +ve bacteria were the predominant pathogens, Staphylococcus aureus was the commonest aetiological agent. Our result is consistent with those of previous studies conducted in other countries (12-14, 1). In contrast to our results, some studies from India showed the G -ve bacteria as the predominant organisms associated with DFI (15, 11). A possible reason for the high prevalence of G +ve in the present study was because almost half of our patients had either G I or II; if they have infection it may be mild or moderate infection. Another reason may be because the predominant pathogens causing diabetic foot infections are Gram +ve cocci, especially S. aureus. These organisms are predominant both in mild infection, as well as in more severe and chronic infected wounds (16).

The bacterial cultures from the specimens yielded numerous bacteria in 51% of cases, single bacteria in 41% of cases and negative cultures in 8%. The same result was reported by many researchers (17, 11). Several studies have investigated the relationship between the types of infections and the number and types of organisms recovered from wound infections. These studies found that most mild infections are monomicrobial and are caused by aerobic Gram +ve cocci. Further, they found that most severe infections are usually polymicrobial and caused by aerobic Gram +ve cocci, Gram-ve bacilli and anaerobes (18, 19).

Anaerobes isolated from our study are consistent with other reported studies, in which Peptostreptococcus

| Parameter | G I No.(14) | G II No. (24) | G III No. (25) | G IV No. (15) | G V No. (12) | p-value F- test |
|---|---|---|---|---|---|---|
| | Mean ±SE | Mean± SE | Mean ±SE | Mean ±SE | Mean ±SE | |
| PCT ng/ml | 0.04± 0.00 | 0.16± 0.04 | 0.29±0.04 | 0.30 ±0.07 | 0.60 ±0.11 | P<0.01 |
| | Wagner Grades | | Probability | P value | Test statistics | |
| | G1 VS G II | | 0.02 | p<0.05 | T test | |
| | G1 VS G III | | 0.001 | p<0.001 | | |
| | G1 VS G IV | | 0.004 | p<0.00 | | |
| | G1 VS G V | | 0.001 | p<0.001 | | |
| | G II VS G III | | 0.025 | p<0.05 | | |
| | G II VS G IV | | 0.06 | p>0.05 | | |
| | G II VS G V | | 0.001 | p<0.001 | | |
| | G III VS G IV | | 0.86 | p>0.05 | | |
| | G III VS G V | | 0.003 | p<0.001 | | |
| | G IV VS G V | | 0.03 | p<0.05 | | |
| P<0.05: Significant; P<0.01: Highly significant; P>0.05: Not significant; G: Grade | | | | | | |

Table 2: Relationship between serum PCT mean levels of diabetic foot patients according to Wagner grades

spp. were the predominant isolates (20-22), and they were isolated almost always in mixed culture. A mixture of aerobes and anaerobes has been reported by many researchers (23, 24). This can be explained on the basis of the nature of wounds in diabetic patients, and in diabetic patients impairment of blood supply due to vascular disease of acute trauma is associated with a fall in the oxygen concentration in tissues. Dead tissue rapidly creates anaerobic conditions. If infection with aerobic bacteria or facultative anaerobic bacteria occurs, these bacteria may use up available oxygen, thus making the environment more suitable for growth of anaerobic bacteria (25).

Our findings suggested that the magnitude of PCT elevation could be significantly higher in patients infected with G-ve than in those with G+ve bacteria. Charles et al (26) and Brodska et al (27) share the same result; they clearly established that differences exist in the signaling pathways involved in the host's inflammatory response induced by the two bacterial species and hence PCT elevation may be high in G-ve bacterial infection.

## Conclusion

Procalcitonin may be a useful diagnostic marker for diabetic foot infection patients. Those infected by Gram negative bacteria could be associated with higher PCT values than those found in Gram positive bacteria.

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| Bacterial isolates | No. | Percentage |
|---|---|---|
| Aerobes (No= 113) | | |
| Gram positive cocci | | |
| *Staphylococcus aureus* | 26 | 20 |
| Coagulase Negative Staphylococci | 17 | 13.07 |
| *Enterococcus spp.* | 11 | 8.46 |
| *Streptococcus spp* | 6 | 4.61 |
| Total | 60 | 46 |
| Gram negative bacilli | | |
| *Escherichia coli* | 20 | 15.38 |
| *Proteus spp.* | 8 | 6.15 |
| *Pseudomonas spp* | 7 | 5.38 |
| *Klebsiella oxytoca* | 4 | 3.07 |
| *Acinetobacter baumanii* | 4 | 3.07 |
| *Enterobacter cloacae* | 3 | 2.3 |
| *Morganella morgani* | 2 | 1.53 |
| *Aeromonas hydrophila* | 2 | 1.53 |
| *Citrobacter freundii* | 2 | 1.53 |
| *Cedecea davisae* | 1 | 0.76 |
| Total | 53 | 41 |
| Anaerobes (No= 17) | | |
| *Peptostreptococcus spp.* | 8 | 6.15 |
| *Bacteroides fragilis* | 5 | 3.84 |
| *Fusobacterium spp.* | 2 | 1.53 |
| *Clostridium clostridioforme* | 2 | 1.53 |

**Table 3: Frequency of aerobic and anaerobic bacteria isolated from 83 DF patients**

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| Type of isolate | No.90 | PCT serum concentration | p-value |
|---|---|---|---|
| | | Mean± SE | F- test |
| Gram +ve | 25 | 0.18±0.05 | 0.006 |
| Gram –ve | 12 | 0.23±0.03 | p<0.01 |
| Mixed | 46 | 0.35±0.04 | HS |
| No growth | 7 | 0.04±0.00 | |
| Gram +ve Vs Gram –ve | | 0.44 | T test |
| Gram +ve Vs Mixed | | 0.01 | |
| Gram +ve Vs no growth | | 0.01 | |
| Gram -ve Vs Mixed | | 0.02 | |
| Gram -ve Vs no growth | | 0.001 | |
| Mixed Vs no growth | | 0.001 | |
| p<0.05: Significant; p<0.01: Highly significant; p>0.05: Not significant | | | |

**Table 4: PCT means serum concentration in types of isolate**


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# The Effect of Nasal Steroid Spray in the Treatment of Otitis Media with Effusion in Children - Non Random Therapeutic Trial

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## Abstract

**Background:** Otitis media with effusion is a common otological problem which needs special care in the pediatric age group regarding diagnosis and treatment in order to prevent its complications.

**Aim:** To study the effect of short term effect of intranasal steroid in the management of otitis media with effusion.

**Patients and Methods:**
An observational non random therapeutic trial, undertaken from first of March 2010 to the first of April 2011 in the consultation unit of otolaryngology center in surgical specializations Hospital in Medical city.

The study involved 60 children aged from 3 to 10 years diagnosed as having bilateral otitis media with effusion. Complete clinical and audiological assessment for all patients was done.

Patients were divided into 2 groups: those taking intranasal steroids (an intervention) and the other group who received no steroid treatment. Both groups received the same treatment apart from the intervention mentioned . The reduction in the air bone gap was measured (i.e. the response).

**Result:** Reduction in ABG in the treatment group was significant with ($p<.005$) and this is consistent with other studies.

**Conclusion:** Short term intranasal mometasone is likely to be effective in treatment of Otitis Media.

**Key words:** Middle Ear Effusion, Otitis Media with Effusion, Nasal Steroids in Otitis Media with Effusion.

## Introduction

Otitis media with effusion (OME) is the chronic accumulation of mucus within the middle ear and sometimes the mastoid air cell system. The time that the fluid has to be present for the condition to be chronic is usually taken as 12 weeks. (1) Up to 80% of children have been affected by otitis media with effusion by the age of 4 years, but prevalence declines beyond 6 years of age. (2) Abnormal function of the Eustachian tube is the cornerstone of the pathogenesis of Otitis media with effusion. The Eustachian tube in infants and children is shorter, more horizontal, and functionally less mature compared with that in adults. Conditions such as upper respiratory tract infection lead to edema and congestion of respiratory mucosa of the Eustachian tube and middle ear. This leads to an increase in negative middle-ear pressure, causing an influx of bacteria and viruses from the nasopharynx when the Eustachian tube opens.(3)Approximately 30% to 50% of children with OME have positive culture of bacterial species including streptococcus pneumoniae, H.influenza, and M.catarrhalis. (4)There are many etiological factors that contribute to OME and these include Eustachian tube dysfunction, Craniofacial abnormalities, Allergy and Gastro-oesophageal reflux.(1) (5). The diagnosis of OME includes history, physical examination which involves Otoscopy, Pneumatic otoscopy, Tympanometry and pure tone audiometry. The definitive diagnosis for presence or absence of effusion is confirmed at time of myringotomy. The Picture is of the ear with OME bubbles confirming presence of fluid (6). In general OME is a benign condition with a high spontaneous recovery rate and no long-term sequelae. In most children, the main concern will be the hearing. (7)

The medical management is controversial and there is a wide geographic variability in practice. It includes the following: Decongestant/ antihistamine, Antibiotics, Steroids; and in certain conditions surgical treatment is indicated which includes myringotomy with or without tympanostomy tube insertion in addition to adeniodectomy in some conditions.(2,4,8)

## Patients and Methods

Ethical and scientific approval had been taken from the ethical and scientific committee of the medical college. Patients accepted involvement after explanation of the research protocol was given.

**Study type:** an observational non randomized therapeutic trial study. Study duration : from the first of March 2010 to the first of April 2011 Study setting: in Medical City in Surgical Specializations Hospital at the outpatient clinic and so was the follow up. The follow up was done at intervals of 4 weeks and 8 weeks. Study sample: involved 60 patients, aged between 3-10 years. Inclusion criteria: bilateral otitis media, diagnosed by two specialist in the department.

**The Method:** the patients were divided into 2 groups, 40 patients (80 ears) after diagnosis, were put on mometason Furoat monohydrate nasal spray 50 microgram once daily for 3 weeks duration (as the interventions). Twenty patients (40 ears) after diagnosis and no added steroid treatment.

All patients received the same treatment according to a guideline of condition and after ENT expert opinion in the unit.

**Data collection :**

**1-** Questionnaire paper which included a detailed history related to deafness like ear pain, popping, nasal obstruction, nasal discharge, snoring, mouth breathing, apnea, and allergy, history of previous surgery and frequency of upper respiratory tract infection.
**2-** Examination of the ear using otoscope, pneumatic otoscope (if child cooperative) and using otomicroscopy.
**3-** Endoscopic examination using rigid scope to assess the adeniod size was tried, but it was difficult in all children.
**4-** An Audiological examination was done using Tuning fork test with 512 Hz frequency to assess air conduction and bone conduction and compare with the degree of hearing loss using Rinne and Weber tests.
**5-** Pure tone audiometry was done either binaurally free-field for children <5 years or monaurally with headphones for children >5 years.
**6-** The measurement of the difference between air and bone conduction was determined and the result is the air bone gap and Tympanometry. This was done using impedance audiometer to estimate compliance and peak pressure if present (as the response).

**The intervention:** after receiving treatment which was either,

**1-** does not contain steroid.
**2-** steroid containing treatment using mometason furoat monohydrate nasal spray. The assumption is that measuring the response of the treatment's effect can be done by measuring the improvement in ABG in both groups, as a response.

## Results

The study involved 60 children, 40 of them were males and 20 were females, age range was from 3 to 10 years old, with mean age 6.7 years.

## Discussion

Concerning age group in this study it seems that OME occurs in this specific age group ie ; between 3-10 years old. Gultekin et al (9) found in their study the prevalence of the disease between age 5 years and 8 years was 9.8% and the prevalence was 7.2% in children aged between 9 and 12 years.

The sex incidence in the study showed that there is a higher prevalence in males with male to female ratio 2.3:1. Cengel (10) et al revealed no statistical differences regarding the gender. Gultekin (9) et al showed no sex difference in their study. Social circumstances may play a role in the increase in male children attending the clinic.

## Results

**Table 1: shows the number and presenting symptoms (chief complaint) in the study sample at start of the research of 60 patients.**

| Symptoms | Number | Percentage | P value* |
|---|---|---|---|
| Hearing loss | 46 | 76.6% | 0.000 |
| Nasal symptom | 6 | 10% | |
| Snoring | 2 | 3.3% | |
| Sore throat | 6 | 10% | |

* Chi-Square Goodness-of-Fit Test for Observed Counts in Variable

**Table 2: examination using otoscope and pneumatic otoscope of 60 patients.**

| | | No. | % | P value* |
|---|---|---|---|---|
| Tympanic membrane examination | blue color TM | 28 | 46.6% | 0.000 |
| | amber | 8 | 14.6% | |
| | pale grey | 6** | 10% | |
| | TM translucency | 60 | 100% | |
| | dilated blood vessels | 60 | 100% | |
| Cone of light finding. | broken cone of light | 33 | 55% | 0.000 |
| | absent cone of light | 18 | 31.6% | |
| | normal position of cone of light | 2** | 3.3% | |
| TM finding | retracted TM | 45 | 75 % | 0.000 |
| | bulging TM | 8 | 13.3% | |
| | normal position TM with retraction pocket | 6 | 10% | |
| | air bubbles | 2 | 0.03% | |
| Malleus handle finding | horizontal and short position of malleus handle, | 36 | 61.6% | 0.000 |
| | Normal malleus position. | 29 | 38.3% | |
| | prominent lateral process of malleus | 42 | 70% | |
| | process in its normal position | 18 | 30% | |
| Process in its normal position | difficult to examine by Siegle | 18 | 30% | 0.006 |
| | normal mobility | 34 | 56% | |
| | immobile. | 14 | 23% | |

* Chi-Square Goodness-of-Fit Test for Observed Counts in Variable
** the rest of 60 = no significant clinical finding.

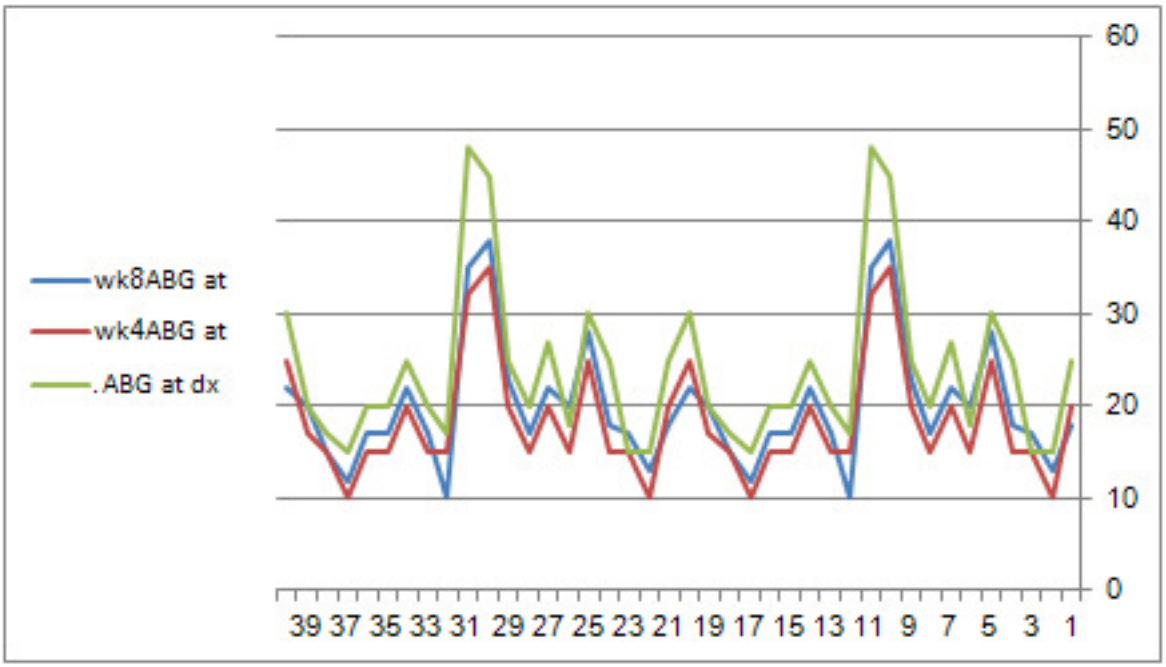
(continued next page)

Table 3: showing ABG difference in mometasone group and non steroid treatment group's response.

| | ABG | At diagnosis | After 4 weeks | After 8 weeks | P* |
|---|---|---|---|---|---|
| ABG In treatment group | 10—20 dB | 55% | 80% | 65% | P=0.001 |
| | 21—30 dB | 35% | 10% | 25% | |
| | >30 dB | 10% | 10% | 10% | |
| ABG In non treatment group | 10—20 dB | 55% | 60% | 55% | P=0.221 |
| | 21—30 dB | 35% | 25% | 25% | |
| | >30 dB | 10% | 15% | 20% | |

*Chi-Square Test

**Figure 1: ABG in mometasone group**




The main clinically presenting symptoms in patients suffering from OME were hearing loss. The diagnosis: Deafness formed 76.6% of the presenting symptoms , while nasal obstruction and snoring symptoms formed 10% and this is consistent with the study above.

Concerning Table 3 and Figure 1 it is clearly found that adding steroids will improve the ABG in OME with significant results, and this is consistent with a lot of studiessuch as Lilholdt et al (11) in 1982 who reported no difference between the use of intranasal beclomethasone versus placebo in children aged from 4-14 years after 2 months duration so it is not consistent with our study. Shaprio et.al (12) in an 1982 did a study on the effect of dexamethasone nasal spray versus placebo in children aged from 2-12 years for 4 weeks duration. He reported that dexamethasone showed more efficacy than placebo and this goes with our study in the steriod taking group. Tracy et al(13) in a 1998 study on the effect of beclomethasone + amoxicillin versus placebo+ amoxicillin versus amoxicillin alone in children aged 3-11 years for 12 weeks duration showed the beclomethasone group had significantly greater frequency of resolution of OME at 4 and 8 weeks but not at 12 weeks, although this study contained amoxicillin in all studied groups but the effect of steriods was significant and this accommodates our study. Cengel et al (10) in a 2005 study on the effect of intranasal mometasone furoat monohydrate 100 mcg/day versus placebo in children aged 3-15 years for 6 weeks duration concluded that the mometasone group had a more significant resolution rate than the control group but this result is short term and this goes with our study in the first group., Williamson and Benge et al (14) in a 2007 study on the effect of mometasone furoate 50 mcg/day versus placebo in children aged 4-11 years for 3 months duration and they concluded that topical steroids were unlikely to be effective treatment for OME. This could be due to lack of long term follow up in the result of our study because we lost a lot of patients during follow up. Thomas CL. et

al(15) in a 2006 study on the effect of systemic or topical nasal steroid concluded that both oral and topical intranasal steroids alone or in combination with an antibiotic lead to a quicker resolution of OME in the short term, however, there is no evidence of longer term benefit.

## Conclusions

1. Otitis media with effusion is more prevalent in males than females.
2. The most common presenting symptom is impaired hearing which was correlated with audiogram rather than tympanometry result.
3. Topical steroids in general improve OME in children but in a short term course from ABG point.

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