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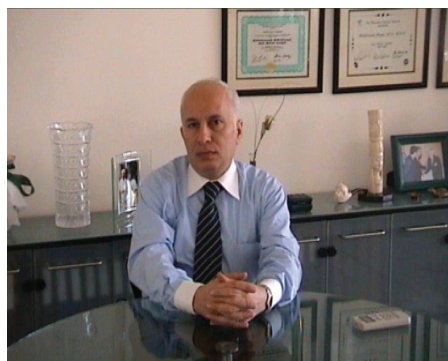
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From the Editor



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A cross sectional study from Saudi Arabia looked at the current prevalence of depression, anxiety and stress among primary health care (PHC) physicians in Aseer Region, Saudi Arabia. A total of 304 PHC physicians took part in the study with a 88.4% response rate. The authors concluded that PHC physicians in Aseer experience variable forms of negative emotional states (i.e., depression, anxiety and stress). System-level interventions to improve workplace environments and, hopefully, reduce their contribution to mental disorder are suggested.

A paper from Jordan attempted to characterize the clinical features, investigations, and prognosis of women referred with chest pain who subsequently underwent coronary angiography. The authors did a retrospective study on 500 women. The authors concluded that in women referred with chest pain, a diagnosis of normal coronary arteries was common. Risk factor analysis and exercise stress testing were of limited value in predicting coronary artery disease in women. A diagnosis of non-cardiac chest pain in patients with

normal coronaries is of little benefit regarding morbidity.

A paper from Iraq looked at the effect of intake of carbonated beverages on = increased urinary calcium excretion and fracture risk in observational studies. The study was done on eighteen randomly selected male volunteers of average 24.05 years age; each were given 500 ml of Coca Cola a day, for six successive days. Their pre and post- Coca Cola consumption urine samples were collected and analyzed for calcium excretion levels. The author concluded that the excess calciuria is confined to normal males who are habitual consumers of Coca Cola. This findings suggests that excess consumption of carbonated beverages in general, and particularly Coca Cola, which mostly replaced milk, must be discouraged in order to prevent bone resorption and hence early osteoporosis.

A paper from India looked at the the magnitude and pattern of acute suicidal poisoning in the turmoil affected Kashmir valley and compared the same with the retrospective (pre-turmoil) data. The authors concluded that turmoil in Kashmir valley has lead to increased suicidal poisoning and is likely to increase further if proper measures are not instituted. Prompt peaceful, political intervention is suggested.

A number of papers in this issue dealt with various obstetric problems. A study from Yemen looked at persistent Khat chewing habits during pregnancy. The authors stressed that there are a significant number of Yemeni people who have been chewing Khat daily. The habit represents a major part of their cultural and social traditions, and plays an important role in their life-styles. In the recent years, it is observed that Khat-chewing among women is increasing, and persisting during pregnancy. The authors evaluated 1554 pregnant women. The authors concluded that many women continue their khat chewing habits during pregnancy which leads to delivery of neonates with reduced birth weight in a large proportion of such births.

A paper from Iran looked at Risk of fetal loss due to chorionic villous sampling in Iran. The authors pointed that when earlier diagnosis for detection of chromosomal abnormality is required, transabdominal CVS could be a safe method with minimum fetal loss.

A Hospital Based Enquiry looked at Maternal and Umbilical Cord Blood Lead Levels and pregnancy outcomes. Environmental lead exposure is a public health problem on a global level. The population most sensitive to lead exposure from various sources are pregnant women and children. The study population consisted of 350 mother-infant pairs. The study revealed that high maternal blood lead value is significantly associated with the development of hypertension during pregnancy ($p=0.000$) giving a low birth weight baby ($p=0.000$), with a small head circumference ($p=0.013$). The authors concluded that the results needed to be transferred to decision makers to implement measures to effectively eliminate lead from the environment and protect future generations from its deleterious effects.

A paper from Bangladesh looked at Anti-Natal Care Service Uptake in Slum Areas of Dhaka City. This study examined the socio-economic and cultural determinants of ante natal care received by women in slum areas of Dhaka city. The authors concluded that as socio-economic characteristics of women play an important role in determining the differential use of ANC service, it may be suggested that such characteristics should be considered accordingly in order to increase the uptake of the number of ANC recommended by World Health Organization.

ABSTRACT

Aims: To assess the current prevalence of depression, anxiety and stress among primary health care (PHC) physicians in Aseer Region, Saudi Arabia.

Methods: A cross-sectional, self-reported questionnaire survey was undertaken among all primary care physicians in Aseer Region, in the south western area of Saudi Arabia using Depression, Anxiety, and Stress Scale (DASS).

Results: A total of 304 PHC physicians took part in the study with a 88.4% response rate. The general prevalence rate of negative emotional states among PHC doctors was 13.2%, while the prevalence rates for depression, anxiety and stress were 7.6%, 8.6% and 7.2%, respectively. No significant differences were attributed to age, nationality, marital status or years of experience. However, female physicians experienced significantly higher anxiety and stress than male physicians ($p=0.035$, $p=0.032$, respectively). The present study showed that the higher the qualification of the PHC physician, the higher is the experienced stress ($p=0.035$).

Conclusions: PHC physicians in Aseer experience variable forms of negative emotional states (i.e., depression, anxiety and stress). System-level interventions to improve workplace environments and, hopefully, reduce their contribution to mental disorder are suggested.

Keywords: Primary care physicians, DASS, depression, anxiety, stress, Saudi Arabia.

Emotional Status of Primary Health Care Physicians in Saudi Arabia

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Introduction

There is an increasing concern about the interaction between mental health problems and the workplace⁽¹⁾. Mental disorders are among the most frequent causes of occupational disability⁽²⁾.

Amongst doctors, poor psychological health has been associated with significant impact on the quantitative and qualitative care of patients, leading to poor performance and the resulting effects on patients' satisfaction and adherence to treatment⁽³⁾.

Wall et al.⁽⁴⁾ examined a large sample of National Health Service workers in Britain and reported relatively high levels of minor psychiatric disorders among doctors, nurses, allied health professionals, and managers compared with rates in the general population⁽⁴⁾. In Pakistan, 39% of family physicians were shown to suffer from depression or anxiety⁽⁵⁾.

In Saudi Arabia the Ministry of Health (MOH) is the major government agency entrusted with the provision of preventive, curative and rehabilitative health care for the Kingdom's population. The Ministry provides primary health care (PHC) services through a network of health care centers (comprising 1,925 centers) throughout the Kingdom⁽⁶⁾, of which most health professionals are expatriates.

High prevalence rates of anxiety, stress and depression were reported among Saudi secondary school

teachers and students^(7,8). However; very limited evidence is available on the psychological issues among health care providers.

The aim of this study is to explore the prevalence of negative emotional states (i.e., depression, anxiety and stress) among PHC physician working in Aseer region.

Methods

During January 2006, this study was conducted on all physicians working in PHC centers in Aseer region (N=345). Aseer occupies a part of Southwest of Saudi Arabia with a total population of 1.6 million inhabitants and a total area that exceeds 185,000 km².

Physicians were assessed using the "Depression, Anxiety Stress Scale" (DASS). It is a 42-item mood state inventory designed to measure negative affective states. It has reliable, independent subscales of depression, anxiety, and stress. Gamma coefficients that represent the loading of each scale on the overall factor are 0.71 for depression, 0.86 for anxiety, and 0.88 for stress. Reliability of the test is considered adequate and test-retest reliability is likewise considered adequate with 0.71 for depression and 0.79 for anxiety and stress. Exploratory and confirmatory factor analyses have sustained the proposition of its factors ($p<0.05$)^(9,10).

Demographic and environmental data, as well as the presence of associated psychological factors, were collected via a

questionnaire devised for the study. Participants were assured about the confidentiality of any provided data through a covering letter.

The questionnaire was distributed to all PHC physicians working in Aseer region. In order to answer the questionnaire properly, the technical supervisors in all sectors (16 sectors) supervised the assessment and were requested to return the responses to the General Directorate of Health Affairs within a maximum of one week.

Physicians who proved to have any of the three negative emotional states (i.e., depression, anxiety or stress) received the necessary consultation and psychiatric care from the psychiatrist researcher of this study.

Data of the completed questionnaire were entered and analyzed using the Statistical Package for Social Sciences (SPSS) version 15. Appropriate statistical tests were applied accordingly and results were considered significant if $p < 0.05$.

Results and Discussion

A total of 305 questionnaires were returned giving a response rate of 88.4%. No reason was found to exclude any of them.

Table 1 shows that participant physicians were of middle age with a mean age of 39.1 years (SD = 6.2 years) with 4.2:1 male to female ratio. Most participants were married and live currently with their families (78%). Almost two-thirds of the physicians had been in general medical practice for over 10 years since graduation. However, the qualification of three-quarters of the physicians was the Bachelor degree. Among participants, there were only 8 Saudis (3%).

Table 2 displays that the prevalence rate of negative emotional states among PHC physicians in Aseer was 13.2%. Anxiety occupied the highest prevalence (26, 8.6%), followed by depression (23, 7.6%), and stress (22, 7.2%). High extent of overlap among the three negative emotional states is quite obvious (Figure 1).

Table 3 shows that depression, anxiety and stress were strongly, positively and significantly correlated.

Table 4 shows that depression was not significantly associated with any of the socio-demographic characteristics. Anxiety and stress were significantly higher among females than males ($p=0.035$ and $p=0.032$, respectively). Moreover, the 3 negative emotional states were shown to be higher among physicians with higher qualifications. However, this trend was statistically significant only as regards stress ($p=0.035$).

Discussion

This study indicated that the prevalence of negative emotional states among primary care physicians in Aseer region is 13.2%. Differentially, the prevalence rates of depression, anxiety and stress were 7.6 %, 8.6% and 7.2%, respectively. These results are relatively lower compared with the results reported among Saudi secondary school teachers using the same tool⁽⁷⁾, as well as the prevalence of any depressive disorder in Saudi population which is 22.8%⁽¹¹⁾. This finding is not in accordance with that reported by several researchers, who indicated that mental disorders are significantly higher among general practitioners (GPs) than in the general population^(12,13).

There are possible reasons why the reported prevalence of negative emotional states are relatively low in this study. Some respondents with a 'felt negative' emotional state may experience personal concerns about the confidentiality of their responses (in spite of the clear written assurance accompanying the data collection sheets) or toward the social "stigma" commonly attached to psychiatric issues. In addition, frequently, some general practitioners might falsely believe that they, as physicians, are qualified enough for self-diagnosis and self-medication. Moreover, tight time constraints for delivering the physicians' response (one week only) might have contributed to this result⁽¹⁴⁾. Finally, the present study may have a limitation since

the obtained data within this study were 'self-reported'. Hence, some degree of response bias, due to underreporting, is possible. Nevertheless, the fact remains that findings would reflect the prevalence of these disorders among the primary care physicians

The present study revealed a high extent of overlap among the negative emotional states and that studied negative emotional states are significantly and positively highly inter-correlated. This may indicate that the personal common vulnerability is universal, i.e., if a physician is susceptible to depression, he/she is also susceptible to anxiety and stress as well.

This study showed that participants' age group, nationality, marital status, and years of experience were not significantly associated with prevalence of negative emotional states. However, anxiety and stress were significantly higher among female than male physicians (15.5% vs. 6.9%, respectively, $p=0.035$ for anxiety and 13.8% vs. 5.7% for stress, respectively, $p=0.032$).

These findings are in accordance with those of Bekker and van Mens-Verhulst⁽¹⁵⁾, who reported a significantly higher prevalence of anxiety among females (16.3%) than males (7.8%). To explain this significant anxiety and stress predilection among females, Gianakos⁽¹⁶⁾ stated that males, compared to females, perceive greater levels of workplace support or at least report such support is effective in reducing their felt stress. Social support in the workplace likely buffers the impact of stress by providing actual assistance in problem solving or in feelings of attachment to others for emotional support. The present study showed that the higher the qualification of the PHC physician, the higher is the experienced stress. This finding is in agreement with that reported by Oubiña et al.⁽⁷⁾, who stated that academic qualifications make a difference to the recognition and experiencing of a stressful situation. This may be due to the fact that highly qualified physicians usually

carry higher responsibilities.

In both the USA and Europe, 30-40% of the workforce is exposed to workplace stress, and levels of stress appear to have been rising over the last two decades⁽¹⁷⁾.

Several studies have evaluated the role of stressful or unsupportive workplaces in the genesis or maintenance of psychiatric symptomatology. Researchers have found that certain kinds of workplace stress are associated with a higher frequency of depression, anxiety and stress in employees^(4,7,8,13,19).

In this study, almost all participating physicians were expatriates from different countries with different training backgrounds, different experiences in PHC, different cultural backgrounds and frequently different languages. These differences might create stresses at work that are added to the baseline stresses of working in a primary health care setting. The steady growth in health services in recent years in Saudi Arabia raises the demand for labor in the health sector, which cannot be easily met by Saudi nationals due to the insufficient number of Saudi graduates from the medical educational and training institutions.

In literature, important sources of psychosocial stress for GP's are mentioned. These comprise excessive paperwork, health reforms, bureaucratic interference, job demands, decision latitude, workplace location, job pressure, patient load, lack of organizational support, dealing with difficult patients and objective personal characteristics such as age, gender and workers' marital status^(4,7,18,19). Suicidal tendencies and alcohol dependence were reported to be higher among physicians than controls of a comparable social class⁽²⁰⁾. For the workplace, these conditions lead to increased absenteeism, conflict, higher turnover and reduced quality and quantity of work.

Conclusion

This study indicates that PHC physicians in Aseer experience some degree of burnout, manifested in variable forms of expressed negative emotional states (i.e., depression, anxiety and stress). This work provides some insight about the satisfaction levels of workplace characteristics, stress and its affect among physicians. It contributes to the acknowledged need for further research to explore sources of stress among PHC physicians, their possible solutions and preventive measures and also to determine the effects of any change secondary to implementation of preventive strategies at different levels.

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Table 1. Socio-demographic profile of primary care physicians in Aseer Region, Saudi Arabia 2006 (n= 304)

Socio-demographic characteristic	No.	%
Age group:		
25 – 35		89
36 – 45		29.0
46 – 55		149
		49.0
		66
		22.0
Gender:		
Male	246	
Female	81.0	
	58	
	19.0	
Nationality		
Saudi	8	3.0
Non-Saudi	296	97
Marital Status:		
Single	20	7.0
Married & live with family	238	78
Married & live alone	46	15
Qualification:		
MBBS	227	75
Diploma	47	16
Master	26	9.0
Fellowship	4	1.0
Experience:		
< 5 years	17	6.0
5 to 10 years	98	32
11 to 15 years	84	28
> 15 years	105	35

Table 2: Prevalence of depression, anxiety and stress among primary care physicians in Aseer region, Saudi Arabia, 2006 (n= 304)

Negative emotional states	No.	%
Absent	264	86.8
Present*	40	13.2
· Depression	23	7.6
· Anxiety	26	8.6
· Stress	22	8.6

* More than one negative emotional state can be complained about by the same participant

Table 3. Correlation matrix between different studied psychological disorders among primary care physicians in Aseer region, Saudi Arabia, 2006 (n= 304)

Negative emotional state	Depression		Anxiety		Stress	
	r	p-value	r	p-value	r	p-value
Depression	--	--	0.689	<0.001	0.697	<0.001
Anxiety	0.689	<0.001	--	--	0.739	<0.001
Stress	0.697	<0.001	0.739	<0.001	--	--

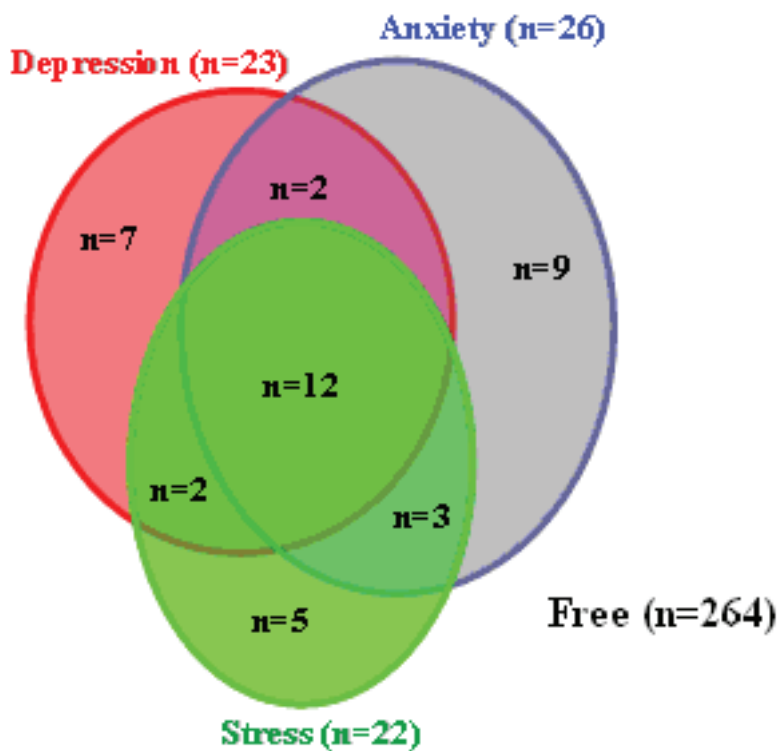
Table 4. Prevalence of negative emotional states according to socio-demographic profile of primary care physicians in Aseer Region, Saudi Arabia 2006 (n= 304)

	Total	Depression (n=23)		Anxiety (n=26)		Stress (n=22)	
		No.	%	No.	%	No.	%
Age groups							
· 25-35	89	10	11.2	8	9.0	7	7.9
· 36-45	149	11	7.4	12	8.1	11	7.4
· 46-55	66	2	3.0	6	9.1	4	6.1
p-value		0.160		0.954		0.908	
Gender							
· Males	246	16	6.5	17	6.9	14	5.7
· Females	58	7	12.1	9	15.5	8	13.8
p-value		0.149		0.035*		0.032*	
Nationality							
· Saudi	8	0	0.0	0	0.0	1	12.5

· Non-Saudi	296	23	7.8	26	8.8	21	7.1
p-value		0.412		0.381		0.560	
Marital status							
· Single	20	3	15.0	3	15.0	3	15.0
· Married living with family	238	16	6.7	20	8.4	18	7.6
· Married not living with family	46	4	8.7	3	6.5	1	2.2
p-value		0.385		0.519		0.166	
Qualifications							
· MBBS	227	12	5.3	14	6.2	11	4.8
· Diploma	47	6	12.8	7	14.9	7	14.9
· Master	26	4	15.4	4	15.4	3	11.5
· Fellowship/ Doctorate	4	1	25.0	1	25.0	1	25.0
p-value		0.057		0.072		0.035*	
Years of experience							
· <5 years	17	1	5.9	1	5.9	2	11.8
· 5-10 years	98	11	11.2	11	11.2	8	8.2
· 11-15 years	84	7	8.3	6	7.1	6	7.1
· >15 years	105	4	3.8	8	7.6	6	5.7
p-value		0.247		0.710		0.799	

* Statistically significant ($p < 0.05$)

Fig. 1. Psychiatric morbidity among primary care physicians in Aseer region, Saudi Arabia, 2006 (n= 304)



Carbonated Beverages and Urinary Calcium Excretion

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ABSTRACT

Background and objectives:

Intake of carbonated beverages has been associated with increased urinary calcium excretion and fracture risk in observational studies.

The aim of the present study was to assess the short-term effects of carbonated beverages on total urinary calcium excretion in normal young males in Erbil city.

Materials and methods: Eighteen randomly selected male volunteers of 24.05 years age were given each 500 ml of Coca Cola® / day for six successive days. Their pre and post-Coca Cola consumption urine samples were collected and analyzed for calcium excretion levels.

Total urinary calcium was estimated by an enzymatic colorimetric method.

Results: A significant increase ($P < 0.05$) in urinary calcium level was observed in subjects consuming Coca Cola.

Conclusions: The excess calciuria is confined to normal males who are habitual consumers of Coca Cola. These findings suggest that excess consumption of carbonated beverages in general, and mainly Coca Cola, which mostly replaced milk, must be discouraged in order to prevent bone resorption and hence early osteoporosis.

Key words: Hypercalciuria, Carbonated beverages, Colas, Caffeine, Calcium, Phosphorous.

Introduction

Inadequate calcium intake is a serious public health concern, since this mineral is involved with numerous metabolic processes including bone remodeling (bone turnover), vascular function, muscular contraction and others. Moreover, the literature suggests that adequate calcium intake may reduce the risk of obesity, insulin resistance syndrome and certain chronic diseases of aging such as hypertension, some forms of cancer and osteoporosis⁽¹⁾.

Carbonated beverages (soft drinks) are beverages that do not contain alcohol and usually contain phosphoric acid, caffeine, sugar or aspartame or saccharin, caramel coloring, carbon dioxide and are commonly known as soda, soda pop, pop, tonic, fizzy drinks, minerals, colas, coke, flavored water, sparkling water, iced tea, lemonade, squash and fruit punch.

Carbonated beverages are junk food - sugary drinks that are high in calories, but supply no nutrient (empty calories). A 12-ounce Cola contains the equivalent of 10 teaspoons of sugar and 150 calories. Soft drinks are prepared by pumping carbon dioxide, which is a waste product of metabolism that is exhaled. So why should we want to further add a waste product to our bodies?

Carbonated beverages also contain large amounts of carbonic acid, hence the term carbonated beverages. This carbonic acid causes the body to deplete the bones of calcium, to remain alkaline⁽²⁾.

Frequent consumption of carbonated beverages has been associated with reduced bone mass, or increased fracture risk, both later in life and in children and adolescents, obesity, diabetes, tooth decay, nutritional deficiencies, heart disease, kidney stones, and other health problems⁽³⁾.

In most reports, Colas were more strongly associated than were other carbonated beverages. Several investigators suggested that the factor or factors responsible for this association may be the increase in phosphorous intake, or the net acid load of those beverages that use phosphoric acid as the acidulant or the caffeine of those beverages that are caffeinated⁽⁴⁾.

For most of these factors, the effect is usually attributed to increased total urinary calcium loss, and the biochemical explanation is that parathyroid hormone (PTH) primarily controls calcium levels in our blood. When the brain senses low calcium to phosphorous ratios (normally = 1.5-2/1), it triggers the release of PTH, which acts in a complex manner on three major body parts (intestines, bones, and kidneys) to restore or increase calcium levels. PTH causes calcium release from bone as it causes osteoclasts to increase in size, and number, leading to enhanced osteoclast activity and bone resorption (bone loss)⁽⁵⁾.

The issue is especially important today because calcium intakes in our region fall far short of current recommendations (1000-1300 mg/day). Per capita, carbonated beverage consumption has risen dramatically, and has replaced milk in the diet of most Iraqi - Kurdistan region children, adolescents and adults and carbonated sodas are now the preferred beverage of young individuals. This increase in consumption of soft drink is not a surprise because soft drink manufacturers have spent billions of dollars in advertising to attract more consumers and to increase consumption of their products. Accordingly, and because of the interest among nutritionists and dietitians as to the possible effects of carbonated beverages, we undertook the present study.

We investigated the acute effect of

Coca Cola on urinary calcium loss by young subjects, who were habitual users of such beverages.

Materials and Method

Subjects

This study was carried out during the period: March to June 2008 at the Department of medical biochemistry, College of medicine, Hawler Medical university, Erbil, Iraq.

The present investigation was conducted on 18 randomly selected young male volunteers who were on usual dietary intakes of foods and nutrients and divided into two groups:

Group I (pre-carbonated beverage consumption group = control group): included 18 apparently healthy male volunteers, their mean age was 24.05 years and the range of age was 19-30 years.

None of this group had clinical or biochemical evidence of any type of diseases, none were taking carbonated beverages and medications containing calcium and vitamin D six days before the test, and informed consent was obtained from each individual.

Group II (post-carbonated beverage consumption group = case group): Included the same 18 subjects of group 1. Each individual of this group had drunk about 500 ml of Coca Cola / day for six successive days. The Coca Cola was purchased from a public market and is a popular brand that is available worldwide .

The details concerning the two groups are elucidated in Table (1).

Samples

Pre- and post- Coca Cola consumption 24 hour urine samples were collected from the two groups for estimation of total urinary calcium levels.

Methods

Total urinary calcium was estimated by an enzymatic colorimetric method described by Tietz N.W.⁽⁶⁾, using commercial kits (BIOLABO SA, France). The principle of this method was explained by Morehead and Briggs⁽⁷⁾, and depends on the reaction of O-Cresol Phthalein

Complexone (CPC) with calcium in an alkaline medium to form a dark-red colored complex, the intensity of which is measured at 570 nm and proportional to the amount of total calcium in the urine samples.

Statistical analysis

The statistical evaluation of the results (mean, standard deviation (S.D.), and standard error of mean (S.E.M.) were calculated using the sSPSS system version 15}. The different variables were compared to each other; simple correlations were tested with the unpaired 't' test. Only ($P < 0.05$) is regarded as significant⁽⁸⁾.

Results

Group I (control group): The mean \pm S.E.D. level of urinary calcium was 144.74 ± 2.58 mg / dl, and the range of variation was 41.64-239.07 mg / dl, table (2).

Group ? (case group): The mean \pm S.E.D. level of urinary calcium was 189.36 ± 5.33 mg/dl, and the range of variation was 83.78-376.00 mg / dl, Table 2.

Discussion

The previous studies carried out on the same aspect, were mostly on children, adolescents and female subjects^(4,9), whereas we have seen the acute effects of Coca Cola on young male subjects.

The most apparent detail in our data is the significant rise ($P < 0.05$) in total urinary calcium excretion after consumption of Coca Cola. This most likely means that carbonated beverages as a whole have a significant intrinsic effect on calcium economy. However even a small excess urinary excretion, if cumulative and not offset by additional calcium absorption would inevitably lead to hypocalcemia, hypercalciuria and bone loss⁽⁴⁾

Massey LK and Wise KJ⁽¹⁰⁾ conducted a study on the effect of caffeine, a constituent of carbonated beverages and reported a rise in urinary calcium excretion.

Published data by Robert P Heaney and Karen Rafferty⁽⁴⁾ revealed that phosphoric acid contents of carbonated beverages

would lower blood calcium by 0.09 mmol (3.6 mg) and increase its urinary excretion.

Our results are consistent with that of Michelle AO Kinney⁽¹¹⁾, who reported that drinking Cola beverages, which contain phosphoric acid and often caffeine, may increase calciuria, and cause fragility of bones in children and adolescents, through interaction with the bone mineral content.

Wyshak G⁽³⁾ also conducted a study on the effect of carbonated beverage consumption on teenage girls and showed an increase in urinary calcium excretion and increased risk of bone fracture in active girls who drank Colas; conversely, there was no increased urinary calcium excretion and no risk of fractures in those who drank non-Colas.

Phosphoric acid is associated with altered calcium homeostasis and development of hypocalcaemia. Consumption of approximately 0.6 or more cans or bottles of Cola beverages per day, is a risk factor for the development of hypocalcaemia in children 14 years of age or younger. Similarly, the consumption of one or more bottles of Cola beverage per day is associated with hypocalcaemia in postmenopausal women⁽³⁾.

Garcia Contreras et al⁽¹²⁾ showed that rats that drank Cola beverages developed hypocalcaemia and lower femoral mineral density compared with control rats that drank water.

Caffeine is also present in most Cola beverages, recognized as a mild diuretic, with short-term increase in urinary calcium excretion, and may affect bone health.

Ohta et al.⁽¹³⁾ showed that caffeine intake affected the content and crystallite size of bone minerals and that the femur of rats fed caffeine tended to be weaker compared with controls.

Michael Murray and Joseph Pizzorno⁽¹⁴⁾ reported that soft drinks have long been suspected of leading to lower calcium levels and higher phosphate levels in the blood.

When phosphate levels are high and calcium levels are low, calcium is pulled out of the bones. The phosphate content of soft drinks like Coca Cola and Pepsi Cola is very high, and they contain virtually no minerals, vitamins, proteins, fibers, or other essential nutrients. Most soft drinks contain food additives such as food coloring, artificial flavoring, emulsifiers and preservatives. Carbonated beverages may also displace other healthier choices in people's diet, such as water, milk and natural fruit juices.

The same authors added that of the 57 children who had low calcium levels, 38 (66.7%) drank more than four bottles (12-16 ounces per bottle) of soft drinks per week.

These results, more than support the contention that soft drink consumption leads to lower calcium levels in children. This situation ultimately leads to poor bone mineralization.

In another study conducted by Marion Nestle⁽¹⁵⁾, it was found that soft drinks are the single greatest source of caffeine in children's diet; A 12-ounce can of Cola contains about 45 mg, but the amounts in more potent soft drinks can exceed 100 mg, a level approaching that found in coffee.

Moreover Mette Kristesen et al.⁽¹⁶⁾ carried out a study on the effects of Cola on urinary calcium excretion, and showed that over a 10 day period, high intake of Cola (2.5 liters / day) caused an increase in urinary calcium excretion in young men.

Grace Wyshak et al.⁽¹⁷⁾ conducted a study to evaluate the effects of non-alcoholic carbonated beverage consumption on bone fractures among 2,622 women, former college athletes, and found a statistically significant association between nonalcoholic carbonated beverage consumption and bone fracture.

Tero H et al.⁽¹⁸⁾ conducted a study on the effects of carbonated beverages and the risk of kidney stones among male smokers and found that the incidence of kidney stones could be decreased by limiting soft drink consumption.

Saldana Tina M et al.⁽¹⁹⁾ carried out also a study on the relationship between carbonated beverage consumption and kidney disease and reported that Cola consumption may increase the risk of chronic kidney disease.

Ogor R et al.⁽²⁰⁾ conducted a study to determine bone mineral density changes caused by consumption of Cola drinks and the associated factors, and reported that Cola consumption had a statistically significant decrease in (BMD) bone mineral density (approximately 20% lower) compared to the control rats. They found also non significant decrease in serum calcium. Moreover they revealed evidence of renal damage in the Cola-fed rats.

Finally Katherine L Tucker et al.⁽²¹⁾, conducted a study using data from > 2,500 men and pre- and post-menopausal women and found also that intake of Cola, but not of other carbonated beverages, is associated with low bone mineral density in older women.

Conclusion

The results of the present study, confirm previous findings that high consumption of Carbonated beverages induce calciuria and suggest that the habitual and excessive consumption of soft drinks must be discouraged and replaced by milk and natural fruit juices, in order to avoid the negative calcium balance seen in carbonated beverage drinkers, which may cause bone resorption and osteoporosis in later life.

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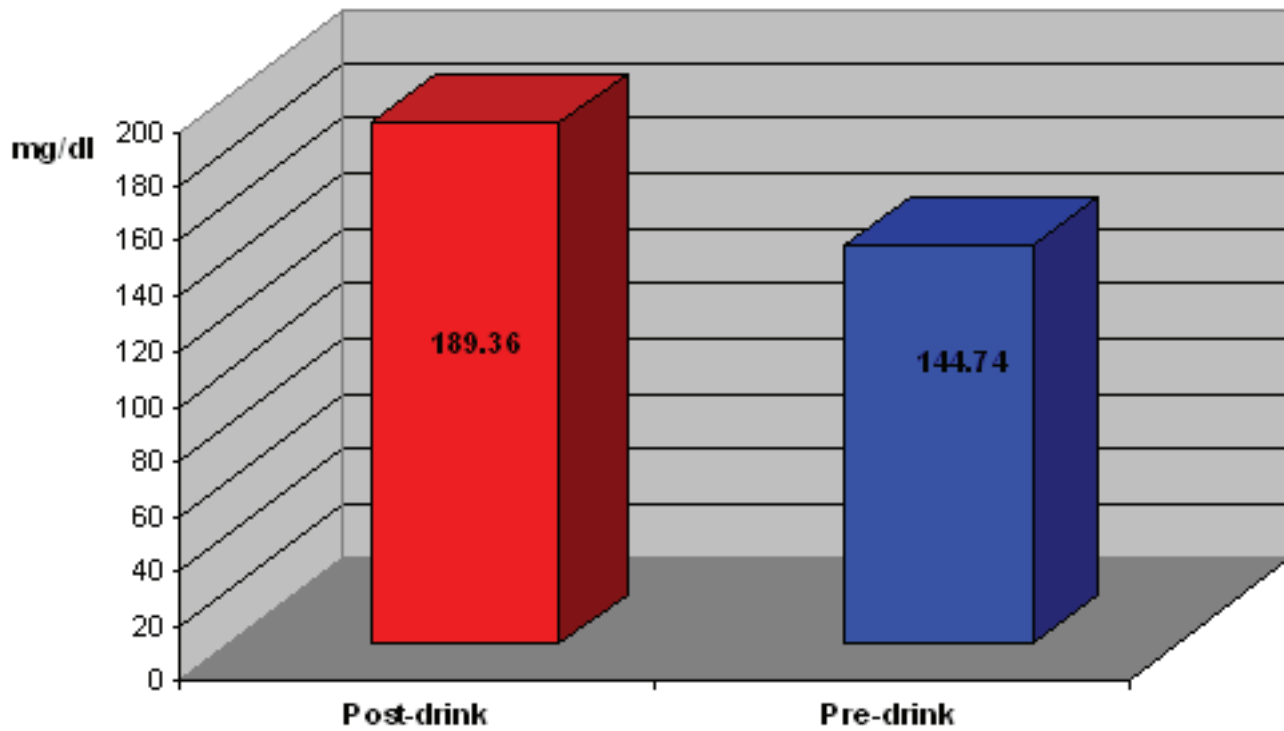
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Table (1): Number and age of the studied groups.

Groups	Number of subjects	Age (years)	
		Mean \pm S.E.M	Range
Group I	18	24.05 \pm 0.20	19—30
Group II	18	24.05 \pm 0.20	19—30

Table (2): Biochemical Parameters of the Studied Groups.

Biochemical Parameters	Group I		Group II		Statistical value
	Mean \pm S.E.	Range	Mean \pm S.E.	Range	
Total Urinary Calcium mg/dl	144.74 \pm 2.58	41.64 - 239.07	189.36 \pm 5.33	83.78 - 376	P < 0.05

Figure (1): Total urinary calcium excretion (mg / dl) of the studied groups

Persistent Khat Chewing Habit During Pregnancy May Affect Neonatal Birth Weight

ABSTRACT

Background and Objective

There are a significant number of Yemeni people who have been chewing Khat daily. The habit represents a major part of their cultural and social traditions, and plays an important role in their life-styles. In recent years, it is observed that Khat-chewing among women is increasing, and persisting during pregnancy. We conducted this study to test the effect of persistent Khat chewing habits among pregnant women on the reducing neonatal birth weight.

Methods

We evaluated 1554 pregnant women. The study sample was divided into 2 groups. The study group (n = 1154) comprised those women who had no obvious risk factors for low birth weight (LBW) but were Khat chewers. Control group (n = 400) comprised women who were considered healthy and did not chew Khat at all. The rate of LBW was compared in both groups.

Results

316 cases out of 1,154 women (31.3%) had delivered babies with LBW (< 2500g). The mean birth weight of the studied group was 2243.5±127.2 g. In the control group the mean birth weight was 2861±339g. The difference between the two groups was statistically significant (p<0.0001). The gestational age, maternal weight, height, age, gravidity, and the gender of the neonate were statistically insignificant in the two groups (P > 0.05).

Conclusion

Many women continue their khat chewing habit during pregnancy, which leads to delivery of neonates with reduced birth weight in a large proportion of births.

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Introduction

Khat plant (*catha edulis forsk*) is a stimulant leaf, widespread in several countries of the Africa and Arabian peninsula region, including Yemen. It is also called Qat, chat, catha and other names. It has a pleasure-inducing effect, increasing intellectual efficiency and hyper alertness¹. It is chewed daily by a high percentage of the adult population in Yemen. It has been estimated that about 80% of Yemeni men and 60% of women chew Khat².

Several studies demonstrated that the leaves of the Khat plant contain many alkaloids such as cathine and cathinone, the latter structurally related and pharmacologically similar to amphetamine and this is considered to be the main active ingredient in fresh Khat leaves³. However, more than 40 alkaloids, glycosides, tannis and terpenoides have been reported¹. The pharmacological effects of the plant are largely due to its symphathomimetic ingredients cathine as (+) Norpseudoephedrine and other alkaloid fractions⁴.

Khat use during pregnancy has many clinical implications like intrauterine growth restriction, decreasing milk production after delivery, and it causes failure to thrive during childhood with its likely long-term consequences⁵. A study on pregnancy outcome and khat showed that it is associated with significantly increased incidence of LBW of full term infants compared to those non-

chewers during pregnancy⁶.

In pregnant women, khat consumption may have detrimental effects on utero- placental blood flow and as a consequence, on fetal growth and development⁷. Lower mean birth weights have been reported in khat-chewing mothers compared to non-using mothers indicating an association between khat chewing and decreased birth weight⁶.

Recently, a significant number of young males and females have been involved in the daily chewing habit, and many pregnant women continue chewing Khat during pregnancy. Unfortunately, "Khat chewing during pregnancy is highly prevalent in Yemen^{2"}. The purpose of this study was to evaluate the relationship between Khat chewing during pregnancy and the possible low birth weight in unaffected low-risk pregnancies.

Materials and Methods

It was a prospective controlled study carried out in Al Thawra General Hospital, Sana'a through a year from 1st January to December 31st 2006, to study the effect of khat chewing during pregnancy on neonatal birth weight. For the purpose of this study, we considered a woman as a khat user, if she had chewed khat at least twice a week, regularly for at least one year including the time of index pregnancy. All pregnant women who attended delivery room with labor pain or pregnancy complications

(preeclampsia, antepartum hemorrhage, etc), 37 week gestational age or more, were initially surveyed for chewing khat.

However, for those women who were considered khat chewers ($n = 1154$ women) a complete assessment of maternal and fetal risk factors for low birth weight (LBW) was undertaken. This includes past medical and obstetric history, medication use, recent infections, history of congenital anomalies, occupational or toxic exposure, pre-pregnancy body weight, smoking and other factors.

The gestational ages were estimated either by the last menstrual period (LMP) and/or early ultrasonography. Antenatal cards were reviewed when available. On physical examination, any sign of malnutrition or chronic illnesses were noted. Those presenting with chronic illness, namely, chronic hypertension, anemia, renal disease, prior history of poor pregnancy outcome and other risk factors likely to cause intrauterine growth restriction were excluded from the study. Multiple pregnancy as well as delivery before 37 week gestational age, were also excluded.

1154 women were enrolled in the study and control group ($n = 400$); women were chosen by simple random sampling and for each case enrolled, the 5th next case, of term pregnant woman who was not a khat chewer, was selected as a control. Consent was obtained from each participant after explaining the study objectives and procedures to the respondents.

In this study we used WHO criteria for low birth weight as less than 2500g.

Standing height was measured before and after delivery with a wall-mounted ruler, and the body weight was estimated either from clinical record or obtained at the time of admission.

After delivery the infants were weighed at birth to the nearest 100gm on ordinary scales by the nursing attendants. Head circumference and height were

examined by neonatologists within the first hour after delivery. Neonatal resuscitation and subsequent care of the growth-restricted infants were followed in the same manner as used with other newborns. Also the placenta (appearance, weight and size) were noted.

All statistical analyses were conducted using SPSS for Windows version 16.0. Mean and standard deviations (SD) were calculated for continuous variables, and proportions were calculated for categorical variables. To test the difference in means, we used Student's *t* test (2-tailed) because data were distributed normally. We used Pearson's χ^2 test to analyze differences in proportions. Statistical significance was defined at the 5% level.

Results

Table 1 gives the general characteristics of the study population. 361 out of 1154 (31.3%) of khat chewing women had delivered babies of less than 2500g body weight. The mean birth weight (MBW) in this group was 2243.5 ± 127.2 g. In the control group 63 women out of 400 (15.75%) had delivered babies of less than 2500g. The MBW was 2861 ± 339 g. The difference between the two groups was statistically significant ($P < 0.0001$). (See Table 2).

The age of both groups was statistically similar, ($P = 0.791$). There were no differences in the gravidity, maternal weight, height, gestational age, mode of delivery, and neonatal gender between the two groups ($P > 0.05$). The prevalence of placental abnormalities among LBW infants in our study was 49% in the case group versus 32% in control group. No stillborn or congenital anomalies were detected in this study.

Discussion

Worldwide, 15.5 percent of all births, are born with low birth weight, 95.6 percent of them in developing countries⁸. However, the incidence of LBW varies from as low as 3% in industrialized countries to as high as 30% in some developing countries in Asia and Africa⁹.

Our study showed that the consumption of khat during pregnancy was associated with LBW (< 2500 g) in 31.3%, in comparison to the rate of 15.75% in the control group. Recent evidence indicates that the neonates of mothers who chewed khat during pregnancy had a significant decrease in all neonatal parameters such as birth weight, length, head circumference and Apgar score at 1 and 5 minutes compared to non-chewer mothers¹⁰.

LBW could be attributed to many factors. Decrease of daily food intake is a feature of khat chewers that has been proved among pregnant women and female guinea pigs^{2,11}, which therefore, could explain the low maternal weight gain during pregnancy. Placental insufficiency has been demonstrated through animal data. Jansoon and Colleagues (1987) found that the (+) norpseudoephedrine causes vasoconstriction in the utero-placental vascular bed of guinea pigs, which may in turn impair fetal growth through the reduction of placental blood flow¹². Also moderate elevation in blood pressure during and immediately after chewing is reported¹³ that might have a role in placental insufficiency. An experimental study in rats has recently proved that khat consumption can effect intrauterine fetal growth by reducing total fetal fat and weight through some changes in the chemical composition of fetal organs, particularly the liver, heart and kidneys due to depletion of carbohydrate materials and suppression of DNA and protein synthesis in the fetal organs¹⁴.

A large study on pregnant mothers conducted in Yemen (1991), showed that the Khat chewing mothers had more low birth weight babies than the control, but there was no difference between the groups in stillbirth or congenital anomalies⁶. Our results, however, are in agreement with these findings as there were no congenital anomalies, observed in both groups. A possible explanation is that the teratogenic properties of khat chewing were found to be dose-related¹⁵ whereas the women in fact consume much smaller quantities of

khat than men.

During the chewing sessions, the users have more desire to smoke tobacco as both habits are mostly associated, and this further potentiates the adverse effects on fetal weight. Recently, chemical pesticides have been used on Khat by farmers and the residual pesticide could be ingested by Khat users. Although, the causal relationship cannot yet be determined, nevertheless these combined intoxications may expand the list of the possible adverse health effects on pregnant women.

The recorded LBW in control group of 15.75% is consistent with the finding of the other studies. Makki A.M (2002) found in a study conducted at four main hospitals in Sana'a city that the mean birthweight of a newborn was 2812g and 22% of them had weights between 700 - 2499g⁶.

There are certain limitations in our study. First, it is a result obtained in one referral hospital, therefore, the results may not be generalized to the other hospitals.

In fact the khat chewing habit is increasing among the young group of both sexes and becoming popular in all segments of the female population, which could be attributed to the modern life and gradual disappearance of what was socially deemed unacceptable. For this reason, more surveys and population-based studies are needed.

The other limitation of this study is that, it was carried out in the labour room where admission is restricted to those pregnant women already having labor pain. The future studies are needed to cover, in addition, all durations of gestation through evaluating other variables such as head and abdominal circumferences, femur length, and some of the Doppler measurements in utero during the antenatal check-up.

Despite the limitations in the research methods, the study provides the basic information on the national level and could excite further researchers to address this important issue.

Conclusion

Our results support the proposition that the women who continue their khat chewing habits during pregnancy may result in delivery of neonates with a reduced birth weight in a large proportion of births. However, the issue of possible impact of khat chewing on birth weight warrants further evaluation.

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Table 1: Maternal characteristics of the study population

Variable	Khat user group (n=361)	Control group (n=400)	P value
Mean age, (year)	25.6±4.0	25.51±5.21	0.791
Mean body weight, (kg)	60.7±9.3	63.3±7.6	0.0015
Mean height, (cm)	156±11.5	156.4±10.6	0.6177
Mean gestational age, (weeks)	38.85±1.4	38.79±1.27	0.5355
Gravidity, (%)			
1	46 (13)	47 (11.75)	
2 – 4	257 (71)	248 (62)	
5 or more	58 (16)	105 (26.2)	
Mode of delivery, (%)			
Vaginal	319 (88.4)	378 (94.5)	
Abdominal	42 (11.6)	22 (5.5)	

Values are expressed in mean±SD, n (%).

Table 2: Neonatal characteristics

Variable	Case group (n=361)	Control group (n=400)	P value
Mean birth weight, (g)	2243.5±127.2	2861±339	0.0001*
Mean head circumference, (cm)	31.92±0.75	33.5±0.6	0.0001
Height, (cm)	42.12±0.73	45.6±2.2	0.0001
Gender, (%)			
Male	183 (50.7)	265 (66.3)	
Female	178 (49.3)	135 (33.7)	
Placental condition, (%)			
Normal	184 (50.9)	272 (68)	
Abnormal	177 (49)	128 (32)	

Values are expressed in mean±SD, n (%).

*Extremely significant

Chest Pain in Women

ABSTRACT

Objectives:

To characterize the clinical features, investigations, and Prognosis of women referred with chest pain, who subsequently underwent coronary angiography.

Material and methods:

A retrospective analysis of 500 women with chest pain seen in emergency or outpatient clinics in three hospitals belonging to the Royal Medical Services in Jordan, between January 2000 - January 2004) who subsequently underwent coronary angiography. Women were divided according to angiography results as: division with normal coronaries, and other, with coronary artery disease.

Results:

195/500 women had normal coronary angiograms, and 305 of them have had coronary artery disease. Diabetes mellitus was the most common risk factor that was encountered in women with coronary artery disease ($P=0.001$). The specificity and positive predictive value of exercise testing before angiography were 68%, and 73% respectively. Revascularization procedures were 216/305 (71%). Many patients with normal coronaries had symptoms during follow up 146/195(75%) and 44/195(23%) required readmission for severe symptoms.

Conclusions:

In women referred with chest pain, a diagnosis of normal coronary arteries was common. Risk factor analysis and exercise stress testing were of limited value in predicting coronary artery disease in women. A diagnosis of non-cardiac chest pain in patients with normal coronaries is of little benefit regarding morbidity.

Key words: chest, pain, women

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Introduction

Epidemiologic studies of acute myocardial infarction have described gender differences in the time of death after infarction, with greater numbers of men dying before hospitalization than women. Chest pain in women is a commonly encountered condition which accounts for an appreciable number of referrals to cardiologists for further evaluation. Psychiatric illnesses are presents in up to 50% of new patients attending the cardiac clinic with chest pain. Patients with recurrent chest pain who are free of significant coronary artery disease (CAD) account for 10% to 30% of patients who were undergoing coronary angiography.

The accurate diagnosis of chest pain is often difficult. Myocardial ischemia, aortic dissection, pulmonary embolism, pericarditis, and gastroenterological sources of chest pain are the most common differentials. The symptom of chest pain has many causes - some of them are cardiac and others are not.

The presence of common symptoms, such as heartburn and regurgitation, usually make the diagnosis of gastro esophageal reflux disease fairly straightforward. Coronary angiography is the criterion for establishing a diagnosis of CAD. Patients with positive results on an exercise test are more likely to be further investigated, but ST segment shift with exercise is a less specific marker of CAD in women.

However, coronary angiography carries a small but well documented risk of complications and consequently should be for those patients most likely to have chest

pain of cardiac origin. For many years research in CAD has been focused on men, yet CAD is also the major cause of death and an important cause of disability in women.

We studied the files of 500 women referred to the cardiac center in King Hussein Medical Center (KHMC) with chest pain for further investigation over a four year period. Additionally we compared the characteristics of women with CAD and women with normal coronary arteries.

Materials and Methods

We reviewed the files of 500 women referred to the cardiac center

with chest pain who subsequently underwent coronary angiography. Risk factors, results of exercise testing and coronary angiography, intervention, morbidity and mortality were recorded.

Patients were divided into two groups according to the presence or absence of CAD identified by coronary angiography. A diagnosis of CAD, based on the cardiologist's reports, was made if the diameter of stenosis in any coronary artery exceeded 40%.

Patients were excluded if they were found to have cardiac disease other than CAD. The presence of recognized risk factors for CAD, which included a family history (first degree relative with CAD), hypercholesterolemia (random total cholesterol more or equal than 6.5mmol/l or patient receiving lipid lowering agent), hypertension requiring specific treatment, history of smoking (current or previous cigarette smoker), and diabetes mellitus (requiring treatment by diet, oral hypoglycemic, or insulin, were

recorded).

The exercise test was analyzed as positive or negative. Patient details were obtained from the clinical notes, with follow up to present day. Events during follow up including MI, hospital readmission and death were recorded. Chi-square was used for statistical analysis.

Results

Of the 500 females who underwent coronary angiography, 305 (61%) had CAD and 195 (39%) had normal coronary arteries. Women with CAD were older than women with normal coronary arteries (mean SD 58.7(9.1) year v 53.6(9.3); $P=0.001$). Only diabetes mellitus was more frequently encountered in women with CAD than women with normal coronary arteries (39/305(13%) v 4/195(2%); $P=0.01$) (Table 1). Hypertension and positive family history for CAD were more frequently encountered in women with CAD than in those with normal coronaries (hypertension 156/305(51%) v 106/195 (54%), $P=0.003$; family history, 216/305 (71%) v 155/195(51%), $P=0.01$).

Smoking was not a common risk factor for CAD in both groups (70/305 (23%) v 33/195 (17%)). Exercise test results were correlated with the presence or absence of CAD. The test was positive in 50/195 (26%) in women with normal coronary arteries and 201/305 (66%) in women with CAD. The sensitivity of exercise testing was (63%) and the specificity was (74%). In 103/305 (34%) had single vessel disease, 88/305 (29%) had two vessel disease, and 118/305 (39%) had triple vessel disease. No correlation was found between the results of exercise test and numbers of diseased vessels.

Follow up details were obtained in 91% of patient. Mean follow up time was 3.6 years.

Patients with normal coronary arteries

Table II shows the outcome in the 195 women with normal coronary arteries. Three women died from non-cardiac causes, and three women died suddenly of unknown cause. Table III shows outcome in the

305 women found to have CAD.

Discussion

There is growing interest in research into women with suspected or documented coronary artery disease which, until recently, has been little studied. Coronary artery disease is the main cause of death in women in the Western world. Whether the results from these studies can be applied to all women is unknown.

Consequently, the aim of our study was to characterise women referred with chest pain to a cardiac centre since they represent an important clinical problem. Standard risk factors for coronary artery disease and the results of exercise testing were of limited value in distinguishing women with coronary artery disease from those with chest pain from non-cardiac causes. Despite a diagnosis of noncardiac chest pain, many patients continued to have symptoms and seemed to have derived little benefit from cardiac investigation. Furthermore, cardiac events were no more frequent during the follow up period. Women represented the minority of patients referred with a clinical diagnosis of angina for further investigation. 39% of women referred with chest pain for further investigation, were subsequently found to have normal coronary arteries, which is in keeping with the coronary artery surgery study, in which 46% of women referred with chest pain for angiography had normal coronary arteries.

Studies examining the importance of risk factors in the development of coronary artery disease have shown that hypertension, smoking, raised serum concentrations of lipids, diabetes mellitus, and a family history of coronary artery disease are all important in predicting the development of the disease. Other than diabetes mellitus, however, risk factors for coronary artery disease in women were poor discriminators in our study. The reason(s) why only diabetes mellitus discriminated between women with and without coronary artery disease is uncertain. Smoking is not a common risk factor for coronary artery disease in Jordan because of social restrictions. In

one study the relative risk of fatal coronary artery disease in diabetic compared with non-diabetic patients was 3.3 in women after adjustment for age, systolic blood pressure, cholesterol, body mass index, and cigarette smoking. Positive results on the exercise test were found in 26% of women subsequently shown on angiography to have normal coronary arteries, which is comparable with other studies. Some patients may have abnormalities of coronary flow reserve, which could account for their symptoms.

Our data indicates that the vast majority of patients with normal coronary arteries continue to experience chest pain. Perhaps this is not surprising since the cause of the patient's symptoms may remain undiagnosed, despite further non-cardiological investigation. Alternatively, patients may continue to believe that their pain is cardiac in origin, a possible explanation in some, since about a third continued antianginal treatment during follow up. Although these findings are not new, the implication is that doctors communicate poorly with patients and reassurance is inadequate. Furthermore, the situation is perpetuated by the continued prescription of antianginal drugs in the knowledge that the patient does not have coronary artery disease. Perhaps cardiologists spend disproportionately little time counseling patients with normal coronary arteries compared with patients with coronary artery disease.

The results of this study indicate that chest pain in women referred for coronary angiography is often non-cardiac in origin, and standard criteria used to determine the likelihood of coronary artery disease in men are of limited value in women. Current limitations on health care resources emphasise the need for better identification of those women most likely to have coronary artery disease before referral for invasive assessment.

Although establishing a diagnosis of normal coronary arteries may be reassuring for the patient's physician, such a diagnosis does little to relieve

the symptoms experienced by these patients, who, in the absence of an alternative diagnosis, continue to place a considerable drain on health care resources.

Conclusion

Chest pain in women is common and may or may not have a cardiac cause. In this study 39% of women referred with chest pain who subsequently underwent coronary angiography were found to have normal coronary arteries. Despite a diagnosis of normal coronary arteries, morbidity was considerable; an appreciable proportion continued to have chest pain and to take anti-anginal drugs.

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Table I risk factor profile in patient with chest pain:

Patient group	Family history of(CAD)	Hyper-cholesterolaemia	Hypertension	Smoking	Diabetes mellitus
Coronary artery disease(CAD)	216 (71%)	146 (48%)	156 (51%)	70 (23%)	39 (13%)
Normal coronary arteries	155 (51%)	79 (41%)	106 (35%)	33 (17%)	4 (2%)

Table II -Outcome in 195 patients referred to hospital with chest pain and found to have normal coronary arteries:

Outcome	Women number and percent
Continued chest pain	146(75%)
Further treatment for angina	56(29%)
Readmission to hospital due to chest pain	87(45%)
Myocardial infarction	3(1.5%)
Death from non-cardiac cause	3(1.5%)
Sudden death	3(1.5%)

Ante-Natal Care Service Uptake in Slum Areas of Dhaka City

ABSTRACT

Objectives: This study examined the socio-economic and cultural determinants of the number of Antenatal Care (ANC) services received by women in slum areas of Dhaka city.

Methods: A semi-structured questionnaire was developed by which the relevant information was collected from slum women aged 15-49 in Dhaka city. The three slum areas were identified by applying cluster sampling techniques from which a total 540 study subjects were randomly selected.

Results: Around two-thirds of women were found to use ANC services; however, the mean number of ANC uptake was only 1.95. Women were more likely to receive ANC from Government hospitals (46.22%) rather than private clinics (36.25%). A multivariate simple linear regression model was used to examine the determinants found that the over-all model explained as 31.1% variance in ($P < 0.001$). Among the significant determinants, individually women's education was the most explanatory (11.6% variance). Positive influence was also found by respondents' autonomy, mass media exposure, male participation, monthly family income, monthly income of husband and respondent's monthly income. On the other hand, a negative association was found by order of last birth, husbands' monthly income and distance between home and clinic.

Conclusion: As socio-economic characteristics of women play an important role in determining the differential use of ANC services, thus it may be suggested that such characteristics should be considered accordingly in order to increase the uptake of the number of ANC services recommended by the World Health Organization.

Keywords: ANC service, determinants, slum areas, Dhaka city.

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Introduction

The International Conference on Population and Development (ICPD) held in Cairo in 1994 emphasized safe motherhood in which all pregnant women are expected to receive basic antenatal care (ANC). Such ANC package includes monitoring pregnancies for signs of complications, treating concurrent problems of pregnancy, providing iron supplements, tetanus toxoid immunization and counseling on preventive care and related issues. The purposes of providing such services was to identify signs of, or risk factors for, complicated pregnancies and identify the appropriate health provider (Vanneste and others, 2000; Magadi, Madise and Rodrigues, 2000; Matthews and others, 2001).

Such care necessity is due to the fact that complications during the antenatal period can result in various complications at the time of delivery such as hemorrhage, which increases the risk of excessive hemorrhage during delivery; the risk of obstructed labor increases significantly if abdominal pain is observed during the antenatal period; prolonged labor appears to be significantly higher for the first pregnancy; and mothers suffering from abdominal pain during pregnancy tend to have a higher risk of prolonged labor during delivery (Islam et al, 2004).

In most developing countries, women of reproductive age constitute more than one-fifth of the total population. These women are exposed repeatedly to the risk

of pregnancy and childbearing and, under existing socioeconomic conditions and the inadequacy of medical and health facilities, are at greater risk of morbidity and mortality from causes related to pregnancy (Bhatia, 1993). As expected, in Bangladesh, about 12,000 women die each year from maternal causes while the estimated lifetime risk of dying from pregnancy and child birth-related causes is about 100 times higher than that in developed countries (NIPORT 2003). A tragic consequence of such deaths is that about 75% of the babies born to these women are also likely to die within the first week of their life (WHO 2004). In this regard, different studies in developing countries identified the causes of maternal deaths have repeatedly emphasized the need for antenatal care utilization (Maine, 1986; Fauveach et al, 1988; Fortney et al, 1988). Receipt of ANC services plays a pivotal role in bringing the women into delivery care-seeking. Moreover, women who receive ANC were more likely to receive Postnatal care (PNC) (Chakraborty, et al, 2003) and preventive care for children aged one to three years (Bracken et al, 2003).

Generally, the utilization of ANC service is poor in Bangladesh to say the least; moreover, in poor socio-economic areas such service uptake is at an unacceptable level, though the World Health Organization (WHO) recommended to ensure at least three visits during pregnancy. However, to the best of our knowledge, there is little or almost no extensive work on differential determinants of uptake

of ANC in slum areas. Considering such matters, our study focused on socio-economic, demographic and cultural factors that influence the use of a number of ANC services among women in slum areas of Dhaka city.

Materials and Methods

Study Area, Population and Data Collection

The data were drawn from a randomly selected group of slum dwelling women of reproductive age through a semi structure based survey questionnaire that collected information on the socio-economic, demographic and cultural characteristics of respondents as well as the family along with uptake of the number of ANC visits during pregnancy. A cluster sampling technique was used in selecting the study population where at first a cluster of slum areas was randomly selected which included Khilgaon, Meradia and Rampura slums. From each slum area women who had at least one birth on or before March 1, 2008 were randomly selected and a total of 540 women were successfully interviewed. Before applying the final interview schedule a pre-test of the questionnaire was conducted among 25 women in Khilgaon and Meradia slums in order to maintain the sequence, coding and to localize the wording of the questionnaire. Informed consent was taken from each subject before interview. In this regard, the purpose and rationale of this study was fully explained to respondents.

Measuring Variables

The times of ANC uptake during the last pregnancy was used as a dependent variable while several socio-economic, demographic and cultural variables were included as the independent variables. Among the independent variables, four variables such as mass media exposure to respondents, respondent's autonomy, respondent's attitude towards maternal health care services and male participation in maternity care were used as index variables. The mass media exposure was measured with three indicators like frequency of listening to radio, watching television and reading

newspaper, per month. Respondent's autonomy, positive attitude and male participation were measured by respectively drawing information on 9, 8 and 6 yes-no type questions. In this case, yes was numbered as 1 while no was 0, which later converted into scale score following the arithmetic transformation procedure.

Data Processing and Analysis

The collected data was edited two times i.e., once by supervisor during the data collection and another by the researcher just before entering the data into computer in order to maintain the quality of the data. Moreover, data were doubly entered in the computer for maintaining accuracy of the data. At the analysis stage, univariate, bivariate and multivariate analyses were conducted. Mainly frequency distribution was done in univariate analysis, while at bivariate level, mean comparison and Pearson correlation coefficient were used respectively for observing differences between and/or among different levels of independent variables and correlation between each independent and dependent variable. As the dependent and independent variables were interval level of measurement, simple linear regression analysis was considered in order to identify the factors determining the times of ANC uptake. In this regard the following regression equation was used to estimate the regression coefficients:

$$Y = a + b_1X_1 + \dots + b_k X_k + e$$

Where, Y = dependent variable, a = constant, b = the regression coefficient, X = independent variables of the model, k = end number of the series and e= error term

Results

Level of ANC Uptake

A significant portion of women received ANC services; however, the number of such visits was less in slum areas of Dhaka city. On average, around 2 ANC visits were reported among women aged 15-49 years with standard deviation 1.849 (Table 1). In total, 38.7% women did not receive any ANC service while

61.3% women reported to receive at least one ANC service. Around 15% of women were found to receive ANC for 1-2 times, while around half of the women reported they received ANC at least three times. Though the number of women was decreasing with the increasing number of visits, a small percentage of women reported to receive it for 6, 7 and 8 times.

Ways of Receiving ANC Services

Women were more likely to receive ANC service from government hospital than that of private clinic (Figure 1). Among 331 women, who received ANC, 46.22% reported receiving it by visiting a government hospital while 36.25% received it by visiting a private clinic. Slightly more than one-tenth of women were also likely to receive it from both government and private health facilities. Moreover, 5.14% of women reported receiving an ANC service from a service provider who visited the respondents.

Correlates of ANC Uptake

The differential pattern of number of ANC uptakes was observed by several socio-economic, demographic and cultural factors. The results are displayed in Table 2 which made it clear that the use of a number of ANC services varied with different socio-economic characteristics of Table 2. The distribution of mean comparison and correlation coefficients of uptake of number of ANC services by different socio-economic, demographic and cultural factors of respondents are taken into consideration. Women with primary and >primary education were more likely to use a higher number of ANC services compared to women with no education. On average, women without schooling used ANC services 1.41 times while these were used 2.14 and 3.25 times respectively by women with primary and >primary education. Between number of ANC services and respondent's education a moderate correlation was found with $P < 0.01$. Similarly, a positively significant relationship was observed with varying increasing mean number of ANC services received by women

with their increasing monthly family income, husband's monthly income, respondent's monthly income, mass media exposure, male participation, respondent's autonomy and respondent's positive attitude.

Women's age at present, had a negative significant correlation with number of ANC services received by women. Women aged <20, on average, received ANC 1.94 times while women aged 20-29 and 30-39 were found to receive on average slightly more, respectively, 2.17 and 2.11 times. However, women aged 40-49 reported they received only 1.16 number of ANC services. Distance between home and clinic was found to have significant correlation with the number of ANC services received by women. Women whose household was within 1 and 2-3 kilometers from the clinic, on average, received 1.63 and 2.24 ANC services while women with increased distance from home to clinic (>3 KM) women reported to receive only 1.35 ANC services. Similarly a significant relationship with the same direction was found in regard to the order of the respondent's order of last birth. Women with first parity received ANC, on average, 1.67 times; as expected the mean number of ANC services received was reduced to 1.02 for women with parity >3.

Determinants of ANC Uptake

The main objective of this study was to examine the determinants of the number of ANC services received by women of reproductive age group. To do so, simple linear multiple regression technique was applied after meeting the criteria such as homoscedasticity of variance, multi-collinearity, interval level of measurement of dependent and independent variables. All the variables used at bivariate analysis were included in the regression model; however, as stepwise method was applied during multivariate analysis, only significant variables were displayed in the output (Table 3).

Overall, the regression model explained 31.1% of variance in the number of ANC services received by women (P<0.001). All

the variables found significant at bivariate analysis, were also found significant at multivariate analysis. The most explanatory variable was respondents' education, which explained 11.6% variance (p<0.001) indicating the higher the education of respondents, the higher the number of ANC services received by women. Among other significant variables respondents' autonomy, mass media exposure, male participation, monthly family income, monthly income of husband, and respondents' monthly income positively explained 3.4%, 2.9%, 2.6%, 2.0%, 2.0% and 1.1% of variance respectively. Results of such positively significant variables suggest that women with higher autonomy, mass media exposure, male participation, monthly family income and their own monthly income were higher receivers of ANC.

As in bivariate analysis, distance from home to clinic has a negative influence on the number of ANC services received by women. Individually it explained 1.0% variance indicating that the higher the distance the lower the number of ANC services received. Similar to distance, respondent's order of last birth negatively explained 4.5% of variance also suggesting the higher the order the lower the number of ANC received.

Discussion

In order to reduce the risk of mother and child which ultimately reduce the maternal mortality ratio (MMR), proper antenatal care (ANC) is very crucial. In this study 61.3% of women received ANC during their last pregnancy which is lower than urban utilization (75.7%), and slightly higher than the national statistics (60.3) (NIPORT et al., 2007). The percentage of women who received ANC for at least three times was 45.9%. Overall, the mean number of visits in slum areas was only less satisfactory as only 1.95 ANC was received by study women which is notably less than the minimum required 3 visits. Among the women who received ANC service, women were comparatively more likely to receive it from government hospital than that of private clinic.

Variation was observed in receiving the number of ANC by women with differing socio-economic, demographic and cultural characteristics of respondents as well as the family. Attempting to identify the determinants of receive of ANC, this study found some significant explanatory variables influencing the number of ANC received by. As expected, women's education was found to have significant positive impact on use of ANC service which is similar to other findings (Elo, 1992; Prasad, 2000; Matsumura and Gubhaju, 2001). This is because better educated women are more aware of health problems, know more about the availability of health care services, and use this information more effectively to maintain or achieve good health status. Moreover, mother's education may enable her to enhance female autonomy so that women develop greater confidence and capability to make decisions about their own health (Caldwell, 1981; Raghupathy, 1996).

Respondent, family and husbands' monthly income had positive impact on ANC receive in study areas. This may be due to that respondents', husband of respondent and family income is usually considered as social status. Differences in attitudes to modern health care services by income of husband and family were depicted as a predisposing factor as income enables acquisition of more and better health care (Fiedler, 1981). As a result, the higher use of ANC services is expected with higher income. In a study conducted by Hadi et al (2007) it was clearly found that the health status of the population could not be improved further without fundamental changes brought about to education and income (Hadi et al, 2007).

Autonomy of women regarding maternal health care services had significant positive impact on number of ANC received by women. Autonomy is not a singular matter, rather it comes with many things like education, income, employment of women, etc. General argument suggests that autonomous women are more likely to decide about the

family planning themselves or take part in such decision making process with their partner along with other household decisions. As a result, they become more conscious about their lives including health matters.

Mass media are effective in information dissemination, which increases awareness about innovations, and fosters inter-personnel communication, which could facilitate behavioural changes allowing for the adoption of new/different behaviours (Valente et al., 1996). With regard to maternal health care uptake, it changes to beliefs and behaviour of women to receive health service. As a result, it is expected that women with higher mass media exposure are more likely to receive higher number of ANC. Similar to this concept, mass media had significant positive impact the number of ANC uptake.

Women who experienced higher male participation in their last pregnancy were significantly more likely to receive higher number of ANC compared to women with lower male participation. This is most probably due to the fact that in a traditional society like Bangladesh, the most of the decisions including family planning and health seeking decisions mainly comes from male partners. Besides, men are less likely to accompany women to hospital in health seeking where women alone are often are not permitted to visit the health facility alone. Moreover, women are generally ignored in regard to health care especially when lower income in the household limits the expenditure on the family health budget. In this regard, supporting financially in health care uptake as well as accompanying women to clinic by male partners increase the uptake of ANC among women.

The order of the last birth had been found to have significant negative impact on number of ANC received by women which is similar to other findings (Elo, 1992; Bhatia and Cleland, 1995). Because the lower parity woman tend to give careful attention to seeking antenatal care due to their inexperience in pregnancy while lower number of ANC receive, among higher parity

women could be due to time and resource constraints faced by those with larger families (Wong et al., 1987; Elo, 1992; Bhatia and Cleland, 1995).

As expectedly, distance from respondent's home to clinic had negative effect on number of ANC received by women. Generally it is believed that women near to clinic are more interested to receive ANC service due to less time needs, less cost needs and women also can visit clinic alone. The lower uptake among women whose home had at more distance from clinic may be due to the poor road construction, time consuming distance, more financial necessity to receive care as well as the need of accompanying women to visit to the clinic.

Conclusion

The receive of ANC services is very essential in order to make the delivery safer as well as protecting the lives of both mother and child. In response to it, at least 3 ANC visits for each pregnant women is strongly recommended by World Health Organization (WHO). However, this study found that women on average were likely to use less than 2 number of ANC during their last pregnancy. The different socio-economic and cultural factors were examined and found to be associated with such use of ANC. Therefore, it may be suggested that in order to further increase the use of number of ANC in slum areas, the determinants found in this study may provide a priority based focus for the program planners and policy makers.

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Table 1. The Distribution times of ANC uptake among women

Times of ANC Uptake	N	%	Cumulative %
0	209	38.7	38.7
1	25	4.6	43.3
2	58	10.7	54.1
3	155	28.7	82.8
4	47	8.7	91.5
5	30	5.6	97.0
6	7	1.3	98.3
7	6	1.1	99.4
8	3	.6	100.0
Total	540	100.0	
Mean=1.95 and Std=1.849			

Figure 1. Ways of receiving ANC services among women in slum areas

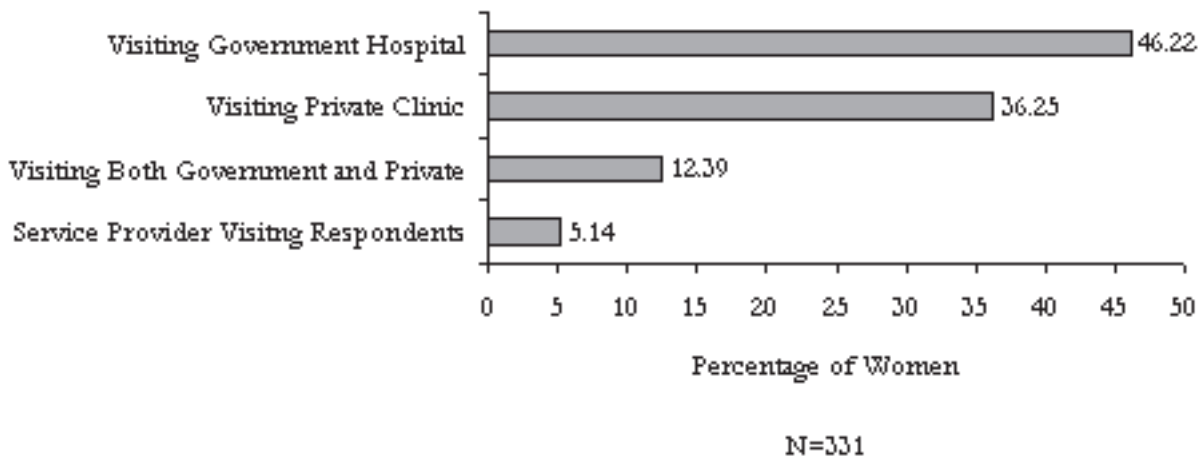


Table 2

Variables	Level	N	Mean	Std. Deviation	Pearson r
Respondent's Age at Present	<20	34	1.94	1.369	-.146**
	20-29	246	2.17	1.842	
	30-39	158	2.11	1.874	
	40-49	102	1.16	1.773	
Respondents' Education	None	260	1.42	1.659	.341**
	Primary	203	2.14	1.758	
	>Primary	77	3.25	1.968	
Respondents' Monthly Income	None	430	1.84	1.826	.147**
	<=1000	30	1.47	2.013	
	1001-2000	36	2.94	1.756	
	>2000	44	2.55	1.691	
Husbands' Monthly Income	<=3000	295	1.74	1.749	.168**
	3001-6000	193	2.06	1.891	
	>6000	52	2.73	2.030	
Mass Media Exposure	No Exposure	284	1.40	1.719	.294**
	Low Exposure	134	2.34	1.880	
	Medium Exposure	87	2.61	1.728	
	High Exposure	35	3.26	1.502	
Distance between Home and Clinic	1 KM	365	1.96	1.836	-.106*
	2-3 KM	113	2.24	1.834	
	>3 KM	62	1.35	1.847	

Male Participation	No	20	1.60	1.875	.180**
	Low	98	1.45	1.788	
	Medium	232	1.91	1.772	
	High	190	2.29	1.912	
Respondents' Autonomy	No	284	1.58	1.825	.212**
	Low	192	2.21	1.807	
	Medium	46	2.80	1.668	
	High	18	2.72	1.809	
Order of Last Birth	1	157	2.67	1.756	-.307**
	2	140	2.07	1.737	
	3	119	1.82	1.582	
	>3	124	1.02	1.921	
Respondents' Positive Attitude towards MHCS	0-2	301	1.90	1.800	.181**
	3-4	132	2.19	1.915	
	5-6	58	1.88	1.920	
	7-8	49	1.65	1.866	

** P<0.01 (2-tailed) and * P<0.05 (2-tailed)

Table 3. The regression results of determinants of ANC in slum areas

Variables	B	Std. Error	Beta	T Values	R Square Change
(Constant)	.768	.274		2.803**	
Respondent's Education	.099	.025	.166	4.012***	.116
Order of Last Birth	-.220	.046	-.185	-4.797***	.045
Respondent's Autonomy	.149	.038	.145	3.927***	.034
Mass Media Exposure	.008	.002	.147	3.728***	.029
Male Participation	.190	.045	.159	4.203***	.026
Monthly Family Income	.001	.000	.844	5.849***	.020
Husband's Monthly Income	.001	.000	.643	4.946***	.020
Respondent's Monthly Income	.000	.000	.173	3.061**	.011
Distance between Home and Clinic	-.074	.027	-.105	-2.724**	.010
Multiple R=0.558 R Square=0.311 Adjusted R Square=0.300 F Value=26.625 df=9 and 530					

*** P<0.001 and **P<0.01

Increasing Incidence of Suicidal Poisoning in the Turmoil Affected Kashmir Valley - a Threatening Situation

ABSTRACT

Objectives: To study the magnitude and pattern of acute suicidal poisoning in the turmoil affected Kashmir valley and to compare the same with the retrospective (pre-turmoil) data.

Methods: Patients referred to the SMHS Hospital of the Government Medical College Srinagar - a tertiary care institution for management were selected and subjected to psychiatric evaluation.

Findings: A total of 11,829 cases over 16 years of turmoil (1989 - 2004) were studied. Patients were aged 14 to 80 years (mean: 34 years) predominantly females (53.15%) and mainly from rural areas (82.43%). In majority of cases (69.94%) turmoil related events were responsible for suicidal poisoning. On psychiatric assessment depression with post-traumatic stress disorder provoked by the turmoil was found to be responsible for suicidal poisoning in 62.99% of victims. Organophosphorus compounds were used for the purpose by the majority (57.59%) of cases. The study revealed mortality of 6.12%. While comparing the data with the pre-turmoil period (1985-1988) an increase in suicidal poisoning by 260% was observed. The incidence continues to increase.

Conclusion: Turmoil in the Kashmir valley has lead to increased suicidal poisoning and is likely to increase further if proper measures are not instituted. Prompt, peaceful, political intervention is suggested.

Key words: Poisoning, suicide, turmoil, Organophosphorus poisons.

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Introduction

Around one million people die from suicide and at least 10 times more attempt suicide worldwide every year¹. A review of the world literature shows that attempted suicide rates vary from 100 and 300 per 100,000 with a preponderance of females². In the United States, around 5 million poison exposures occur yearly and up to 30% of psychiatric admissions are prompted by attempted suicidal poisoning³. In India, no nation-wide epidemiological studies have been undertaken, so it is not possible to know about the extent of the problem and change in pattern over the years⁴. However, an unprecedented increase in the number of suicides has recently been observed in Kashmir, and poisoning is the commonest mode of such incidents^{1,5,6}. In a recent study of 364 poisoning cases by Khan G Q et al, 83.5% cases were found to be suicidal in nature, and similar results were found by Malik G M et al from Kashmir valley^{5,6}. The incidence of suicidal poisoning is alarmingly increasing in Kashmir valley because of the existing turmoil since 1989 and the resultant social, mental and physical stress. In view of this threatening situation, we studied the total number of suicidal poisoning cases during the turmoil period (i.e. 1989 onwards) and compared the

same retrospectively with the pre-turmoil period, at the SMHS hospital of the Government Medical College, Srinagar - a tertiary care health institution of the valley.

Methods

Study population

This study included the patients of attempted suicidal poisoning who were referred to the Department of Medicine of the SMHS Hospital Srinagar for emergency treatment from the peripheral primary and secondary health care institutions from January 1989 to December 2004. The study population mainly comprised permanent residents of the Kashmir Valley, and also includes a few security personnel and labourers from different parts of India working in Kashmir. Patients were of both sexes and of different age groups belonging to different religions.

The data of patients from January 1985 to December 1998 was collected from the Medical records Department and studied retrospectively.

Methods

Brief socio-medical history was obtained from the patients, their attendants and the accompanying policemen. This included nature of poison, amount consumed,

time duration since intake and the circumstances which prompted the patients to take the poison. Containers of poisons like bottles, strips of tablets and sachets etc were searched, examined and sent for chemical analysis wherever possible. After a brief history and clinical examination, priority was given to the immediate treatment of the patients and included gastric lavage (whenever indicated), maintenance of, and patency of airways and intravenous line and subsequent supportive treatment, till the patient was stabilized. All gastric contents and blood and urine samples were preserved for chemical analysis. During hospitalization all patients were subjected to investigations like Haemogram, Urine analysis, Biochemical tests, Electrocardiograph and Chest radiographs.

Exclusion Criteria

The following cases were excluded from the study:

- Doubtful history of ingestion of poisons.
- Patients with accidental exposure to poisons
- Poor level of cooperation.
- Patients leaving hospital against medical advice

Psychiatric Evaluation

Following stabilization of the general condition, the selected patients were subjected to detailed psychiatric evaluation by the experienced psychiatrist.

All the data obtained from history, examination, investigations, psychiatric evaluation and/or mortality findings were recorded in the proforma for every patient.

Morality

Despite energetic and aggressive treatment by highly trained staff, 724 (6.12%) victims died during the period. These were the people who either had consumed a huge quantity of Organophosphorus compounds or reported late to the hospital. Of the victims who had consumed other substances for poisoning, no death was observed. All the saved victims were discharged in a stable condition and we advised regular psychiatric

follow-up.

Results

The study included a total of 13,157 cases of suicidal poisoning, of which 11,829 cases were studied over a period of 16 years viz. 1989 to 2004 whereas the data of the previous 4 years (1985 to 1988) was obtained for comparison, retrospectively. The present turmoil in Kashmir valley came into existence in 1989; as such the present study is mainly concerned with 11,829 cases of this period. The study group comprised 5,543 (46.85%) males and 6286 (53.15%) females having the age of 14 to 89 (mean # SD) years. The majority of these 10,823 (91.49%) belonged to Muslim religion; others were Hindus, Sikhs and Christians. Among the six districts of Kashmir valley, Pulwama dominated the others while the least number of cases were noted from the Anantnag district (Table 1). The majority of the cases (82.43 %) belonged to the rural population. Females 6286 (53.15%) dominated the males.

The yearly number of cases during the turmoil period showed a progressive trend compared to the pre turmoil period (Table 2, Figure 1) and female victims dominated over the males. Among the substances implicated for the suicidal purposes, organophosphorus compounds were the most commonly used by 6,813 (57.59%) cases. The other substances include rodenticides in 2,482 (20.99%), drugs like benzodiazepines, acids, antihistamines in 1893 (16.0%) cases and the other substances like dhatura and alcohol were used by 641 (5.42%) victims.

While analyzing the various precipitating factors for suicidal poisoning it was found that loss of lives, property/business and torture of innocent people and eventually adverse effects, was the leading cause of suicidal attempts. Other factors include events like poverty, failure in love affairs, divorce, drug abuse and strained social relations unrelated to the turmoil (Table 3).

Analysis of selected groups (8,984) by psychiatrists revealed that depression with post traumatic

disorder provoked by the existing turmoil, was the main psychiatric ailment in the poisoning victims. In addition several other disorders were found in the remaining cases and we attributed these to the untoward circumstances created by the turmoil (Table 4).

Discussion

This study showed an alarming increasing rate of poisoning in the Kashmir valley attributed mainly to the existing turmoil for the last 16 years now, as is well known to the whole world. Thousands of lives were lost, parents, siblings, property and business with eventual decline of economy, creation of a frightful environment and increase of mental stress. Several others lost their lives because they could not reach the available medical facility due to unavoidable circumstances, adding further to the bad situation. The present study is fairly accurate because almost all victims with history of intake of poisons are immediately referred to our tertiary care centre from the primary and secondary care levels. Although early published studies^{5,6,8} signifying the impact of the turmoil on increasing attempted suicidal poisoning, such observations involved small samples at the same place within only a few years. We studied the data in detail and compared the observation with the retrospective observations of the pre turmoil era. The study showed the increased rate of attempting suicidal poisoning among young adults, predominantly females with the majority belonging to the rural areas. These findings are consistent with previous literature.

Mostly Muslims are involved, being the majority of the population of this region; most of the non-Muslims having migrated to other places of India. Several security personnel also became the culprit of attempting suicide in view of performing their jobs in stressful circumstances. Organophosphorus compounds were mostly used for suicidal attempts. It is because of free availability of such products in the valley, being used as pesticides and fungicides in apple orchards and agriculture,

the main source of income in the valley. Similarly, Organophosphorus has been found as the most used substance for suicidal poisoning by several other observers^{5,6,11-13}.

Stressful situations and psychiatric disorders are the known risk factors for attempting suicidal poisoning and unemployment has been associated with increasing the same^{2,9,11}. Unemployment, poverty and low literacy are directly related to the presently existing turmoil. Occurrence of frequent bandhs, hartals, crack downs and firing episodes led to the closure of industrial units, malfunction of educational institutions, tourism failure due to the kidnappings and killings, and overall deterioration of economy, education and social environment, with creation of a stressful atmosphere. This has led to increased incidence of psychiatric ailments with eventual increase in the incidence of suicidal poisoning.

The present study revealed mortality of 6.1% however; varying figures were found by Pichot MH¹⁴ (14%), Nordstrom P¹⁰ (6-11%) and Kumar S¹⁵ (8.1%). While compiling the data from the preturmoil period we found an increase in incidence of suicidal poisoning by (260%) and the picture is showing a progressively increasing trend. This may cause a dangerous deterioration if proper effective measures are not instituted.

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Table 1. Topographic Distribution of the Cases.

S. NO	Name of the District	Number of the Cases (%)	
		Preturmoil period (1985-1988) n = 1328	Turmoil period (1989- 2004) n = 11829
1.	Srinagar	291 (21.91)	2449 (20.70)
2.	Anantnag	136 (10.24)	1032 (8.72)
3.	Pulwama	347 (26.12)	3347 (28.29)
4	Budgam	188 (14.16)	1506 (12.73)
5.	Baramulla	203 (15.28)	1657 (14.03)
6.	Kupwara	163 (12.29)	1838 (15.53)

Table 2: Data of poisoning cases from January 1985 to December 2004

Year	Total Cases	Males (%)	Females (%)
1985	341	202 (59.23)	139 (40.77)
1986	382	199 (52.09)	183 (47.91)
1987	309	207 (66.99)	102 (33.01)
1988	296	153 (7.69)	143 (48.31)
1989	592	308 (52.02)	284 (47.98)
1990	673	321 (47.69)	352 (52.31)
1991	684	392 (57.30)	292 (42.70)
1992	597	286 (47.90)	311 (51.10)
1993	602	309 (51.32)	293 (48.68)
1994	642	272 (42.36)	370 (57.64)
1995	682	279 (44.42)	349 (55.58)
1996	753	314 (41.69)	439 (58.31)
1997	718	298 (41.50)	420 (58.50)
1998	833	331 (39.73)	502 (60.27)
1999	856	367 (42.87)	498 (57.13)
2000	792	411 (51.89)	381 (48.11)
2001	817	335 (41.00)	482 (59.00)
2002	863	487 (56.43)	336 (43.57)
2003	883	394 (44.62)	489 (55.38)

2004	896	439 (48.99)	457 (51.01)
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Table 3 Analysis of precipitating factors for attempting suicidal poisoning. (n = 9263)

Factors	Number of cases (%)		
	Total	Male	Female
Turmoil related (+)	6294 (69.94)	2171 (34.49)	4123 (65.51)
Failure in examination	1486 (16.06)	663 (44.61)	823 (55.39)
Unemployment	558 (6.02)	403 (72.22)	155 (27.78)
Psychiatric disorders	279 (3.01)	142 (50.89)	137 (49.11)
Others (++)	646 (6.97)	413 (63.94)	233 (36.06)

+, loss of property, parents/siblings, loneliness, torture by security forces and militants, and unmarried pregnancies.

++, poverty, failure in love affairs, divorce, drug abuse, and strained social relations.

Table 4 Psychiatric (DSM –IV –T, Axis I & II) diagnosis of the suicide and parasuicide. (n = 8984)*

Psychiatric Illness	NO. of cases (%)		
	Total	Male	Female
Axis I			
Depression with Posttraumatic Stress Disorder	5659 (62.99)	2418 (42.72)	3241 (57.28)
Generalized Anxiety Disorder and Panic Attacks.	1346 (74.99)	561 (41.67)	785 (58.33)
Impulse Control Disorders.	808 (8.99)	513 (63.49)	295 (36.51)
Obsessive Compulsive Disorder	359 (3.99)	197 (54.88)	162 (45.12)
Bipolar affective Disorder	187 (2.09)	98 (52.41)	89 (47.59)
Axis II			
Personality Disorder	539 (5.99)	312 (57.89)	227 (42.11)
Mental Retardation	86 (0.96)	54 (62.79)	32 (37.21)

* Excluding 279 cases who had psychiatric illness like major depression, manic depressive psychosis and schizophrenia January 1985 to December 1988

Risk of Fetal Loss Due to Chorionic Villous Sampling in Iran

Farzad Mehrnaz MD

ABSTRACT

Background: Chorionic villous sampling (CVS) is a method in which tissue for genetic study is aspirated from the developing placenta by means of a catheter for prenatal diagnosis in the first trimester. This procedure is performed trans-abdominally under the guidance of ultrasonography. In Iran termination of pregnancy due to abnormal conception is allowed up to 16 weeks of conception. Therefore, any prenatal diagnosis must be confirmed before the 16th week of conception. The objective of this interventional study was to assess the safety of trans-abdominal CVS for detection of genetic- or chromosomal abnormality in 1,000 pregnancies at a referral clinic in Iran during the years of 2005-7.

Results of this study showed most of the subjects (77%) were referred to detect thalassemia. Mean gestational age was 11.3 ± 1.7 weeks of pregnancy. There was one case of fetal loss (0.1%) among 1,000 procedures.

Conclusion: When earlier diagnosis for detection of chromosomal abnormality is required, transabdominal CVS could be a safe method with minimum fetal loss.

Key words: Chorionic villous sampling, fetal loss.

Introduction

Twenty years after mid-trimester genetic amniocentesis-, first trimester invasive prenatal procedures were introduced, and many centers began to look into an alternative for first trimester diagnosis (1). Chorionic villous sampling is an alternative for earlier prenatal diagnosis. Early amniocentesis (EA) can be performed effectively, as shown over the years in many observational studies and partially randomized and randomized trials, but, a multicenter randomized trial (Canadian Early and Mid-trimester Amniocentesis Trial) reported a higher total pregnancy loss, a significant increased incidence of musculoskeletal foot deformities, a significant increased culture failure rate, and an increased post amniocentesis rate of leakage in the EA group compared with mid-trimester amniocentesis(1). Recently the biochemical blood test of free b-hCG (beta human chorionic gonadotropin) and PAPP-A (pregnancy associated plasma protein A) and the measurement of nuchal translucency have reduced the need for invasive prenatal diagnosis at first trimester(2) but some abnormal answers, on rechecking data have failed to detect some abnormality like thalassemia, justifying the performance of chorionic villous sampling. Termination of abnormal fetuses in Iran is prohibited after 16 weeks of pregnancy and any prenatal diagnosis must be proved up to this date. Chorionic villous sampling is done at limited centers and our clinic is one of the referral clinics for these procedures, including CVS and amniocentesis which are performed by one expert obstetrician in this field.

Materials and Methods

We did a prospective study of women with singleton viable pregnancies who were referred for first-trimester

fetal karyotyping because of advanced maternal age, parental anxiety, or family history of genetic or chromosomal abnormality by trans-abdominal CVS during the years of 2005-7. Gestational ages were proved after 9 weeks of conception by ultrasounds that reconfirmed them. Half of an hour before the procedure they took a 500mg capsule of Cephalexine and one tablet of acetaminophen-. Procedure was done by insertion of an 18-gauge needle by transabdominal-guided ultrasound (Honda2000, convex probe) needle (number18, GTA, 20 centimeter). The participants in our study were one thousand pregnant women. The procedure-related pregnancy loss rate was obtained up to more than two and less than four weeks after the procedure from total pregnancy losses. We followed the cases up to one year after procedure. All the procedures were done by just one physician and one basis for procedure. Technique was aspiration and fine suction of chorionic villous preferably by one sampling but it could be repeated after failure of the first attempt. The samples were collected in sterile physiologic serum and forwarded to the standard genetic laboratory. Data were collected and analyzed by descriptive statistics.

Results

CVS was performed for 1,000 referred cases. They requested CVS due to: familial history of thalassemia; both parents have beta-thalassemia trait (77%), detection of fetal sex (8.4%), diagnosis of systemic muscular atrophy (SMA)(4.4%), sickle cell anemia,(1.7%), hemophilia (1.6%) and Duchene disease (1.6%).

Mean age of women was 26.7 ± 5.3 (15-43 year). Approximately 38.5% were nulliparous (Table 1.). Mean gestational age was 11.4 ± 1.7 (9-21) weeks. The placental site as shown in Table 2 is mostly at the posterior wall of the uterus. Sampling was

successful in all cases. Attempt to achieve chorionic villous was by one needle at 71.1%, two at 23.1%, three at 4.9%, four attempts at 0.8% and six at 0.1%. The needle crossed the amniotic sac in 58 cases (5.8%).

Among one thousand procedures, one case had rupture of amniotic sac three days later and fetal loss (0.1%) following that. Most of the cases (849) were followed for one year, except 151 women who were not available. Among samples, one case had congenital heart disease and one intrauterine death near term and another had preterm pregnancy. All other cases were apparently healthy infants and the results of their genetic studies have been recorded.

Discussion

Systematic reviews imply the risk of fetal loss attributed to invasive prenatal procedures by a range of 0.6-2%. Estimate of pooled pregnancy loss within 14 days has been 0.6% rising to 0.9% for pregnancy loss before 24 weeks and 1.9% for total pregnancy loss. Corresponding figures for CVS were 0.7%, 1.3%, and 2%(3). The data on multiple insertions showed large heterogeneity, ranging from 0.2% to 2.9% for amniocentesis (pooled risk 2.0% and from 1.4% to 26.6% for CVS (pooled risk 7.8%). Only five amniocentesis studies provided controls, but none was matched for gestational age. Pooled relative risks for fetal loss before 28 weeks and total pregnancy loss were 1.46 and 1.25, respectively(3). However mid trimester amniocentesis is an easy performed procedure compared to CVS but a major disadvantage of amniocentesis is that the result is usually available only after 16-18 weeks' gestation. Chorionic

villous sampling (CVS) and early amniocentesis can be done between 9 and 14 weeks and offers an earlier alternative(4) However, second trimester amniocentesis is safer than trans-cervical CVS and early amniocentesis. If earlier diagnosis is required, transabdominal CVS is preferable to early amniocentesis or transcervical CVS. In circumstances where transabdominal CVS may be technically difficult, the preferred options are transcervical CVS in the first trimester or second trimester amniocentesis(4). Several cohort studies have shown the feasibility of early amniocentesis (between 11 and 13 weeks of gestation) as an alternative to chorionic villus sampling (CVS) for karyotyping, but the only completed randomised study of fetal safety showed a significant fetal-loss risk related to first-trimester amniocentesis and even though the numbers were small, they found an association between early amniocentesis and talipes equinovarus (1.63) that was higher than in the CVS group (0.56%), but this difference was not significant(5,6). Our study showed just 0.1% risk of fetal loss. We conclude that chorionic villus sampling is a safe and effective technique for the early prenatal diagnosis of cytogenetic abnormalities.

One of the upcoming non-invasive techniques of prenatal diagnosis is maternal blood sampling for fetal blood cells in which the fetal cells for particular DNA sequences can be sorted out and analyzed by a variety of techniques, but without the risks that invasive procedures inherently have.

Fluorescence in-situ hybridization (FISH) is one technique that can be applied to identify particular chromosomes of the fetal cells recovered from maternal blood, and diagnose aneuploid conditions such as the trisomies and monosomy X(7). The request of our patients are mostly for detection of or to rule out thalassemia and the problem with this technique is that it is difficult to get many fetal blood cells. There may not be enough to reliably determine anomalies of the fetal karyotype or assay for other abnormalities. Although the risk of pregnancy loss is relatively low, lack of adequate controls tends to underestimate the true added risk of prenatal invasive procedures. We conclude that chorionic villous sampling is a safe and effective technique for the early prenatal diagnosis of cytogenetic abnormalities but that it probably entails a slight risk of procedure failure and of fetal loss that can be controlled by skill improvement.

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Table 1: Parity score at CVS procedure

Parity score	Frequency (%)
Nulliparous	38.5
Para 1	27.5
Para2	19.3
Para3	8.4
Para4	4.2
Para5	1.3
Para6	0.7
Para7	0.1

Table2: position of placenta at CVS procedure.

Location of placenta	frequency	percent
Anterior	382	38.2
Posterior	407	40.7
Circular	138	13.8
Lateral	23	2.3
Fundal	50	5

Table3: Attempts of needle insertion at CVS procedure.

Frequency of needle attempt	number	percent
1	711	71.1
2	231	23.1
3	49	4.9
4	8	0.8
6	1	0.1

Maternal and Umbilical Cord Blood Lead Levels and pregnancy outcomes: A Hospital Based Enquiry

ABSTRACT

Background: Environmental lead exposure is a public health problem on a global level. The population most sensitive to lead exposure from various sources, are pregnant women and children. The aim of the present study is to measure maternal and umbilical cord blood lead levels and their association with pregnancy outcome among a study sample in Mosul city.

Methods

The study population consisted of 350 mother-infant pairs. Data was obtained directly from women before delivery. Blood pressure of each woman was checked before delivery too. Neonatal birth weight, head circumference, and Apgar score was measured soon after birth. Maternal and umbilical blood lead levels were estimated by Lead Care Blood Lead Testing System and Kits (ESA, Inc.; USA).

Results

The maternal geometric mean of blood lead concentration is significantly higher than that of the umbilical cord with a significant positive correlation between the two values ($r = 0.856$, $p = 0.001$). The present study revealed that high maternal blood lead value is significantly associated with the development of hypertension during pregnancy and ($p = 0.000$) giving a low birth weight baby ($p = 0.000$), with a small head circumference ($p = 0.013$).

Conclusions

Study results have provided information needed to be transferred to decision makers to implement measures to effectively eliminate lead from the environment and to protecting future generations from its deleterious effects.

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Introduction

As far as the exposure to environmental elements is concerned, attention has been directed to study the exposure to lead, and since its health effects may begin during exposure in uterus, the study of maternal exposure is of significance^[1].

The Center for Disease Control and Prevention (CDC) has grouped blood lead values into three ranges: (1) low (1 - 10 µg/ dl); (2) moderate (11 - 20 µg / dl); (3) high (20 - 38 µg/ dl)^[2]. Needleman and Landrigan in 2004 stated that, there is no demonstrated safe concentration of lead in blood, a large part of adverse health effects occur at the lowest doses^[3].

During pregnancy stores of lead deposited in bones over life may be mobilized and transferred to the more bioavailable compartment of the maternal circulation with potential toxic effects on the fetus and mother^[4]. This possibility of bone resorption during pregnancy is alarming in view of a study linking even lower levels of lead exposure may be associated with deficits in neurobehavioral function in infants. Early 3rd trimester of pregnancy may constitute a critical period for subsequent intellectual child development during which lead exposure can produce lasting and possibly permanent effects^[5]. Neurodevelopment involvement from prenatal and early childhood exposures have been observed at a relatively low level of lead and it may

be the most sensitive end point for its toxicity^[6].

The period of fetal growth is often the stage of development at which an organism is most sensitive to toxic agents. However, fetal exposure cannot be directly measured during pregnancy in human research studies. Maternal measurements are the only exposure indices ethically available^[7].

The effects of lead on fetal growth, intrauterine development, and postnatal status have long been of concern in occupational and environmental medicine. Lead in a large amount has been shown to be fetotoxic in humans, prenatal lead exposure likely increases the risk of preterm delivery and inconsistently associated with reduced Apgar score at delivery, birth weight, head circumference, and recumbent length^[8].

Maternal BLLs (MBLLs) were also associated with increase of systolic and diastolic blood pressure as well as increased risk of 3rd trimester hypertension^[9].

The main concern of the present study is to monitor the association of MBLLs with pregnancy outcomes among the study sample.

Materials and Methods

Prior to data collection an official permission was obtained from Nineveh Health Office and Maternity Hospitals Administrations that were to be involved in this work. A written consent was taken from participants

prior to the interview and blood sample collection.

The present study was conducted in Mosul city, the center of Nineveh Governorate. Data collection was carried out in the main maternity hospitals in Mosul; selected on the basis of having the largest number of monthly births, and their accessibility for the whole population living in this city.

In this study a cross-sectional design was adopted among women who attended the delivery units in the chosen hospitals. A sample of 370 maternal-fetal pairs was considered which forms almost 10% of the average monthly attendance distributed over the chosen hospitals. Out of this numbers 350 pairs were reached. The inclusion criteria for the study participants were:

1. She is 15-49 years old.
2. Mosul city resident for more than 3 years.
3. Has a full term single viable pregnancy.
4. Has no gestational diabetes or seizure.
5. Has no psychiatric illness.
6. Delivered by normal vaginal delivery.

Data were obtained directly from mothers who signed a letter of consent before collection of blood samples. Collected information included mother's age, parity, and blood pressure (BP) which was measured before delivery. A woman was considered hypertensive if one measurement of diastolic BP was 110 mmHg or more, or diastolic BP more than 90 mmHg on two occasions four hours apart.

Hemoglobin (Hb) level was obtained from the maternal case sheet. A woman was included among the anemic group if her Hb level was $<11\text{g/dl}$ ^[10].

Birth weight (BW) was measured immediately after birth. Neonates weighing less than 2.5 kg were regarded as a low birth weight (LBW) baby^[11]. Head circumference (HC) was measured using non-stretchable tape and recorded to the nearest cm. A normal baby should have a HC of 35 cm or more^[12]. Apgar score more

than 7 was regarded as normal^[12].

Blood lead levels analysis

Analysis of blood lead was performed at the Environmental Health Education and Recourses unit of Mosul College of Medicine.

Blood Lead Levels (BLLs) were estimated by using LEADCARE® Blood Lead Testing System and Lead Care Blood Lead Testing Kits by (ESA, Inc., USA). This system relied on electrochemistry and a unique sensor to detect lead in the whole blood. The contents of these kits are used specifically with LEADCARE® Analyzer and Blood Lead Testing System.

Three ml of venous maternal blood samples were collected in lead free EDTA tubes and the same volume of umbilical cord blood was also collected immediately after birth from each corresponding newborn baby in EDTA tubes as well.

Fresh whole blood samples were thoroughly mixed in their EDTA tubes and accurately measured. 50 μL samples were transferred and mixed with treatment reagent until they turned brown. An exactly measured 50 μL blood mixture was then transferred to the kidney shaped active area of the sensor using the 50 μL pipette that was supplied with the LEADCARE® System.

With the sensor properly placed into the sensor holder and its active area thoroughly covered with the mixture, it was then pushed the rest of the way into the sensor holder where the analyzer displayed the BLL in $\mu\text{g/dl}$, after exactly 180 seconds. The range of the test is 1.4 - 65 $\mu\text{g/dl}$. "Hi" in the display window indicates that BLLs are greater than 65 $\mu\text{g/dl}$.

Analyses of refrigerated blood mixtures in the treatment reagent tubes were made in weekly batches. Mixtures were allowed to reach room temperature prior to analysis.

LEADCARE® Blood Lead Controls were used to monitor the accuracy and precision of blood lead testing. They are prepared from bovine blood containing metabolized lead and they consist of a low level blood lead control; $6.4 \pm 3.0 \mu\text{g/dl}$ (Level 1) and a high level blood lead control; $25.9 \pm$

$4.0 \mu\text{g/dl}$ (Level 2).

Each control contains 2.0 ml lyophilized bovine whole blood that should be reconstituted with the provided 2.0 ml LEADCARE® water with isothizolones ($< 0.002\%$) as preservative. Reconstituted controls were used as would be a patient blood sample and as an internal quality control program.

Statistical Methods

Data were analyzed with a SPSS package version 13. Blood lead concentrations were log transformed due to non-normal distributions. Unpaired T-test was used to determine the presence or absence of significant differences between the two means. Pearsons' correlation was performed to find the degree of correlation between MBLLs and umbilical BLLs (UBLLs).

Chi- squared (X^2) test was used to test for the presence or absence of significant association between elevated MBLLs and pregnancy outcomes. Odds ratio (OR) and the corresponding 95% confidence interval (CI) were also computed. P-value of <0.05 was considered significant throughout the present study.

Results

Overall, out of 370 maternal infants pairs were reached making a participation rate of 94.6%

Table 1 exhibits characteristics of maternal-infant pairs. The geometric mean (GM) of MBLLs at delivery was $3.26 \pm 1.91 \mu\text{g/dl}$ with a range of 0.50-22.39 $\mu\text{g/dl}$. The GM of lead concentration in the umbilical cord blood was $2.29 \pm 22.11 \mu\text{g/dl}$; the range was 0.30-22.29 $\mu\text{g/dl}$. A highly significant difference was reported between the two GMs ($p=0.000$). On average, the UBLLs were lower than MBLLs by 0.97 $\mu\text{g/dl}$. Using untransformed data: 57 pairs (16.3%) had an umbilical blood lead value higher than their mothers.

Figure 1 portrays a significant positive correlation between MBLLs and UBLLs ($r= 0.856$, $p= 0.001$).

Table 2 clarifies the effect of MBLLs on the development of hypertension and anemia among women

participants during the current pregnancy. Women with BLLs =10 µg/ dl are more at risk of developing hypertension than those with BLLs= 10 µg/ dl (OR= 6.84, p= 0.000). Although there is an evident risk of anemia development among women with high BLLs (OR=2.73) this risk does not reach a significant level

Table 3 shows that mothers with high BLLs (=10 µg/ dl) are more at risk of having a low BW baby, (OR= 43.54, p= 0.000). Also such mothers have babies with fairly significant small HC (OR= 3.16, P= 0.013). However, no effect was significantly shown on the Apgar score of such newborns.

Discussion

The survey of targeted populations at a special risk for either lead exposure or toxic health effects can provide improved, cost - effective means for eventual control of exposure. Prenatal lead exposure is of concern because it may have an effect on cognitive development and may increase delinquent and antisocial behaviors when the child gets older and it may also reduce neonatal weight gain. In addition to fetal risk, lead may be a risk to mothers by causing an increase in blood pressure^[13].

There is an ongoing debate over the appropriate cut-off point of blood lead concentration of concern in infants and young children. Consequently, it was lowered by CDC from 60 µg / dl in 1960 to 25 µg / dl and then to the currently used value of 10 µg / dl in 1991. Two factors brought about this reduction: improved investigational strategies and reduced background lead levels due to removal of lead from gasoline^[14].

Mosul is a densely populated city. It is the second largest city in Iraq. Like other cities in this country, it is facing several environmental health problems with an increased burden from environmental lead pollution. This pollution may come from various sources such as old cars, electrical generators (which are widely distributed in the city), and the presence of a large number of old houses which can be translated into increased BLLs in the general population.

As the present study is a part of an original work to examine lead levels in pregnant women and their infants in the city, data derived from such a study could be used as a baseline indicator for future programs. It is important to have a high confidence in data derived from this survey.

The GM of MBLLs concentration of maternal blood in this study was 3.26 ± 1.91 µg / dl with a range of (0.5 - 22.39 µg / dl), which is lower than reported in Al-Naemi et al. [15] study carried out in 2007 (5.26 ± 3.33 µg / dl) in the same venue. The mean BLL reported by Al-Naemi et al [15] was for 306 non-pregnant mothers at childbearing age which were taken randomly from women coming to a primary health care center (PHCC) for their children's vaccination. This discrepancy could be explained by three hypotheses:

(1) The sample of the current study is hospital based so probably could not be considered as representative. The sample of Al-Naemi et al.[15] included females of a childbearing age who attended Al-Hadbaa PHCC. This center has a wide catchment area mostly of moderate and low socioeconomic status.

(2) Al-Naemi et al.^[15] in their work, used finger stick samples which may yield higher false measurements than venous blood samples used in the present study, probably due to outside lead contamination and lastly the data of the reported work were not log transformed.

The GM of lead concentration in the umbilical cord recorded by this study was 2.29 ± 2.11 µg/dl with a range of 0.30 - 22.91 µg/dl. This figure was higher than that reported by Kirel et al^[16] in Turkey who recorded a mean UBLL value of (1.65 ± 1.4 µg/ dl).

This difference may be due to small sample size in the Kirel et al^[16] study (n= 120). Also it is worth noting that unleaded gasoline, which is widely used in this country may lead to a sub-statistical low level of exposure to lead.

In the present work, lead concentration in the umbilical cord is significantly correlated with, and lower than, the concentration of maternal venous blood (r= 0.856,

P= 0.001). This finding is consistent with the findings of other studies^[16-18] which supports the conclusion that the placenta is not a very effective biological barrier and it does not hinder much of the lead transport. Lead freely crosses the placenta, consequently gestational lead is not only harmful to women but also to the developing fetus^[19].

The present work demonstrated that high MBLLs were significantly related to the risk of development of hypertension during pregnancy (OR= 6.84, P= 0.000). This result is similar to the result obtained by Rothenberg et al^[20] who reported an association between blood lead and blood pressure during pregnancy by a cohort study conducted among 1932 pregnant women in South Central Los Angeles.

The particular target tissue for an effect of lead on blood pressure has not yet been established, but several biologic mechanisms have been suggested. The two major modes of action identified are direct effect on end-arterial smooth muscles mediated through distributed calcium metabolism and effects on the rennin-angiotensin axis. In addition, lead may interact with vasoactive agents^[21].

The present study showed that 234 out of 350 pregnant women (66.86%) were anemic. Although iron has been shown to be important in lead absorption, in this study no association between hemoglobin level and concentration of lead in pregnant women was found. This finding is most likely due to the difficulty of measuring iron deficiency anemia in a population undergoing the physiological changes associated with pregnancy^[22].

Birth weight is a strong predictor of survival and of development outcomes in childhood including growth, morbidity, and cognitive performance^[5]. Kaul et al^[23] mentioned that there is an inverse relation between maternal lead burden and birth weight in the offspring of women with relatively low blood lead.

In the current study, it was observed that neonates born to women with

BLLs = 10 µg/ dl had an increasing risk of having low birth weight (OR= 43.54, P= 0.000).

The public health significance of this finding is notable, because early growth problems have health and social consequences. It has been shown that the early impaired growth is associated with decreased intellectual and physical performance, such as work capacity, and school achievement^[24]. Lead may impair birth weight through an effect on prenatal bone growth itself in such a way that the attained weight at birth may be negatively affected^[25].

Schnaas et al^[5] mentioned that increased MBLL was associated with decreased birth weight, and lower birth weight was associated with poor postnatal intellectual development, which is the modeled effect of MBLL six to ten years later. Also an intelligence quotient (IQ) could be mediated through lead effect on birth weight, since the third trimester of pregnancy constitutes a critical period for fetal growth and subsequent intellectual child development, during which lead exposure can produce long lasting and possibly permanent effects. In addition there is no threshold for the adverse consequences of lead.

Rahman and Hakeem^[26] in Pakistan found no association of MBLLs with fetal growth neither in terms of birth weight nor in birth length. A small sample size (n= 73) which is not large enough to pick up these association and racial differences in the effect of lead, may explain this apparent lack of association.

A study by Hernandez-Avila et al^[27] evaluated the effect of MBLLs on head circumference of newborns and one month old infants. They concluded that high MBLLs were significantly related to the risk of a low head circumference score . The present work also demonstrated that mothers with high BLL (= 10 µg/ dl) are at risk of having a newborn with a low head circumference measurement (OR= 3.16, P= 0.013). However, Rahman and Hakeem did not confirm this resul^[26].

The present study revealed that only 5.3% of newborns have an Apgar score less than 7. Those were newborns to mothers with high BLLs (=10 µg/ dl). Despite that, no association was demonstrated between MBLLs and Apgar score. Sowers et al.^[28] conducted a study among 705 women aged 14-34 years showed that maternal blood lead concentration and its changes were not associated with reduced Apgar score.

Conclusion

The present study provides, for the first time in the country, data on maternal and UBLLs with a clear significant association between high MBLLs and low birth weight neonates with small head circumference .The following points should be carefully considered in Mosul city:

1. Efforts should be made to reduce BLLs of reproductive age women to minimize transfer of MBLL to fetus and nursing infant. So screening of women at childbearing age for elevated BLLs is needed.
2. General education on measures to reduce lead exposure may be useful for parents. This includes information on potential risk factors for lead exposure and specific prevention strategies that should be tailored for the family and for the community in which care is provided.
3. Future research is needed to evaluate the BLLs among women of child bearing age, since little is known about the cycling of blood lead through generations and the means to reduce the lead burden on women's bodies at child bearing age.

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Table 1: Characteristics of mother-infant pairs

Characteristics	Mean
Maternal	
Age (years)	25.00 ±6.07
Parity	2 .00 ±0.89
GM of MBLLs µg / dl	3.26 ± 1.91
Newborns	
Birth weight (kg)	3.06 ± 0.52
Head circumference (cm)	35.12±0.84
Apgar score	6.78±1.89
GM of UBLLs µg / dl	2.29± 2.11
Male n=178	50.9%
Female n=172	49.1%

Table 2: Association of MBLLs (µg / dl) and development of hypertension and anemia among study women

MBLLs (µg/dl)	Maternal Bp		OR	P-value*	95% CI
	hypertensive	normotensive			
≥10(n= 19)	7(36.8)	12(63.2)	6.84	0.000	2.79 – 16.76
<10(n= 331)	26(7.9)	305(94.0)			
Maternal Hb level (gm/dl)					
< 11					
≥ 11					
≥10(n= 19)	16(84.2)	3(15.8)	2.73	0.103	0.82 – 9.14
<10(n= 331)	219(66.2)	112(33.8)			

· χ^2 test was used

Table 3: Association of MBLLs (µg / dl) and neonatal variables measured

MBLLs (µg/dl)	Birth weight Kg		OR	P-value*	95% CI
	< 2.5	≥ 2.5			
≥10(n= 19)	14(73.7)	5(26.3)	43.54	0.000	20.28 - 93.47
<10(n= 331)	20(6.0)	311(94.0)			
Head circumference cm					
< 35					
≥ 35					
≥10(n= 19)	8(42.1)	11(57.9)	3.16	0.013	1.31 – 9.97
<10(n= 331)	62(18.7)	269(81.3)			
APGAR score					
< 7					
≥ 7					
≥10(n= 19)	1(5.3)	18(94.7)	1.99	0.100	0.69 – 6.05
<10(n= 331)	9(2.7)	322(97.3)			

· χ^2 test was used

Figure 1: Correlation between MBLLs and UBLLs