What is the relationship between irritable bowel syndrome, smoking, hypertriglyceridemia and fasting plasma glucose?

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Abstract

Background: We tried to understand whether or not there are some significant relationships between irritable bowel syndrome (IBS), smoking, and metabolic parameters.

Method: IBS is diagnosed according to Rome II criteria in the absence of red flag symptoms including pain and diarrhea that awakens/interferes with sleep, weight loss, and fever and abnormal physical examination findings.

Results: The study included 936 patients with the IBS and 346 control cases. Mean age of the IBS patients was 41.0 ± 14.7 (13-86) years. Interestingly, 63.2% of the IBS patients were female. Prevalence of smoking (35.2% versus 20.8%, p<0.001), chronic gastritis (CG) (80.4% versus 15.0, p<0.001), antidepressants use (46.4% versus 16.1%, p<0.001), hemorrhoids (37.1% versus 7.2%, p<0.001), and urolithiasis (22.0% versus 9.5%, p<0.001) and mean values of fasting plasma glucose (FPG) (111.9 versus 105.4 mg/dL, p= 0.002) and triglycerides (167.0 versus 147.3 mg/dL, p= 0.013) were all higher in patients with the IBS, significantly.

Conclusion: IBS may be a low-grade inflammatory process being initiated with infection, inflammation, anxiety, depression, sleep disorders, cancer fear, death fear, and smoking-like stresses, and eventually terminates with dysfunctions of the gastrointestinal and genitourinary tracts. There may be some significant associations between female sex, IBS, CG, depression, hemorrhoids, urolithiasis, smoking, higher FPG, and hypertriglyceridemia. FPG and triglyceride values may be sensitive acute phase reactants indicating some inflammatory processes like smoking and IBS in the body.

Key words: Irritable bowel syndrome, smoking, hypertriglyceridemia, fasting plasma glucose

Introduction

Recurrent upper abdominal discomfort may be the cause of nearly half of applications to Internal Medicine Polyclinics (1). Although gastroesophageal reflux disease, esophagitis, duodenal or gastric ulcers, erosive gastritis and duodenitis, celiac disease, chronic pancreatitis, and malignancies are found among possible causes, irritable bowel syndrome (IBS) and chronic gastritis (CG) may be two of the most frequently diagnosed disorders among all. Flatulence, periods of diarrhea and constipation, repeated toilet visits due to urgent evacuation or early filling sensation, excessive straining, feeling of incomplete evacuation, frequency, urgency, reduced feeling of well-being, and eventually disturbed social life are often reported by the IBS patients. Although many patients relate onset of symptoms to intake of food, and often incriminate specific food items, a meaningful dietary role is doubtful in IBS. According to literature, nearly 20% of the general population have IBS, and it is more common among females with unknown causes, yet (2). Psychological factors seem to precede onset and exacerbation of gut symptoms, and many potentially psychiatric disorders including anxiety, depression, sleep disorders, death fear, or cancer fear usually coexist with the IBS (3). For example, thresholds for sensations of initial filling, evacuation, urgent evacuation, and utmost tolerance recorded via a rectal balloon significantly decreased by focusing the examinees' attention on gastrointestinal stimuli by reading pictures of gastrointestinal malignancies in the IBS cases (4). In another definition, although IBS is described as a physical disorder according to Rome II guidelines, psychological factors may be crucial for triggering of these physical changes in the body. IBS is actually defined as a brain-gut dysfunction according to the Rome II criteria, and it may have more complex mechanisms affecting various systems of the body by means of a low-grade inflammatory state (5). As a result, IBS may even cause CG, urolithiasis, and hemorrhoids (6-8). Similarly, some authors studied the role of inflammation in the IBS via colonic biopsies in 77 patients (9). Although 38 patients had normal histology, 31 patients demonstrated microscopic inflammation and eight patients fulfilled criteria for lymphocytic colitis. However, immunohistology revealed increased intraepithelial lymphocytes as well as increased CD3 and CD25 positive cells in lamina propria of the group with "normal" histology. These features were more evident in the microscopic inflammation group who additionally revealed increased neutrophils, mast cells, and natural killer cells. All of these immunopathological abnormalities were the most evident in the lymphocytic colitis group who also demonstrated HLA-DR staining in the crypts and increased CD8 positive cells in the lamina propria (9). A direct link between the immunologic activation and IBS symptoms was shown by some other authors (10). They demonstrated not only an increased mast cell degranulation in the colon but also a direct correlation between proximity of mast cells to neuronal elements and severity of pain in the IBS (10). In addition to the above findings, there is some evidence for extension of the inflammatory process behind the mucosa. Some authors addressed this issue in ten patients with severe IBS by examining full-thickness jejunal biopsies obtained via laparoscopy (11). They detected a low-grade infiltration of lymphocytes in myenteric plexus of nine patients, four of whom had an associated increase in intraepithelial lymphocytes and six demonstrated evidence of neuronal degeneration. Nine patients had hypertrophy of longitudinal muscles and seven had abnormalities in number and size of interstitial cells of Cajal. The finding of intraepithelial lymphocytosis was consistent with some other reports in the colon (9) and duodenum (12). On the other hand, smoking is a well-known cause of chronic vascular endothelial inflammation terminating with an accelerated atherosclerotic process-induced end-organ insufficiencies all over the body. We tried to understand whether or not there are some significant relationships between IBS, smoking, and metabolic parameters in the present study.

Material and Methods

The study was performed in the Internal Medicine Polyclinic of the Dumlupinar University between August 2005 and March 2007. Consecutive patients with upper abdominal discomfort were taken into the study. Their medical histories including smoking habit, alcohol consumption, urolithiasis, and already used medications including antidepressants at least for a period of six-month were learned. Patients with devastating illnesses including eating disorders, malignancies, acute or chronic renal failure, cirrhosis, hyper- or hypothyroidism, and heart failure were excluded. Current daily smokers at least for six-months and cases with a history of five pack-year were accepted as smokers. Patients with regular alcohol intake (one drink a day) were accepted as drinkers. A routine check up procedure including fasting plasma glucose (FPG), triglycerides, low density lipoproteins (LDL), high density lipoproteins (HDL), C-reactive protein, albumin, creatinine, thyroid function tests, hepatic function tests, markers of hepatitis A, B, C, and human immunodeficiency viruses, urinalysis, a posterior-anterior chest x-ray graphy, an electrocardiogram, a Doppler echocardiogram in case of requirement, an abdominal ultrasonography, an abdominal x-ray graphy in supine position, rectosigmoidoscopy in patients symptomatic for hemorrhoids, and a questionnaire for IBS was performed. IBS is diagnosed according to Rome II criteria in the absence of red flag symptoms including pain and diarrhea that awakens/interferes with sleep, weight loss, and fever and abnormal physical examination findings. An upper gastrointestinal endoscopy was performed, and sample biopsies were taken in case of requirement. CG is diagnosed histologically, and infiltration of neutrophils and monocytes into gastric mucosa is the hallmark of CG (13). Additionally, microscopic examination shows stereotypical changes in epithelium such as degeneration, focal intestinal metaplasia, dysplasia, and glandular atrophy (13). An additional intravenous pyelography was performed according to the results of the urinalysis and abdominal x-ray graphy. So urolithiasis was diagnosed either by medical history or as a result of current clinical and laboratory findings. Body mass index (BMI) of each case was calculated by measurements of

the same clinician instead of verbal expressions. Weight in kilograms is divided by height in meters squared (14). Cases with an overnight FPG level of 126 mg/dL or higher on two occasions or already using antidiabetic medications were defined as diabetic. An oral glucose tolerance test with 75-gram glucose was performed in cases with FPG levels between 100 and 126 mg/dL, and diagnosis of cases with 2-hour plasma glucose levels of 200 mg/dL or higher is diabetes mellitus (DM) (14). Office blood pressure (OBP) was checked after a 5 minute rest in seated position with mercury sphygmomanometer on three visits, and no smoking was permitted during the previous 2 hours. Ten-day twice daily measurements of blood pressure at home (HBP) were obtained in all cases, even in normotensives in the office due to the risk of masked hypertension after a 10-minute education session about proper blood pressure (BP) measurement techniques (15). The education included recommendation of upper arm devices, using a standard adult cuff with bladder sizes of 12 x 26 cm for arm circumferences up to 33 cm in length and a large adult cuff with bladder sizes of 12 x 40 cm for arm circumferences up to 50 cm in length, and taking a rest for a period of 5 minutes in seated position before measurements. An additional 24-hour ambulatory blood pressure monitoring was not required due to the equal efficacy of the method with HBP measurements to diagnose hypertension (HT) (16). Eventually, HT is defined as a mean BP of 140/90 mmHg or greater on HBP measurements and white coat hypertension (WCH) is defined as an OBP of 140/90 mmHg or greater, but a mean HBP value of lower than 140/90 mmHg (15). Eventually, all patients with the IBS were collected into the first, and age and sex-matched controls were collected into the second, groups. Mean BMI, FPG, total cholesterol (TC), triglycerides, LDL, and HDL values and prevalences of smoking, CG, antidepressants use, hemorrhoids, urolithiasis, WCH, HT, and DM were detected in each group and compared in between. Mann-Whitney U test, Independent-Samples T test, and comparison of proportions were used as the methods of statistical analyses.

Results

The study included 936 patients with the IBS and 346 control cases. Mean age of the IBS patients was 41.0 ± 14.7 (13-86) years. Interestingly, 63.2% of the IBS patients were female. Prevalence of smoking (35.2% versus 20.8%, p<0.001), CG (80.4% versus 15.0, p<0.001), antidepressants use (46.4% versus 16.1%, p<0.001), hemorrhoids (37.1% versus 7.2%, p<0.001), and urolithiasis (22.0% versus 9.5%, p<0.001) and mean values of FPG (111.9 versus 105.4 mg/dL, p= 0.002) and triglycerides (167.0 versus 147.3 mg/dL, p= 0.013) were all higher in patients with the IBS. On the other hand, prevalence of WCH, HT, and DM and mean values of BMI, TC, LDL, and HDL were all similar in both groups (p>0.05 for all) (Table 1 - next page). Although the high prevalence of smoking, there was no patient with regular alcohol intake either among the IBS patients or control cases.

Discussion

Smoking-induced vasculitis may be the most frequent vasculitis in society. It is a major risk factor for the development of atherosclerotic end-organ insufficiencies including coronary heart disease (CHD), peripheric artery disease (PAD), chronic obstructive pulmonary disease (COPD), cirrhosis, chronic renal disease (CRD), and stroke (17, 18). Its atherosclerotic effect is the most obvious in Buerger's disease. Buerger's disease is an obliterative vasculitis characterized by inflammatory changes in small and medium-sized arteries and veins, and it has never been documented in the absence of smoking in the literature. Although the well-known strong atherosclerotic effects of smoking, some studies reported that smoking in human beings and nicotine administration in animals are associated with lower BMI values (19). Proof revealed an increased energy expenditure during smoking both on rest and light physical activity (20), and nicotine supplied by patch after smoking cessation decreased caloric intake in a dose-related manner (21). According to an animal study, nicotine may lengthen intermeal time and simultaneously decreases amount of meal eaten (22). Additionally, BMI seems to be the highest in former, the lowest in current and medium in never smokers (23). Smoking may be associated with post-cessation weight gain but proof suggests that risk of weight gaining is the highest during the first year after quitting and decreases with the years (24). Similarly, although CHD was detected with similar prevalence in both genders, prevalence of smoking and COPD were higher in males with the CHD against the higher mean values of BMI, LDL, and triglyceride and higher prevalence of WCH, HT, and DM in females (25). This result may indicate both the strong atherosclerotic and weight decreasing roles of smoking (26). Similarly, the incidence of a myocardial infarction is increased six-fold in women and three-fold in men who smoked at least 20 cigarettes per day (27). In other words, smoking may be more harmful for women regarding the atherosclerotic end-points probably due to the greater BMI and its consequences. Similarly, smoking is consistently higher in men in the literature (18). So smoking is probably a powerful atherosclerotic risk factor with some suppressor effects on appetite. On the other hand, smoking-induced weight loss may be related to the chronic vascular endothelial inflammation all over the body, since loss of appetite is one of the chief symptoms of disseminated inflammation in the body. Clinicians can even understand healing of patients by means of normalizing appetite. Several toxic substances found in cigarette smoke get into the circulation via the respiratory tract, and cause a vascular endothelial inflammation until clearance from the circulation. But due to the repeated smoking habit of the individuals, the clearance process never terminates. So the patients become ill with loss of appetite, permanently. In another definition, smoking-induced weight loss is an indicator of being ill instead of being healthy (21-23). After smoking cessation, appetite normalizes with a prominent weight gain in patients but the returned weight is their normal and physiological weight, actually.

Table 1: Comparison of patients with irritable bowel syndrome and control cases

Variables	Patients with IBS*	*p*-value	Control cases
Number	936		346
Mean age (year)	***41.0 ± 14.7 (13-86)***	***Ns†***	***41.4 ± 14.4 (15-82)***
Female ratio	***63.2% (592)***	***Ns***	***63.0% (218)***
Prevalence of smoking	***35.2% (330)***	***<0.001***	***20.8% (72)***
Prevalence of chronic gastritis	***80.4% (753)***	***<0.001***	***15.0% (52)***
Prevalence of antidepressants use	***46.4% (435)***	***<0.001***	***16.1% (56)***
Prevalence of hemorrhoids	***37.1% (348)***	***<0.001***	***7.2% (25)***
Prevalence of urolithiasis	***22.0% (206)***	***<0.001***	***9.5% (33)***
Mean BMI‡ (kg/m2)	27.2 ± 5.6 (15.0-51.1)	Ns	27.7 ± 5.9 (16.5-49.0)
Prevalence of WCH§	27.7% (260)	Ns	31.4% (107)
Prevalence of HT‖	12.8% (120)	Ns	14.7% (50)
Mean FPG** (mg/dL)	***111.9 ± 42.8 (66-392)***	***0.002***	***105.4 ± 32.9 (70-323)***
Prevalence of DM***	8.3% (78)	Ns	10.0% (34)
Mean TC**** (mg/dL)	199.8 ± 43.9 (105-352)	Ns	196.5 ± 43.6 (110-296)
Mean triglycerides (mg/dL)	***167.0 ± 106.5 (20-622)***	***0.013***	***147.3 ± 102.9 (27-857)***
Mean LDL***** (mg/dL)	125.4 ± 35.8 (10-282)	Ns	124.0 ± 32.5 (54-231)
Mean HDL****** (mg/dL)	46.6 ± 13.5 (24-124)	Ns	45.0 ± 10.3 (26-72)

*Irritable bowel syndrome †Nonsignificant (p>0.05) ‡Body mass index §White coat hypertension ‖Hypertension
**Fasting plasma glucose ***Diabetes mellitus ****Total cholesterol *****Low density lipoproteins
******High density lipoproteins

There may be several underlying mechanisms terminating with the components of IBS in smokers. First of all, smoking-induced chronic vascular endothelial inflammation may disturb epithelial functions for absorption and excretion in the gastrointestinal and genitourinary tracts. These functional problems may terminate with the symptoms and components of IBS including loose stool, diarrhea, constipation, and urolithiasis. Secondly, diarrheal losses-induced urinary changes may even cause urolithiasis (6, 7). Thirdly, smoking-induced sympathetic nervous system activation may cause motility disorders in the gastrointestinal and genitourinary tracts. Lastly, immunosuppression secondary to smoking-induced chronic vascular endothelial inflammation may even terminate with gastrointestinal and genitourinary tract infections causing loose stool, diarrhea, and urolithiasis since some types of bacteria can provoke urinary supersaturation and modify the environment to form crystal deposits in the urine. In fact, 10% of urinary stones are struvite stones which are built by magnesium ammonium phosphate produced during infection with bacteria that possess the enzyme, urease. Similarly, prevalence of urolithiasis was significantly higher in the IBS patients in the present study (22.0% versus 9.5%, p<0.001).

Chronic endothelial damage may be the leading cause of aging by inducing tissue hypoxia all over the body. Probably whole afferent vasculature including capillaries are mainly involved in the process since much higher BP of the afferent vasculature may be one of the major underlying causes of recurrent endothelial injuries. Thus the term of venosclerosis is not as famous as atherosclerosis in the literature. Secondary to the chronic endothelial damage, inflammation, edema, and fibrosis, vascular walls thicken, their lumens narrow, and they lose their elastic nature, all of this reduces blood flow and increases BP further. Some of the well-known accelerators of the disseminated atherosclerotic process are physical inactivity, excess weight, smoking, alcohol, and chronic inflammatory and infectious processes including sickle cell diseases, rheumatologic disorders, tuberculosis, and cancers for the development of terminal consequences including obesity, HT, DM, PAD, COPD, pulmonary hypertension (PHT), CRD, CHD, cirrhosis, mesenteric ischemia, osteoporosis, stroke, early aging, and premature death. They were researched under the title of metabolic syndrome in the literature, extensively (28, 29). Although early withdrawal of the causative factors may delay the terminal consequences, endothelial changes cannot be reversed completely after development of obesity, HT, DM, PAD, COPD, PHT, CRD, CHD, or stroke due to their fibrotic nature (30, 31).

Obesity may be found among one of the terminal consequences of the metabolic syndrome because after development of obesity, nonpharmaceutical approaches provide limited benefit either to heal obesity or to prevent its complications. Overweight and obesity may lead to a chronic low-grade inflammatory process on vascular endothelium, and risk of death from all causes including cardiovascular diseases and cancers that increase parallel to the range of excess weight in all age groups (32). The low-grade chronic inflammatory process may cause genetic changes on the epithelial cells, and the systemic atherosclerotic process may decrease clearance of malignant cells by the immune system, effectively (17). The effects of excess weight on BP have been shown by several authors previously (33). For example, incidence of sustained normotension (NT) was significantly higher in the underweight (80.3%) than the normal weight (64.0%, $p<0.05$) and overweight groups (31.5%, $p<0.05$), and 52.8% of cases with HT had obesity against 14.5% of cases with the NT ($p<0.001$) (34). So the dominant underlying cause of metabolic syndrome appears as weight gain, which is probably the main cause of insulin resistance, hyperlipoproteinemias, impaired fasting glucose, impaired glucose tolerance, and WCH by means of the chronic low-grade inflammatory process on vascular endothelium all over the body (35). Even prevention of the weight gain with physical activity, even in the absence of a prominent weight loss, will probably result with resolution of many parameters of the metabolic syndrome (36-39). But according to our experiences, excess weight may actually be a consequence of physical inactivity instead of an excessive eating habit therefore prevention of weight gain cannot be achieved by diet, alone (40). Additionally, limitation of excess weight as an excessive fat tissue around the abdomen under the heading of abdominal obesity is meaningless. Instead it should be defined as overweight or obesity by means of BMI since adipocytes function as an endocrine organ, and they produce a variety of cytokines and hormones anywhere in the body (35). The eventual hyperactivities of sympathetic nervous and renin-angiotensin-aldosterone systems are probably associated with chronic endothelial inflammation, insulin resistance, and elevated BP values. Similarly, the Adult Treatment Panel (ATP) III reported that although some people classified as overweight have a larger muscular mass, most of them also have excessive fat tissue predisposing to hyperlipoproteinemias, HT, DM, CHD, and stroke, actually (14).

Although ATP II determined the normal triglyceride value as lower than 200 mg/dL (41), WHO in 1999 (42) and ATP III in 2001 (14) reduced the normal limits as lower than 150 mg/dL. Although these values are usually used to define borders of the metabolic syndrome, whether or not more lower limits can provide additional benefits for human health is unclear. In a previous study (43), patients with a triglyceride value lower than 60 mg/dL were collected into the first, lower than 100 mg/dL into the second, lower than 150 mg/dL into the third, lower than 200 mg/dL into the fourth, and 200 mg/dL and higher were collected into the fifth groups, respectively. Prevalence of smoking was the highest in the fifth group which may also indicate inflammatory roles of smoking and hypertriglyceridemia in the metabolic syndrome. The mean body weight also increased continuously from the first towards the fifth groups, parallel to the increased value of triglyceride. As one of the most surprising results, prevalence of HT, DM, and CHD, as some of the terminal end-points of the metabolic syndrome, showed their most significant increases after the triglyceride value of 100 mg/dL (43). In our opinion, significantly increased triglyceride values by aging may be secondary to aging-induced decreased physical and mental activities, which eventually terminates with obesity and other consequences of the metabolic syndrome. Interestingly, the mean age increased from the lowest triglyceride having group up to the triglyceride value of lower than 200 mg/dL group, gradually and then decreased. The similar trend was also observed with the mean LDL and BMI values, and prevalence of WCH. These trends may be due to the fact that although the borderline high triglyceride values (150-199 mg/dL) are seen together with overweight, obesity, physical inactivity, DM, CRD, smoking, and alcohol-like acquired causes, the high triglyceride (200-499 mg/dL) and very high triglyceride values (500 mg/dL or higher) may actually be secondary to both acquired and genetic causes (14). But although the underlying causes of the high and very high triglyceride values may be a little bit different, probably risks of the terminal end-points of the metabolic syndrome do not change in these groups. For instance, prevalence of HT and DM were the highest in the highest triglyceride having group in the above study (43). Eventually, although some authors reported that lipid assessment in vascular disease can be simplified by measurement of TC and HDL without the need of triglyceride (44), the present study and most of the others indicated causal associations between triglyceride-mediated pathways and parameters of the metabolic syndrome (45, 46). Similarly, another study indicated significant association between higher triglyceride values and CHD in Western populations (47).

As a conclusion, IBS may be a low-grade inflammatory process being initiated with infection, inflammation, anxiety, depression, sleep disorders, cancer fear, death fear, and smoking-like stresses, and eventually terminates with dysfunctions of the gastrointestinal and genitourinary tracts. There may be some significant associations between female sex, IBS, CG, depression, hemorrhoids, urolithiasis, smoking, higher FPG, and hypertriglyceridemia. FPG and triglyceride values may be sensitive acute phase reactants indicating some inflammatory processes like smoking and IBS in the body.

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Prevalence and Risk Factors of Childhood Abuse among Hadhramout University Students in Yemen

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Abstract

Background: Violence against children has long been recognized as a social problem throughout the world, and Yemen is no exception. This study aimed to determine the prevalence of various forms of child abuse, as well as identifying its risk factors and outcomes among Hadhramout university students in Al- Mukalla city, Hadhramout Governorate, Yemen

Methods: A cross-sectional analytical study was conducted in five colleges at Hadhramout university in the educational year 2015-2016. A multi¬stage sampling method was used for the selection of students. Data was collected by using Standardized Arabic Version of Child Abuse Screening Tool for Young Adults aged 18-24 years

Results: Overall, 395 students, (57.5%) were males. Of the students (88.4 %) reported exposure to some form of child abuse in the form of emotional (79.2%), physical (75.7%) or sexual abuse (35.2%) of which 12.7 were reported to have been forced into sexual assault. Parents were the main perpetrators of physical and emotional abuse, while persons outside the home were the main perpetrator of sexual abuse. The results showed significant association between child abuse, sex of students and the family environment. Male students were significantly more likely to be physically, emotionally and sexually abused. Child abuse was also significantly more prevalent among students coming from homes with domestic violence and psychological problems among parents. The main outcomes of exposure to child abuse were poor educational performance, anxiety or nightmares, depression, becoming prone to suicide, violent behavior, fear of the other sex and want revenge on the abusers.

Conclusion and Recommendations: Child abuse is a common phenomenon, with long-term adverse effects among Hadhramout university students. Early diagnosis and preventive educational interventions can play a critical role in reducing the prevalence of child abuse and its harmful consequences.

Key words: Child abuse, risk factors, outcomes, Hadhramout university students, Yemen

Introduction

Violence against children has long been recognized as a social problem throughout the world, and Yemen is no exception. Every year millions of children around the world are victims and witnesses of abuse. (1) Published studies have indicated that violence against children is a major concern for public health around the world. (2,3,4) Various international studies have found that 25-50% of all children have suffered severe and frequent violence, although rates may vary by country. (5,1) Every year, 40 million children aged 15 and below worldwide are neglected or abused. (6) The World Health Organization estimated that about 1,300 children die annually throughout Europe and Central Asia after being abused by their caregivers. (7) Globally, about 20% of women and 5-10% of men report being sexually abused in childhood, while 23% of the people reported being physically abused as children. (8)

According to the World Health Organization (WHO) definition "Child maltreatment is defined as all forms of physical and/or emotional ill-treatment, sexual abuse, neglect or negligent treatment or commercial or other exploitation, resulting in actual or potential harm to the child's health, survival, development or dignity in the context of the relationship of responsibility, trust or power". (6) Child abuse is a complex process that results from the interaction of certain risk and protection factors at four main levels: individual, family, societal and community level. (9) These risk factors are not present in all social and cultural contexts but provide an overview when attempting to understand the causes of child abuse, such as age and gender (10,11) Other risk factors for child abuse by parents or caregivers have also been mentioned in many studies such as low education, age of young parents, unemployment, family environment, and mental disorders of parents such as depression, anxiety and drug abuse. (12,13) The impact of social and demographic risk factors on abuse varies according to the type of abuse. This lack of uniformity in the effects of social and demographic risk factors indicates that each type of abuse has somewhat distinct causes. (14) However, Kellogg et al. Mentioned that child abuse is the result of a set of interrelated familial, social, psychological and economic variables. (15)

Child abuse involves serious physical and psychological consequences that negatively affect a child's health and well-being in general. (16) The child is definitely affected by abuse regardless of form or severity. It weakens the child's physical and mental health and affects his or her risk behavior, resulting in different negative consequences. The life-long consequences of child abuse were found to impair the health of the present and future of children and their well-being in each country and the cultural context in which it was investigated. (17)

There is a paucity of studies on child abuse in the Arab world, which have very different family structures from Western countries that prevail in literature. (18) Arab countries are generally theocratic states, with families that are polygamous, sexually segregated, and extended. Children in the Arabian Peninsula are exposed to all forms of child abuse and neglect. However, the problem is ignored or even tolerated and accepted. Therefore, abused children continue to suffer and most aggressors go free, without punishment and without treatment. (19)

In Yemen, the living conditions for children are dreadful; between violence, poverty, and health problems, dangers of death are their everyday life. Children can be a victim of child abuse in their families or their school or in the general environment. These types of abuse can have serious consequences for their mental and physical health. (20) Child abuse is a violation of the fundamental human rights of the child and is the result of a combination of family, social, psychological and economic factors. Although the problem of child abuse and human rights violations is one of the most important issues on the international human rights agenda, in Yemen, until recently, the government did not intervene and child rights and protection are now being given importance. (20) Moreover, there are certain types of traditional practices that are accepted throughout the country, whether knowingly or unknowingly are to the extent of child abuse. The current socio-economic and political conditions make some children vulnerable and more at risk of abuse, exploitation and neglect. (20) In Yemen documented studies on child abuse are very rare. According to our knowledge, relatively few studies have addressed the problem of child abuse in Yemen, but none of these studies have studied all forms of abuse, particularly sexual abuse and related factors and their consequences, which so far might lead to underestimation of the size of the problem (21-24).

This study is the first attempt to determine the prevalence of various forms of child abuse physical, emotional and sexual abuse, as well as identifying it is risk factors and outcomes among Hadhramout University students in Al-Mukalla city Hadhramout Governorate, Yemen.

Materials and Method

This was a cross-sectional study conducted at Hadhramout University in Al-Mukalla city, the capital of the Hadhramout Governorate, Yemen. The target population consisted of all Hadhramout University students who were available during the academic year 2015-2016 of males and females, aged between 18-24 years old and Yemeni nationality who were invited to participate in the study. A sample size of 384 students was determined by using recommended statistical methods. (25) It was increased to 400 students for an expected non-response and to avoid any missing among participants during the data collection.

A multi-stage random sampling was performed. In the first stage, five colleges were randomly selected which were College of Medicine and Health Sciences, Sciences, Engineering and Petroleum, Arts and Girls. In the second stage, two departments from each college also were randomly selected. In the third stage, the sample size (400)

was proportionally distributed according to the proportion of students in the selected departments for each college. Simple random sampling was applied to select students from each department in selected colleges.

The data were collected by self-reported questionnaire, which consist¬ed of two parts. The first part was a sociodemographic questionnaire developed by the researcher includ¬ing information about students' personal data (gender, age), education and employment status of parents, family income and questions about family structure (living with parents, or with others), number of people living in the same room (Crowding Index). The family living environment, alcohol abuse or drug addiction among parents was also included. Parents at home who argue with each other, hit or hurt each other, the presence of psychiatric problems among one or both parents were also inquired about.

In the second part a stan¬dard Child Abuse Screening Tool (ICAST) self-reported Arabic version questionnaire was used (32). The questionnaire is a multi-country collaborative questionnaire developed by the International Society for the Prevention of Child Abuse and Neglect (ISPCAN) with the assistance of UNICEF and the Oak Foundation. It has been reviewed by more than 100 professionals from different countries, translated into many languages including Arabic, and tested for validation and reliability. It is structured to report all forms of violence against children, more accurately and more representative of the true scope of the problem. This form retrospectively inquires of the the young adult about exposure to any type of child abuse before the age of 18 years. The questionnaire inquired about exposure of students to physical, emotional and sexual abuse. (32)

Emotional abuse was investigated by asking each student about any history of being insulted or criticized, hearing that he/ she was not loved by anyone, or was refused (one wished that he was not born or was dead), or were threatened. In terms of physical abuse, each student was asked about any history of being beaten, punched, or beaten with something that left marks such as a stick, whip, belt etc., kicked, severely shaken, burned, slapped and stabbed. In addition, students were asked about exposure to anyone placing chili in any part of their body to cause pain. With regard to sexual abuse, students were asked about the occurrence of inappropriate sexual behavior by the abuser during childhood, such as being spoken to in a sexual way by an abuser, fondled (their private parts) by an offender, forced to watch /or fondle an offender's private parts, forced to show themself naked, forced to look at pornography or forced into Contact Sexual Assault.

The type of questions was yes / no. Students who answered with "Yes" to any of the above questions (about physical, emotional, and sexual abuse) were asked to report the types of abuse they had experienced and the relationship of the offender to the students (to detail who did it). In addition, the abused students were asked about the impact (outcome) of abuse on their life as to whether they have had poor educational performance, anxiety and nightmares, depressive symptoms, pain of unknown origin, fear of other sex, violent behavior acquired, thinking or attempted suicide or wishing revenge.

A pilot study was conducted among 20 students from two colleges not included in the main study, to ensure that the questionnaire items were clear, understandable and culturally acceptable. Data collected were checked for accuracy and completeness and were coded and entered into the Statistical Package for Social Sciences (SPSS) software version 20. Firstly descriptive statistics was used to present the frequencies and percentages for categorical variables, followed by bivariate and multivariate analysis in order to determine statistical association between the outcome and explanatory variables. Variables which showed significant association in the bivariate analysis were entered into multivariate logistic regression. Logistic regression analysis was done by calculating the adjusted Odds Ratios [aORs], and 95% confidence intervals and P-value level <0.05 was considered significant throughout the study.

Project approval was obtained from Hadhramout University, College of Medicine (HUCOM) and Community Medicine Department. A letter from the College of Medicine to the Dean of each of the five selected colleges was obtained to facilitate the process of data collection. The team followed ethical standards of confidentiality in participation. The objectives of the study were explained to the participants taking into account the moral and social difficulties, and each student was voluntarily invited to participate in the study. If the student agreed to participate, informed verbal consent was obtained from him/ her after confirming that the information to be collected would be used for scientific and research purposes only and the participants were asked not to write their personal identity information. In addition, each student received an envelope with the questionnaire to facilitate the return of completed questionnaire to a special ballot box that had been prepared in advance in each college library selected in the study to better ensure keeping of privacy and confidentiality in the study.

Results

A total of 400 questionnaires were distributed among Hadhramout University students, and all the questionnaires were received which gave a response rate of (100%) in the study. However, 5 questionnaires were excluded because the data was incomplete. The final number of participants was 395.

Table 1 shows the socioeconomic characteristics of the study population. Out of 395 students studied, males constituted the highest proportion (57.5%). Students' ages ranged from 18 to 24 years. The majority (61%) of them were in the age group 20-21 years. More than (70%) of the students' mothers were illiterate (can't read and write) and (87.1%) housewives who do not work outside the home at all, while the majority of students' fathers (90.1%) were educated and employed (94.9%). About two thirds of the

student families (65.1%) had a monthly income > 60000 Y/ R. Most students (84.6%) live with their parents and (38%) live with more than two persons in same room in their home. The same table shows the family environment of students, where 14.1% of parents used alcohol or had drug addiction, 44.8% were arguing and 25.1% hit or hurt each other. While 9.9% of students lived with their parents where one or both suffers from psychological problems at home, and they use guns or knives to hurt or intimidate someone.

Table 1: Socio-demographic characteristics and family environment of Hadhramout University students

Variable	Frequency	%
Sex of the student		
Male	227	57.5
Female	168	42.5
Age group (years)		
18-19	25	6.3
20- 21	241	61.0
22-24	129	32.7
Father's educational level		
Educated	356	90.1
Non educated	39	9.9
Mother's educational level		
Educated	115	29.1
Non educated (Illiterate)	280	70.9
Father's occupation		
Employed	375	94.9
Un employed	20	5.1
Mother's occupation		
Employed	51	12.9
Un employed (Housewife)	344	87.1
Family income in Y/R*		
≤ 60000	138	34.9
> 60000	257	65.1
Crowding index		
1- 2 person/room	245	62
> 2 persons/room	150	38
Living situation		
With parents	334	84.6
With others	61	15.4
Alcohol abuse or drug addiction among one or both parents		
Yes	56	14.1
No	339	85.9
Parents at home argue with each other		
Yes	177	44.8
No	218	55.2
Parents in home hit, or hurt each other		
Yes	99	25.1
No	296	74.9
Psychological problems among parents		
Yes	39	9.9
No	356	90.1

**Y/R = Yemeni Riyal (one US dollar = 570 Yemeni Riyals)*

As shown in Table 2, of 395 students, 349 (88.4%) reported having experienced at least one form of abuse (physical, emotional or sexual) before 18 years of age. Of the three forms of child abuse measured in this study, 20.1% of the students reported that they were exposed to only one form of abuse, 44.4% were exposed to two forms, and 35.5% of students were exposed to all three forms of childhood abuse. The prevalence of emotional abuse among the students was 79.2%, physical abuse was 75.7%, and 35.2% were victims of sexual abuse. The most common types of emotional abuse reported by students were shouting or screaming, criticized or insulted (called by dirty names) and rejected (wished that he/she was never born) at (79.9, 70.7% and 25.2% respectively). The most common physical abuse type was hit/punched, kicked, hit with an object like stick, whip or belt and face slapped, (71.6%, 67.2%, 59.9% and 58.2%) respectively. However, only 12.7% and 4.0% of the students were subjected to physical abuse of a serious nature, including burning or placing chili in any part of the body and threatened with stabbing with knife, respectively. (Table 2)

With regard to sexual abuse, 79.9% of the students reported that they had been sexually spoken to by the abuser (verbal harassment), while 25.9% were forced to touch or view private body parts of the abuser, 20.9% of students had their private body parts fondled by an abuser, and 18.7% were forced to watch pornographic movies. On the other hand, 21.6% of them reported that they had been sexually assaulted. (Table 2)

Table 2: Distribution of students' reported experience of different forms of abuse

Variable	Frequency	Percentage
Exposed to at least one form of child abuse (overall)	349	88.4
One form	70	20.1
Two forms	155	44.4
Three forms	124	35.5
Emotional abuse		
Exposed to emotional abuse (Total)	313	79.2
Types of emotional abuse*		
Shouted or screamed at	250	79.9
Criticized or insulted (called by dirty names)	221	70.6
Heard that he/she wasn't loved	38	12.7
Rejected: wished that he/she was never born	79	25.2
Threatened to be abandoned	60	19.2
Threatened to be hurt or killed	46	14.7
Physical punishment		
Exposed to physical abuse (Total)	299	75.7
Types of physical abuse *		
Kicked	201	67.2
Hit/punched	214	71.6
Hit with an object like stick, whip or belt	179	59.9
Slapped face	174	58.2
Burned or put chili in any part of body	38	12.7
Threatened or Stabbed with a knife	12	4.0
Sexual abuse		
Exposed to sexual abuse (Total)	139	35.2
Types of sexual abuse*		
Spoken to in a sexual way by abuser	111	79.9
Forced to watch pornographic movies	26	18.7
Fondled victim's private body parts by abuser	29	20.9
Forced to view or touch abuser's body private parts	36	25.9
Take photos when the victim is naked (nude photos)	2	1.4
Forced for contact sexual assault	18	12.7

**Each question was asked separately*

Table 3 revealed that, parents were the main perpetrators of emotional and physical abuse, while the persons outside the home were the commonest perpetrators of sexual abuse. Further, other relatives participated in not a small percentage of contact sexual assault.

Table 3: Perpetrators of various forms of child abuse among exposed Hadhramout university students

Offenders / Type of abuse	Parents (%)	Siblings (%)	Relatives* (%)	Teachers (%)	Persons outside home** (%)
Emotional abuse: history of being (N=344)					
Called with bad names	35.2	18.6	19.3	18.5	24.8
Insulted	33.5	6.5	9.4	4.9	12.2
Heard that he/she wasn't loved	22.1	13.7	2.6	1.3	3.6
Rejected	14.3	4.9	4.1	1.0	1.2
Threatened to be abandoned	13.5	1.7	2.0	0.3	2.2
Threatened to be killed	1.8	0.6	3.1	3.2	10.2
Physical abuse: history of being (N= 307)					
Hit with an object as stick, whip or belt	45.1	9.8	8.1	13.0	8.5
Hit/punched	39.5	26.1	5.3	6,5	10.2
Kicked	28.7	20.8	5.8	1.9	8.5
Slapped face	22.8	17.3	9.4	4.9	11.5
Burned or put chili in any part of body	3.2	1.3	2.9	0.3	4.2
Shackled or tried to drown you	0.7	2.9	2.9	1.0	8.5
Stabbed with a knife	0 .0	0.6	0.3	0 .0	1.9
Sexual abuse: history of being (N=158)					
Spoken in a sexual way by abuser	1.9	1.9	9.8	3.8	70.3
Forced to look at pornography	0.0	0.6	2.5	0.0	17.1
Fondled victim's private parts by abuser	0.0	0.6	5.1	0.0	20.9
Forced to view or touch abuser's private parts	0.0	1.3	4.3	0.6	15.2
Photographed the abuser in the nude	0.0	0.0	0.0	0.0	1.3
Forced for contact sexual assault	0.0	1.3	7.3	0.6	12.7

**Relatives: uncles, aunts, cousins, step fathers (mothers), grandfathers (mothers)*
***Person outside the home: friend, neighbor, driver, stranger or others*

To detect the most important factors affecting different forms of child abuse, bivariate logistic regression analysis was first performed. The significance level is set at P <0.05 to ensure that all important variables are covered. The results showed that only students' sex, mother's education and family environment factors had significant association with all forms of child abuse. After determining the significantly associated factors (P<0.05) using bivariate logistic regression, all factors were entered in a multivariate logistic regression model. The results revealed that, there were statistically significant crude associations between the student's sex and family environment. Factors with child abuse persisted after adjusting for other confounding factors, and the strength of associations varied depending on the form of abuse.

As shown in Table 4, child's sex had independent effects on the majority of child abuse risk. Males were more likely to abuse than females. The strongest crude and adjusted associations between student's sex and child abuse were observed for exposure to emotional abuse (AOR=4.44, P ≤ 0.001), followed by physical abuse (AOR=2.56, P≤ 0.01) and sexual abuse (AOR=2.20, P≤ 0.001). The results also showed that, parents who argued with each other at home were the first predictors of emotional abuse of children followed by physical and sexual abuse (AOR= 3.41; 95 % CI: 1.72 –6.77) and (AOR= 2.65; 95 % CI: 1.54 –4.57) and (AOR= 1.75; 95 % CI: 1.11 –2.75) respectively. On the other hand, parents who hit or hurt each other at home were found to be the first predictor also of emotional abuse and physical abuse (AOR= 6.20; 95% CI: 1.86 – 20.67) and (AOR= 4.01; 95 % CI: 1.90 –13.17) respectively. It was also the second risk factor for child sexual abuse (AOR= 2.62; 95 % CI: 1.20 -5.71). Parents' psychological problems was found to be a significant predictor only for physical abuse (AOR= 2.29; 95 % CI: 1.05 –4.97).

Table 4: Logistic regression analysis of child abuse according to students' socio-demographic and family environment

Form of abuse	Emotional abuse		Physical abuse		Sexual abuse	
	Crude OR	aOR	Crude OR	aOR	Crude OR	aOR
Characteristics	**95% CI**		**95% CI**		**95% CI**	
Sex of the student Female **(Ref)** Male	2.64 **	4.44 *** 2.26 - 8.69	2.14**	2.56 ** 1.59 -3,93	1.80 **	2.20 *** 1.36-3.55
Mother's education Non educated **(Ref)** Educated	2.21 *	N/A	N/A	N/A	1.67 *	N/A
Parents argue each other No **(Ref)** Yes	3.47 **	3.41 *** 1.72 - 6.77	3.14***	2.65 *** 1.54 - 4 57	1.86 **	1.75 ** 1.11- 2.75
Parents hit or hurt each other No **(Ref)** Yes	3.50 **	6.20 ** 1.86 -20.67	5.24 ***	4.01 *** 1.90-13.17	2.16 **	2.62 ** 1.20 -5.71
Parents' psychological problems No **(Ref)** Yes	N/A	N/A	7.67 **	2.29 ** 1.05 - 4.97	N/A	N/A

**P < 0.05; **P ≤ 0.01; ***P ≤ 0.001.*
aOR = Adjusted Odds Ratio; CI = confidence interval.
Ref. = reference category. NA: Not applicable

As shown in Table 5, students who experienced emotional abuse were over four times (4.41) times more prone to suicide, (2.97) times more to have depressive symptoms, (2.84) times more to have violent behavior and over two times (2.47) more likely to have anxiety or nightmares compared with students who were not exposed. Table 5 shows also that, students who experienced physical abuse were over three times (3.41) more likely to be prone to suicide, (3.16) times more likely to have anxiety or nightmares, (3.12) times more to have violent behavior and about two times (1.95) more to have depressive symptoms compared with students who were not exposed. Regarding sexual abuse, the same table shows that, students exposed to sexual abuse were (2.95) times more likely to wish revenge on abusers, (2.62) times more have depressive symptoms and (2.44) times more likely to fear the other sex compared with students who were not exposed. The results also showed that students exposed to emotional, physical or sexual forms of abuse were more likely to have poor educational performance (OR =2.63, 2.29 and 1.78 respectively).

Table 5: Logistic regression analysis of child abuse according to resulting outcomes

Form of abuse	Emotional abuse		Physical abuse		Sexual abuse	
	Crude OR	AOR	Crude OR	AOR	Crude OR	AOR
Resulting Outcomes	**95% CI**		**95% CI**		**95% CI**	
Poor educational performance No (Ref) Yes	3.22*	2.63 ** (1.19- 5.8)	2.02** *	2.29*** 1.07 – 4.90	2.72**	1.78* (1.2- 2.9)
Become violent No (Ref) Yes	2.93**	2.84** 1.20- 3.27	4.01** **	3.12*** 1.52 – 6.42	1.85*	NA
Anxiety & nightmares No (Ref) Yes	3.35***	2.47** 1.24- 4.72	3.25* *	3.16** 1.33-7.51	1.48*	NA
Depressive symptoms No (Ref) Yes	3.60**	2.97** 2.2 - 5.7	2.64* *	1.95** 1.02 - 3.5	3.56*	2.62 ** 1.20 – 5.71
Pain of unknown origin No (Ref) Yes	1.79*	NA	NA	NA	1.79**	NA
Fear of other sex No (Ref) Yes	2.05*	NA	2.21*	NA	4.12***	2.44** 1.31- 4.53
Suicidal thought or attempts No (Ref) Yes	2.74 **	4.41 *** 2.21- 6.62	3.59* *	3.41 ** 1.70 – 5.77	3.30**	NA
Wishing revenge No (Ref) Yes	NA	NA	NA	NA	2.04**	2.95 * 1.17- 7.39

**P < 0.05; **P ≤ 0.01; ***P ≤ 0.001.*
aOR = Adjusted Odds Ratio; CI = confidence interval.
Ref. = reference category.
NA: Not applicable

Discussion

Child abuse is a comprehensive term that includes physical, emotional and sexual abuse along with neglect and abuse. The current study is the first of its kind in the study area Al-Mukalla city, Hadhramout governorate to address the prevalence of child abuse in general and its various forms (emotional, physical and sexual abuse), associated factors and outcome among Yemeni university students of both sexes.

Our findings showed that in general 88.4% of Hadhramout university students had experienced at least one form of abuse (physical, emotional or sexual) during their childhood, 44.4% had been exposed to multi-type abuse (two forms) and 35.5% had been exposed to all three forms of abuse. The prevalence of multi-type abuse in childhood in our study is higher than the rates reported by other studies in other countries such as Iraq where 20.0% of students experienced at least one form of abuse and 11.6% were subjected to two or more forms of abuse (27), Egypt 36.6% of students had at least one form of abuse (9%) were exposed to two or more forms of abuse (28), United States found that 13% of participants reported multiple forms of abuse (29) Vietnam where (20.7%) of students have been exposed to two or more forms of abuse, three forms (14.5%) and all forms (6.3%) of abuse, [30]. In Croatia, there was (74%) of students who had been exposed to two or more forms of abuse and all forms of abuse by (5%) of students (31). On the other hand, the prevalence of multi-type abuse in childhood in our study is lower than in the other study conducted in Egypt which revealed that all children (100%) had experienced both physical and emotional abuse (32). The reasons for these differences may be due to methodological differences and the different criteria for categorizing abused and non-abusive participants may also explain variations in our prevalence rates and other rates.

The current study indicated that 75.7% of the students reported that they were victims of physical abuse. Although this rate is relatively higher than reported by other countries in the Region, but it is still lower than the rate reported in former studies, conducted in different parts of Yemen, where the overall rate of child abuses ranges from 55.7% to 81.7% (21-24). The difference between these studies may be due to geographical variation which is an epidemiological characteristic of comparisons within the country, or because of cultural differences in the methods used to punish children. Unfortunately, national studies on child abuse in Yemen are not available to compare with our findings. However, our findings are approaching a high rate observed in studies conducted in Iran (74.4%), Saudi Arabia (61%-76%) Lebanon 76.4% and Egypt (62% -79.9%) (33-36). On the other hand, the prevalence rate of physical abuse 75.5% in our study was relatively high among other Arab countries such as Syria (37), Palestine (38), Erbil in Iraq (27) and Jordan (39), where the prevalence of child abuse is as low as, 45.1%, 28.5%, 6.5% and 2.1%, respectively. Furthermore, our prevalence was found to also be much higher than those stated in Hong Kong 52%, India 47.3%, South Korea 42.2, Iran 36.1%, USA (28.4%), UK 6%-15%, Denmark (5.4%) and Turkey 14.6% (40 - 47).

The findings of the present study showed that the most common physical abuse type was hit/punched, kicked, hit with an object like stick, whip or belt and slapped. This observation is consistent with the result of a study conducted by Dunne and his colleagues where the most common answer in Russia, Egypt, Kyrgyzstan, Malaysia, Colombia and India was “hit/punched” “beaten with an object” (48) and by the other studies (42,47,49). However, only smaller percentages reported exposure to a serious nature of abuse such as burning and stabbing with knife. In contrast, in India Kacker et al found that out of every six abused children one was exposed to a serious form (41).

The current study shows that the main perpetrators of childhood physical abuse are parents, which is consistent with the results of a previous study conducted in Yemen (21,23,24), and in Arab countries, including Iraq, Egypt, Saudi Arabia, Palestine and Kuwait (27,28,49,50,51) as well as with the results of studies from other countries of the world. (52,53) In the Arab world, including Yemen, parents and educators are supported by the legal use of corporal punishment as an educational and disciplinary tool.

In Yemen, Alyaheri studied physical abuse among school children aged 6-12 years; of 1,325 students from the city of Al-Mukalla and 274 students from rural areas in Tuban region, nearly 80% of mothers in the rural area use corporal punishment to discipline children while 59% of mothers were urban. (21) Another study from Yemen by Ba-Saddik et al. of the Aden governorate revealed that more than a half of pupils had experienced at least 1 abusive act by teachers in their school life.)22) A third study by the Social Workers’ Association in Yemen, found that approximately 80% of the children experienced corporal punishment and 1% reported brutal hitting. (23)

A fourth study from Yemen by Al-Thabhani included 586 children, 397 parents, and 33 juvenile children from Social Guidance Centers. Most urban and rural children (88.2%) pointed out that the dominant pattern of treatment by their parents when they make mistakes is punishment. The most commonly used means of punishment against children at home are beating, blaming, hitting with a stick and mocking. (24)

Parents have primary responsibility for protecting their children. In addition, Yemen has enacted a national child rights law that complies with Yemen’s obligations towards international legislation on the rights of the child. (20) However, it is clear from the results of the above studies that there is still a large gap between the law and the practice of parents, teachers and other professionals in Yemen. On other hand, the acceptance of physical punishment as a means of raising children seems to depend greatly on the culture and attitude of the society and relates to child abuse (54,55)

Emotional abuse was found to be the most common form in the present study, similar to the results of other studies conducted in the Arab countries and abroad. (10,28,36,42,49) The highest types of emotional abuse reported in the current study were shouting or screaming, insulting (called by bad names), rejected and not loved by family, which is consistent with the results of other studies (10,48,49). The study revealed that parents were also the commonest perpetrators of emotional abuse. Similar findings were reported in other studies (31,49). In agreement with Machado et al. the mother was the most common perpetrator of child emotional and physical abuse as the mother is considered the main care provider for children in the family and the one responsible for disciplinary practices. (56) This explains the result in the present study as well as in other studies where it is observed that prevalence of physical and emotional abuse is closely related (31,49).

Sexual abuse was rated as the lowest form in the current study; 35.2 % of students reported exposure to some form of sexual abuse during their childhood. The prevalence of sexual abuse observed in the current study coincided with international studies conducted in Central America, where 36% of participants reported having been sexually abused (57) while a slight decreased rate was reported in the Los Angeles study rate 32.3%. (58) Low rates have also been reported from Arab countries such as Egypt 29.8% (59), Lebanon 24% (60) and Saudi Arabia 24.9%. (61) However, evidence about the prevalence of sexual abuse of children and adolescents in the region is small and fragmented, perhaps due to the sensitivity of sexual activity and victimization within Arab countries (61). Sexual abuse can be underestimated in many studies. These studies relied on maternal reporting of sexual abuse of their children, as many mothers may not be aware of the abuse of their children (62). Moreover, sexual abuse is often hidden within families and may not be known until the victim discloses it later in life and may be many children refrain from recognizing their exposure (28).

The most common types of sexual abuse reported by students in the current study were students sexually spoken to by the abuser (verbal sexual harassment), forced students to touch or view private body parts of the abuser, private body parts of the students were fondled by the abuser and they were forced to watch pornographic movies. The types of sexual abuse observed in our study are not different from those observed in the results of other studies from different parts of the world. (49,59) On the other hand, 12.7% of students in the current study reported that they had been sexually assaulted during childhood. Lower rates were reported from India (10.33%), USA (4.5%) and from three Central American countries (5- 8%). (41,44,57)

The main perpetrators of sexual abuse in the present study were persons outside the home such as friends, neighbours, drivers, strangers or others, followed by relatives who also participated in not a small percentage of contact sexual assault (uncles, cousins, etc.). In line with our findings, other studies have reported that strangers are the most common perpetrators of sexual abuse. (49,59, 63)

and a number of psychological problems in adulthood. (39,49,68,69,70)
Sugaya et al in their study in the USA also report that, “many children are so overwhelmed in dealing with their conflicts over the abuse that they may lack the energy to participate in normal activities. However, childhood abuse is also a major trigger of mental illness in later adulthood”. (71)

Regarding risk factors, the current study demonstrated that students’ sex and family environment were significantly associated with higher child abuse occurrence. The results of our study revealed that boys were more likely physically, emotionally and sexually abused than girls. Our results agree with the findings of a study conducted in Bahrain in 2001, which documented sexual abuse in 97 children with 74% of boys and 8% of girls who were sodomized. (64) Our findings also agree with a systematic review of the prevalence of violence against adolescents in 22 countries of the Arab League where found higher levels of violence among males than females, even for sexual abuse. (65) Some researchers suggest that higher rates of sexual abuse against boys could reflect less supervision and greater freedom of movement among boys than girls in some settings. Girls may be less likely than boys to detect sexual abuse in contexts where girls who have been abused prior to marriage are stigmatized and risk of reprisals by their parents. (61,66) However, evidence of sexual differences in the prevalence of violence against adolescents in the Arab region is not strong enough to be mainstreamed and needs further research. (65)

The findings of this study are inconsistent with international statistics that document that 1 in 5 girls and 1 in 20 boys is a victim of child sexual abuse. Self-report studies show that 20% of adult females and 5-10% of adult males recall a childhood sexual assault or sexual abuse incident (67). On the other hand, a study by Ribeiro et al, from Brazil observed that, sex did not influence the greater or lesser degree of violence among students who were exposed to it. (68) The findings of research on child sexual abuse are often not comparable across studies because of the non-standard definitions of child sexual abuse, different age groups used to distinguish childhood and adolescence, and disparate study groups (68).

Family environment has been significantly associated with increased risk of child abuse in this study and the risk was greater among students who witnessed parents or adults at home hit or arguing with each other compared with those who have no history of violence in the family. These findings are consistent with the findings of other studies that noted that marital violence and child abuse are likely to occur together and that children in families with a history of domestic violence are increasingly vulnerable to all forms of child abuse. (27,50,54) In addition, the existence of psychological problems among parents was a risk