Zika Virus Update and Biological control of Aedes species mosquito
(A. aegypti and A. albopictus)   .... Page 44

From the Editor

Chief Editor:
A. Abyad
MD, MPH, AGSF, AFCHSE
Email: aabyad@cyberia.net.lb
Ethics Editor and Publisher
Lesley Pocock
medi+WORLD International
AUSTRALIA
Email:
lesleypocock@mediworld.com.au

Editorial enquiries:
aabyad@cyberia.net.lb

....

This issue is rich with a number of research paper in addition to a review by the publisher on Zika Virus.

A cross-sectional survey was conducted in the governmental and independent schools in Qatar using multistage cluster sampling. The aim was to measure the prevalence of health risk behaviors among adolescents in the secondary schools and identifythe sociodemographic determinants.Health risk behaviors among adolescents seriously threaten their wellbeing. Identifying socio-demographic relationships with health risk behaviors helps to contemplate prevention efforts. Little is known about health risk behaviors among adolescents in Qatar. 561 adolescents participated in the study; response rate 90.9%. Unlicensed driving in the past 30 days was the most prevalent health risk behavior (43.7%) while involvement in a physical fight was 38.3%. Not wearing seat belts attained (31.4%), 21.9 % current smokers, 20% exceeded speed limits while driving, 19.3% were current shisha smokers, 18.9% carried a weapon and 12.1% had ever used inhalants. The authors concluded that prevalence of health risk behaviors is at high levels. Male gender and older were the strongest determinants.

A cross-section study from Saudi Arabia To assess the prevalence of PMDD among female medical students. Premenstrual Dysphoric Disorder (PMDD) is a severe and disabling form of premenstrual syndrome (PMS) affecting 3-8% of women. PMDD was added to the list of depressive disorders in the Diagnostic and Statistical Manual of Mental Disorders (DSM-V) in 2013. A semi-structured and pretested self-administered question

naire was employed for data collection. The criteria proposed by DSM-V were used to diagnose PMDD. Most of participants were single (90.8%) and non-smoker (96. 2%).The prevalence of PMDD among students was 36.6% .There was no significant difference between students with PMDD and without regarding physical symptoms. lack of energy, easy fatigability and lethargy are the most prevalent symptoms (81.9%). Also, 29.6% experienced joint or muscle pain, 58.5 % complained of breast tenderness or swelling and 63.9% suffered from headache. The authors concluded that the study revealed a high prevalence of PMDD among medical students with high overall frequency of abnormal mood and behavior were more than that of the somatic complaints.

A systematic review of randomized controlled trials (RCT) published in between 2002 and 2013 on SDEP from Abu Dhabi. The objective to evaluate the effectiveness of SDEP on metabolic outcomes and quality of life among diabetic patients. The authors stressed that Diabetes people who want to live a good quality of life will need to be educated about management of their illness. Although structured education is essential to provide diabetic patients with the necessary self-management knowledge and skills to achieve accepted glycaemic control still there is a controversy on the effectiveness of the current structured diabetes education Programs (SDEP).

This study identified 19 trials (9378 participants), 12 of them had low risk of bias, 3 had unclear risk of bias and 4 had high risk of bias. The number of participant per study ranged from 84 to 1054 participants. All included studies used HbA1c as a primary outcome measure and most of studies measured psychosocial outcomes e.g. quality of life and depression .Thirteen out of 19 trials demonstrated a significant glycated haemoglobin (HbA1c) reduction in intervention group compared to control group at the end of the intervention while 6 trials did not demonstrated a significant change, Seven trials out of 16 demonstrated statistically significant reduction in Body Mass Index(BMI) or weight in intervention group. Nine trials evaluated the effect of structured diabetes education on quality of life, 3 of them reported significant improvement in the intervention group compared to the control group at the end of intervention.The authors concluded that the results of this systematic review showed

that structured diabetes education has a positive impact on biomedical and quality of life on diabetic patients especially with some degree of reinforcement at additional points of contacts. Further research is needed to evaluate the effect of education on longer duration

A paper from Eygpt looked at the effect of Education Intervention on Prevention of Blood Borne Infections for Health Care Workers in Family Medicine Centers. The study was pre-post quasi-experimental intervention. It was conducted between June and October 2015 in 3 family medicine centers with affliation to Suez Canal University in Ismailia city. Sample was convenient, it included all 82 healthcare workers (family physicians, laboratory technicians, nurses and janitors). Knowledge and attitude were evaluated by a questionnaire. Practice was assessed by observation. Educational training intervention was designed and conducted by the researchers about the common BBIs and standard precautions (SPs) based on guidelines. Statistically significant difference was found between pre and post intervention in means of knowledge, attitude, practice and overall KAP scores of all HCWs (P < 0.001) with large effect size Cohen's d more than .8. The highest median scores of all SPs in pre intervention were for no needle recapping (Mdn=100) with significant difference between pre and post intervention (P <0.001). The authors concluded that continuous periodic education on standard precautions is recommended to cover areas for improvements in knowledge as alcohol rubbing that is not the required action on exposure to body fluids and the recommended time of hand washing (40-60 seconds); attitude towards revising guidelines and ensuring availability of infection control supplies; and ensure compliance with hand hygiene, sharps handling, decontamination of spills and wearing gowns.

....

Copyright

Effect of Education Intervention on Prevention of Bloodborne Infections for Health Care Workers in Family Medicine Centers, Suez Canal University in Ismailia City, Egypt

Hebatallah Nour-Eldein (1)
Rehab Ali Mohamed (2)

(1) Hebatallah Nour-Eldein: Assistant Professor of Family Medicine-Suez Canal University
(2) Rehab Ali Mohamed: Lecturer of Family Medicine-Suez Canal University

Correspondence:
Hebatallah Nour-Eldein
Assistant Professor of Family Medicine
Suez Canal University, Egypt
Mobile: 01274079405
Email: hebanour20@hotmail.com

Abstract

Introduction: Healthcare workers (HCWs) are at particular risk for occupational exposure to bloodborne pathogens, including hepatitis B virus (HBV), hepatitis C virus (HCV) and human immunodeficiency virus (HIV). Objective: to assess the effect of education intervention on knowledge, attitude and practice of (compliance with) preventive measures of bloodborne infections (BBIs) by health care workers.

Methods: The study was a pre-post quasi-experimental intervention. It was conducted between June and October 2015 in 3 family medicine centers with affliation to Suez Canal University in Ismailia city. Sample was convenient; it included all 82 healthcare workers (family physicians, laboratory technicians, nurses and janitors). Knowledge and attitude were evaluated by a questionnaire. Practice was assessed by observation. Educational training intervention was designed and conducted by the researchers about the common BBIs and standard precautions (SPs) based on guidelines.

Results: Statistically significant difference was found between pre and post intervention in means of knowledge, attitude, practice and overall KAP scores of all HCWs (P < 0.001) with large effect size Cohen's d more than .8. The highest median scores of all SPs in pre intervention were for no needle recapping (Mdn=100) with significant difference between pre and post intervention (P <0.001).

Conclusions: Continuous periodic education on standard precautions is recommended to cover areas for improvements in knowledge such as alcohol rubbing, that is not the required action on exposure to body fluids and the recommended time of hand washing (40-60 seconds); attitude towards revising guidelines and ensuring availability of infection control supplies; and ensure compliance with hand hygiene, sharps handling, decontamination of spills and wearing gowns.

Key words: Bloodborne infections; Standard precautions, intervention; health care workers, primary care

Introduction

Healthcare workers (HCWs) are at particular risk for occupational exposure to blood borne pathogens, including hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV). [1] HCV prevalence rates in the general population are estimated at between 10% and 15% in rural areas. Approximately 5-7 million Egyptians carry antibodies for HCV and 3.3 million are chronically infected with HBV. [2] Acquired Immunodeficiency syndrome (AIDS) prevalence rates are low in Egypt at less than 0.1% in the general population. [3]

In the occupational health setting HBV is the most easily transmitted bloodborne pathogen, followed by Hepatitis C virus, and then HIV. [4] The annual proportions of health care workers exposed to bloodborne pathogens were 2.6% of HCV, 5.9% of HBV and 0.5% for HIV, corresponding to about 16,000 HCV infections and 66,000 HBV infections in healthcare workers worldwide. [5]

Standard precautions (SPs) are meant to reduce the risk of transmission of bloodborne and other pathogens from both recognized and unrecognized sources and the Standard precautions measures replaced the previous Universal precautions. [6] It is usually recommended that health workers be vaccinated against HBV and vaccination can also protect against infection if administered post exposure. Post-exposure prophylaxis in the form of anti-viral medication exists for HCV, but this therapy is not endorsed by the American Centers for Disease Control (CDC) given the low risk that the patient will become infected.[2]

Family Medicine Centers, Suez Canal University are in rural areas of Ismailia city 20 kilometers away from the university hospital while, the periodic training is held in the hospital. HCWs need educational training when hired and periodically thereafter to ensure their adherence to infection control measures. Not all health care team members attend the educational training in hospital because of time constraints, workload or their remote site from the hospital. Needs assessment of HCWs revealed their need for educational training regarding prevention of bloodborne infection.

Hypothesis: Null hypothesis (H0) no difference between pre and post intervention KAP scores of HCWs regarding bloodborne infections prevention. Alternative Hypothesis (HA) there is a difference between pre and post intervention KAP scores of HCWs regarding bloodborne infections prevention. The study aimed to improve preventive measures of blood borne infections by health care workers. Objective: to assess the effect of education intervention on knowledge, attitude and compliance with preventive measures of bloodborne infections (BBIs) by health care workers.

Methodology

Design: The study was designed as a pre - post quasi-experimental intervention.
Sample was non-probability convenient.
Participants: The study included all 82 HCWs (family physicians, nurses, laboratory staff and janitors) for ethical reasons.
Setting: HCWs were recruited for participation in their workplace in 3 family medicine centers with affliation to Suez Canal University hospital in Ismailia city (Abukhalifa, Almahsama and Fanara centers).
Time of the study: Pre intervention assessment and the intervention were conducted between June and July 2015 with post intervention evaluation after 3 months between September and October 2015.

Questionnaire

An Arabic questionnaire was self-administered by educated HCWs and interviewer-administered by the researcher for the illiterate workers in the pre and post intervention. The questionnaire was developed by the researchers based on guide to infection prevention for outpatient settings (CDC) guidelines and Occupational Safety and Health Administration (OSHA) guidelines. [7-9] The questionnaire was divided into 3 sections:

1- Personal data of the participants, including: years of work; previous training either pre-service training or in-service training; the time of their last training; place of training, whether in the primary care center or in hospital; previous hepatitis B vaccination and number of received vaccine doses; any previous exposure to needle stick injury or splash in the previous three months.

2- Participants' knowledge included 30 items about the three main blood borne infections; their modes of transmission; courses and prognosis of BBIs; standard precautions meaning, bloodborne preventive measures, control and actions on exposure to needle or sharps injuries. Score: one was to correct answer and zero for incorrect or don't know. The achieved knowledge scores were divided by 30 and multiplied by 100.

3- Participants' attitude included 10 items about the possibility of occupational exposure and transmission of infection, and the importance of prevention; the perception regarding the hand as a source of infection; hand hygiene after removal of gloves; needle recapping and the importance of vaccination; the responsibility towards others in respect to this issue, the revision of national infection control (IC) guidelines and adequate IC supplies. Scores: one was for agree and zero if unsure or disagree. The achieved attitude scores were divided by 10 and multiplied by 100.

Observation

To evaluate the practice (compliance with) SPs related to prevention of BBIs. The observations were carried out by the researchers during their routine training of the junior staff. The observations were for opportunities and the correct actions regarding 7 main items:

1- Hand hygiene (5 moments of hand hygiene)
2- Gloves (wearing gloves, new gloves for each patient, removal of gloves),
3- Gown (wearing gown),
4- Needle recapping (avoided recapping needles),
5- Sharps management (proper handling and safe disposal of sharp objects)
6- Spills (clean spills with an appropriate bleach),
7- Wastes (safe waste disposal).

Each participant was observed with 3 different patients who were non-randomly selected in different working days. Also the observations were done where potential contamination was possible in the emergency room, laboratory, or outpatient clinics including the obstetrical and gynecological examination room. The correct action was given 1 versus zero for the incorrect or missed action. The sum of correct actions was divided by the number of opportunities and multiplied by 100. Overall KAP score was also calculated out of 100.

A pilot study was carried out before the study upon 20 HCWs to assess the feasibility and reliability of the questionnaire and the pilot sample was not included in the final results. Internal consistency reliability was measured using Kuder-Richardson 20 KR20 which yielded 0.68, 0.64 for knowledge and attitude domains. Test-retest reliability was computed as 0.91 and 0.93 for knowledge and attitude domains respectively, revealing an acceptable reliability. The inter-rater reliability of observations was computed as 0.84. Face validity of the tools were assessed by infection control specialists.

The Education Intervention

Content: It had theoretical and practical orientations. The program was produced on two successive sessions, including the background of BBIs causes and transmission mode; SPs meaning and measures, hepatitis B vaccination, personal protection and post-exposure management. These items were structured based on training program minimum standards by OSHA, WHO and CDC. [6, 7, 10] The educational policy aimed to enhance awareness, responsibility and behavioral change among all HCWs.

Delivery methods: Power Point Presentation part 1 was presented in 45 minutes that included the epidemiology, clinical presentations, complications and prognosis of hepatitis B, hepatitis C and HIV viruses and part 2 was also presented in 45 minutes and represented the theoretical part of standard precautions followed by small group discussion. Cluster-work training was followed by one to one teaching method for the technique and time difference between 11 steps of hand washing and 6 steps of Alcohol based hand rubbing; the technique of correct use and removal of personal protective equipment (PPE); safe handling of sharps, safe handling and disposal of needles. Simulation of correct cleaning of wide spills was presented to the participants.

Deliverer: The first researcher delivered the theoretical part and hand hygiene measures. The second researcher delivered safe removal of PPEs and other SPs. Time and place: theoretical part and simulations in training room before joining work with follow up during working hours in workplace. Compliance enhancement: Performance feedback on preventive measures and peer auditing. Printed figures of SPs were distributed in the different clinics to improve the compliance of the participants. Managers within Family medicine centers were encouraged to improve social norms regarding preventive measures by providing the required supplies and to encourage appropriate post-exposure management.

Outcome Measures

Primary outcomes: knowledge, attitude and practice of (compliance with) preventive measures of bloodborne infections (BBIs) by health care workers.

Ethical Clearance

The study was provided to the ethics committee of Faculty of Medicine, Suez Canal University with a reference #2382. It was performed in accordance with the ethical standards laid down in the Declaration of Helsinki (1964). Informed consent was obtained from HCWs who participated in the study. Confidentiality of data was maintained.

Statistical Methods

The collected data were analyzed using Social Product and Service Solution version 20.0 (SPSS 20.0) for Windows. Continuous data and distribution of differences between post and pre intervention scores were checked for normality using eye ball, box plot and Shapiro-Wilk tests. Non normally distributed data were presented in median as a measure of central tendency with interquartile range (IQR) (range between 1st and 3rd quartiles).

Descriptive statistics: Categorical data were presented as numbers and percentages and normally distributed data as mean and standard deviation (SD). **Inferential statistics:** In paired comparisons: paired t test was used in comparison of plausibly normally distributed continuous data, paired Wilcoxon signed rank test was used in comparison of non normally distributed continuous data and McNemar's test was used in comparison of categorical variables. Tests were two tailed with p-value taken as statistically significant if <0.05. Effect size for paired t test was calculated Cohen's

$$d = \frac{t}{\sqrt{N}}$$

Cohen's (1988) suggested that d values of a large effect is .8, a medium effect is .5, and a small effect is .2. [11].

Effect size for paired Wilcoxon $r = \frac{z}{\sqrt{N}}$. Cohen's guidelines for r are that a large effect is .5, a medium effect is .3, and a small effect is .1. [12]

Results

The pre-post intervention included all 82 HCWs working in Ismailia Family Medicine centers with affiliation to SCU with response rate and follow up 100%. The participants were recruited to participate in the pre intervention assessment and intervention between June and July and for post intervention evaluation after 3 months. The mean age of the study sample was 31±6.5 years. The majority of participants were females (82.9%). More than one third of the study sample was either nurses (40.2%) or physicians (37.8%). Two thirds (68.3%) of the participants didn't receive infection control training on being hired while most of them (78%) received in-service training. Only a quarter of HCWs (25.6%) received one or more doses of vaccine and only 10/82 (12.2%) of the study sample received full dose vaccine. Of all participants (18.3%) were exposed to needle stick injury or splash over the last 3 months. [Table 1]

Table 1: Characteristics of the study sample (82)

Variable		HCWs (n=82)	Percent %
Age	Mean (SD)	31 (6.5)	
	≤30 years	45	54.9
	>30 years	37	45.1
Gender	Female	68	82.9
	Male	14	17.1
Education	Bachelor of medicine	31	37.8
	Diploma of nursing	27	32.9
	Bachelor of nursing/science	16	19.5
	Illiterate/primary school	8	9.8
Occupation	Nurses	33	40.2
	Family Physician	31	37.8
	Laboratory technicians	10	12.2
	Janitors	8	9.8
Years in service	> 5 years	50	61.0
	≤ 5 years	32	39.0
Training on hire	No	56	68.3
	Yes	26	31.7
Training in service	Yes	64	78.0
	No	18	22.0
Exposure to needle stick or blood splash over last 3 months	No	67	81.7
	Yes	15	18.3
Vaccination	No	61	74.4
	Yes	21	25.6
Number of Doses of hepatitis B vaccine		Total n=21	
	3	10	47.6
	2	10	47.6
	1	1	4.8
Training time		Total n=64	
	More than one year	39	60.9
	One year or less	25	39.1
Training site		Total n=64	
	Primary care center	36	56.2
	Hospital	28	43.8

Primary outcomes:
Paired comparison of pre and post intervention showed that there was a statistically significant increase in knowledge scores from pre to post intervention, $t(81) = -36.4$, $p < 0.001$ d =4, statistically significant increase in attitude scores from pre to post intervention $t(81) = -13.3$ $p < 0.001$ d =1.46, statistically significant increase in attitude scores from pre to post intervention $t(81) = -17.5$, $p < 0.001$, d = 1.93, statistically significant increase in attitude scores from pre to post intervention $t(81) = -33.8$, $p < 0.001$ d =3,73. The magnitude of all differences were large as Cohen's d was >.8. [Table 2]

Table 2: Pre-post intervention of knowledge, attitude and practice scores of health care workers

	Pre (n=82) Mean (SD)	Post n=(82) Mean(SD)	Mean difference (SD)	95% CI for the difference	Paired t test	P- value
Knowledge score	40.0 (13.3)	75.1 (14.0)	35.1 (8.74)	33.2-37.0	-36.4	<0.001*
Attitude score	62.7 (20.0)	85.1 (10.5)	22.4 (15.3)	19.1-25.8	-13.3	<0.001*
Practice score	35.6 (11.3)	62.4 (12.3)	26.8 (13.9)	23.8-29.9	-17.5	<0.001*
Overall KAP score	46.1 (12.4)	74.2 (9.87)	28.1 (7.54)	26.5-29.8	-33.8	<0.001*

* P value significant <0.05 and high statistically significant < 0.01
Confidence Interval (CI) degree of freedom (df)= 81

Knowledge:
Responses obtained from participants demonstrated significant changes in all key areas of knowledge as shown in [Table 3]. In the post-intervention phase, all the participants (100%) gave the correct response to the definition of SPs in the post intervention compared to (61.0%) pre inter**vention.**

Regarding BBIs, the highest 3 correct responses in the pre intervention were for the common BBIs, their transmission and the asymptomatic phase of BBIs (79.3%, 63.4, 61.0%) with futher statistically significant improvement in the post-intervention (95.1%, 89.0%, 84.1%) respectively (p<0.001). Regarding the protective measures in the pre intervention, the highest correct responses were for the color of waste disposal bags and the correct disposal of syringes (69.5% and 64.4%) with statistically significant improvement among the participants in the post-intervention (98.8% and 95.1%).

The least 4 correct responses of protective and control measures were for the use of alcohol rubbing is not required after accidental exposure to body, the maximum time of keeping biohazards wastes within health care facility, the recommended first action with large spill to put a towel to limit its spread and correct concentration of bleach in dealing with large spills, (6.1%, 7.3% 8.5%, 9.8%), with statistically significant improvement among the participants in the post-intervention (50.0%, 57.3%, 68.3%, 86.6%) p<0.001.

Attitude:
Most of the participants gave a favorable response to questions related to their opinion in the pre-intervention as the importance of receiving vaccination was (86.6%) with statistically significant improvement among the participants in the post-intervention (97.6%) (P <0.001). While, the least favorable responses were revision of guidelines and availability of infection control resources (24.4% and 39.0%) with statistically significant improvement among the participants in the post-intervention (42.7% and 50.0%) (P <0.001 and 0.002) respectively. [Table 4]

Practice:
There was statistically significant difference between pre and post intervention in compliance with 6 out of 7 studied SPs. Compliance with SPs revealed that the best median (Mdn) scores of all SPs were for no needle recapping (Mdn=100) in pre and post intervention with large effect (P <0.001 r =.78) and waste disposal (Mdn=100) in the post intervention with large effect size (p<0.001 r =.53). Wearing gowns remains the least practiced among HCWs with no statistically significant difference between pre and post intervention. [Table 5]

Table 3: Pre-post intervention knowledge responses of health care workers

Knowledge		Correct response		McNemar's test
		Pre (n=82) n (%)	Post (n=82) n (%)	P- value
1.	Common 3 BBIs (Hepatitis B, Hepatitis C and AIDS)	65 (79.3%)	78 (95.1%)	<0.001*
2.	Mode of transmission	52 (63.4%)	73 (89.0%)	<0.001*
3.	Asymptomatic phase of BBIs	50 (61.0%)	69 (84.1%)	<0.001*
4.	Days can Hepatitis B live in dry blood (7 days)	22 (26.8%)	44 (53.7%)	<0.001*
5.	Average conversion time from HIV−ve to HIV+ve (6 weeks)	26 (31.7%)	48 (58.5%)	<0.001*
6.	Most AIDS deaths result from an infection that would not kill most.	24 (29.3%)	49 (59.8%)	<0.001*
7.	Most of acute Hepatitis B patients don't become chronic	35 (42.7%)	57 (69.5%)	<0.001*
8.	Most patients with acute Hepatitis C develop persistent infection	30 (36.6%)	43 (52.4%)	0.029*
9.	No vaccination available for Hepatitis C	51 (62.2%)	72 (87.8%)	<0.001*
10.	Hepatitis B vaccination provides lifelong protection	35 (42.7%)	48 (58.5%)	0.015*
11.	Doses of hepatitis B vaccine (3 doses)	44 (53.7%)	80 (97.6%)	0.001*
12.	Ideal environment for microbes to thrive (dry)	20 (24.4%)	55 (67.1%)	<0.001*
13.	Definition of Standard precautions	50 (61.0%)	82 (100%)	<0.001*
14.	Benefits of HH before touching a patient (patient)	36 (43.9%)	55 (67.1%)	0.003*
15.	Benefit of HH after touching a patient (HCWs)	17 (20.7%)	69 (84.1%)	<0.001*
16.	ABHR is not indicated if hands are visibly contaminated	21 (25.6%)	61 (74.4%)	<0.001*
17.	Recommended time for HW (40-60 seconds)	9 (11.0%)	45 (54.9%)	<0.001*
18.	Use of PPE guarantees 100% elimination of exposure risk (False)	38 (46.3%)	50 (61.0%)	0.001*
19.	Different uses of PPE	40 (48.8%)	71 (86.6%)	0.005*
20.	Reuse of gloves after proper cleaning (False)	43 (52.4%)	72 (87.8%)	<0.001*
21.	Correct disposal of syringes without needle recapping	53 (64.4%)	78 (95.1%)	<0.001*
22.	Correct disposal of sharps in safety boxes	47 (57.3%)	78 (95.1%)	<0.001*
23.	Color of Biohazard waste disposal bags (orange −red)	57 (69.5%)	81 (98.8%)	<0.001*
24.	Use of bleach in small spills at least 10% (1:9)	14 (17.1%)	44 (53.7%)	<0.001*
25.	Use of undiluted bleach solution in large spills	8 (9.80%)	71 (86.6%)	<0.001*
26.	First action with large spills to place a towel over spill	7 (8.50%)	56 (68.3%)	<0.001*
27.	Maximum time of keeping biohazards wastes within facility (30 days)	6 (7.30%)	47 (57.3%)	<0.001*
28.	Handling of contaminated clothing (leaving in specific container)	28 (34.1%)	75 (91.5%)	<0.001*
29.	First action on exposure to body fluids washing the area thoroughly	51 (62.2%)	70 (85.4%)	<0.001*
30.	Alcohol rubbing is not required action after accidental exposure to blood/body fluids	5 (6.10%)	41 (50.0%)	<0.001*

*P value significant < 0.05 and high statistically significant < 0.01
Alcohol Based Hand Rub (ABHR), Acquired Immunodeficiency Syndrome (AIDS) Bloodborne infections (BBIs), health care workers (HCWs), hand hygiene (HH), Human Immunodeficiency Virus (HIV) hand wash (HW), Personal Protective Equipment (PPE)

Table 4: Pre-post intervention attitude responses of health care workers

Attitude (opinion)	Favorable response		McNemar's test
	Pre (n=82) n (%)	Post (n=82) n (%)	P- value
1. Susceptibility to infection	54 (65.9%)	75 (91.5%)	<0.001*
2. Importance of safety measures	63 (76.8%)	75 (91.5%)	<0.001*
3. Need for training on prevention of BBIs	55 (67.1%)	79 (96.3%)	<0.001*
4. Hands (source of infection)	48 (58.5%)	78 (95.1%)	<0.001*
5. Hand hygiene after glove removal	45 (54.9%)	79 (96.3%)	<0.001*
6. Needle recapping	62 (75.6%)	80 (97.6%)	<0.001*
7. Importance of receiving vaccination	71 (86.6%)	80 (97.6%)	0.002*
8. Responsibility towards others	64 (78.0%)	78 (95.1%)	<0.001*
9. Revision of guidelines	20 (24.4%)	35 (42.7%)	<0.001*
10. Availability of infection control resources	32 (39.0%)	41 (50.0%)	0.002*

*P value significant < 0.05 and high statistically significant < 0.01
Bloodborne infections. (BBIs)

Table 5: Pre-post intervention compliance of health care workers to standard precautions

Standard precautions	Pre (n=82) Median (IQR)	Post (n=82) Median (IQR)	Wilcoxon Signed Ranks Test: Z	P-value	Effect size
1. Hand hygiene	20.0 (0- 35.0)	50.0 (50.0- 66.7)	-7.07	<0.001*	.78
2. Gloves	25.0 (0-50.0)	66.7 (66.7- 100)	-6.79	<0.001*	.74
3. No Needle recapping	100 (75.0-100)	100 (100-100)	-3.55	<0.001*	.39
4. Sharps handling	50.0 (50.0- 50.0)	50.0 (50.0-50.0)	-3.54	0.001*	.39
5. Spills	50.0 (37.5-50.0)	50.0 (37.5-100)	-2.11	0.035*	.23
6. Waste disposal	33.3 (25.0- 66.7)	100 (75-100)	-4.79	<0.001*	.53
7. Gown	0 (0-0)	0 (0- 0)	-0.184	0.854	.02

* P value significant <0.05 and high statistically significant < 0.01
Interquartile range (IQR)

Discussion

The current study revealed significant difference between pre and post education intervention with improvement in knowledge, attitude and practice scores of the participants with improvement of the overall KAP scores. This results in rejection of the null hypothesis and acceptance of the alternative hypothesis. These results suggest that this educational intervention could be useful in periodic education of preventive measures for HCWs.

In spite of the importance of the preventive measures of BBIs among HCWs and although it is a high priority in occupational safety only 31.7% of the participants received IC training on hiring while 78% received training later but not specific training on SPs. These results were not in agreement with another national study by Saleh et al., 2009 [13] that was conducted among nurses, lab. technicians and janitors in primary care centers in Cairo and Giza cities and reported that less than one third of the sample received training on universal precautions. Although HBV immunization is one of the preventive measures of BBIs, unfortunately only 10 participants, 12.2% of the study sample, received full doses of Hepatitis B vaccine. This result was in agreement with the study by Saleh et al., 2009 [13] which reported vaccination of only 13.8% of the study sample and lower than findings by Denic et al., 2012 [14] in Belgard where 71.4% of HCWs received vaccination. Lack of HBV vaccination coverage is mainly due to central system defect and financial constraints as it is mandatory on hire for all HCWs who are in contact with blood or body fluids. Of all participants 18.3% reported exposure to needle stick or blood splash over the last 3 months; exposure rate could be limited with adherence to SPs. These results were lower than the Egyptian study by Saleh et al., 2009 [13] which reported 33.8% of one or more exposure in the previous 3 months and the Iranian study by Adib-Hajbaghery and Lotfi 2013,[15] which reported 38.3% needle stick or sharps injury among HCWs in healthcare centers within the previous 6 months. The variation in exposure from one study to another could be related to workload in the different settings and the safe procedures used to reduce the risk of exposure and could be related to the best practice of no needle recapping among the participants in the current study.

The current study revealed improvement in mean scores of knowledge, attitude, practice and overall KAP scores of all the participants. This improvement in KAP scores was higher than scores in the non randomized controlled study in Indonesia by Mutki et al., 2000 [16] that was conducted among 11 physicians and 44 nurses in the emergency department of two hospitals. The difference in scores from the present study could be related to the difference in tools of assessment and the nature of the study setting with heavier work in the emergency department than in primary care settings. Also Saleh et al., 2009 [13] found significant improvement of mean KAP scores in post intervention. The relative difference in scores between these 2 studies could be explained by the difference in the questionnaire and also the difference between observation of compliance in

the current study from self reported practice of only four items (needle disposal, needle recapping, infectious waste collection and disposal).

Another descriptive Egyptian study by Abu Salam et al., 2014 [17] conducted among physicians, nurses and paramedical personnel in four different family health centers in Menoufia city revealed low to moderate level of knowledge, a positive attitude, and a moderate to high practices' score toward infection control measures. Also a previous descriptive study by Alkandari et al., 2013 [18] reported that HCWs in primary health care in Kuwait showed a fair level of knowledge and positive attitude, with poor practice. While in Fayaz et al., 2104 [19]; the HCWs in Kabul in Afghanistan had inadequate knowledge and poor practice in applying universal precautions. The inadequate knowledge and the improper practice could be related to many factors such as lack of periodic training and supervision, and lack of perceived seriousness of the negative outcomes.

Fortunately, all the participants who gave the correct response to the definition of SPs were increased from 61% pre intervention to 100% post intervention. The current study found that 62.2% of the participants responded correctly to non availability of hepatitis C vaccination in the preintervention to be improved significantly to 87.8% post intervention. These results were nearly in agreement with the study by Mohamed and Wafa, 2011[20]; the nurses who responded correctly to the non availability of hepatitis C vaccination were improved from preintervention 40% to 96% post intervention.

Although there was significant improvement in knowledge related to the recommended time for rubbing hands during HW, which improved from 11% pre intervention to 54.9% post intervention and to alcohol based hand rubbing (ABHR) is not a recommended action after accidental exposure to body fluids from 6.1% pre intervention to 50.0% post-intervention, they are still areas for further improvement in the subsequent training. The correct knowledge responses in the pre intervention were much lower than in a descriptive study by Amin and Al Wehedy, [21] about health care providers' knowledge of SPs at primary care in Saudi Arabia that studied 50 items about SPs, as 19.5% of the participants responded correctly to the minimum duration of hand washing by 24.2% and 63.4% to ABHR is not a substitute for hand washing even if the hands are soiled. The difference between the two studies could be related to many factors and maybe the difference in sample size, setting and previous training among the different population.

Positive attitude responses of the participants were given to most of the 10 items in the pre intervention with further significance in post intervention. The current study revealed that attitude to hands are a vehicle for transmission of nosocomial infection with improvement from 58.5% to 95.1%. The necessity of HH after glove removal improved from 54.9% to 96.3%. The pre intervention findings were lower than the findings by Alnoumas et al., 2012 [22] which

was 72.0% for hand as a source of infection and nearly similar to 59.4% for the importance of HH after glove removal. Positive attitude towards no needle recapping among (75.6%) in the pre intervention was in agreement with the previous study by McGaw et al., 2012 [23] as 86% of participants agreed that needles should never be recapped.

The best median scores of practice in post intervention were for waste disposal, and no needle recapping while HH, sharps handling, spills and wearing gowns are still areas for improvement in future training. These results were in agreement with the Indonesian study [16] where the observed practices revealed that wearing gowns was very low in pre and post intervention and non significant increase, in median score of avoiding recapping needles 0 to 19. El ghatey et al., 2013 [24] studied the impact of Universal IC intervention program for nurses at Asser hospital and revealed that there were highly statistical significant differences between nurses' practices pre and post the program implementation. These results indicate the importance of continuing educating of HCWs about infection control preventive measures.

Several descriptive studies about practice revealed similar results, such as the acceptable practice of not recapping was consistent with results by Moyo, 2013 [25] among nurses working at a hospital in Kenya. The study by Fayaz et al., 2014 [19] revealed a low level of practice of UPs among HCWs with the best practice about adherence to safe disposal of used needles and sharps and wearing gloves on exposure to deep body fluids or blood products. While Ferrer et al., 2009 [26] in Chile, found inconsistent use of SPs among HCWs revealed neglecting hand washing and surface cleaning.

Limitations of the study:
Randomization of health care workers to intervention and control groups was not selected in this study. Differences in some characteristics of respondents such as proportion of respondents receiving previous training on infection control might also create bias. Hawthorne effect, meaning observation itself producing change, could also have introduced biases. The small sample size of lab technicians and janitors was another limitation.

Conclusion

The intervention on prevention of BBIs for HCWs within primary care settings lead to an improvement of their knowledge, attitude, and practice. Continuous periodic education on standard precautions is recommended to cover areas for improvements in knowledge; attitude to revising guidelines and ensure availability of infection control supplies; and compliance with hand hygiene, sharps handling, spills and wearing gowns. The intervention is acceptable as essential preventive measures and the results were comparable to other studies in different medical specialties and in primary care settings in developing countries. Generalization of the results could be suitable in developing countries with limited resources.

Future interventions could include adequate sample size of laboratory technicians and janitors to test the difference between the different categories regarding the intervention education.

References

1. National Guidelines for Infection Control Part I. Available at: http://www.drguide.mohp.gov.eg/newsite/e-learning/InfectionControl/infctrlp1.asp Accessed 10 September 2014.
2. Egyptian national control strategy for viral hepatitis Arab Republic of Egypt, Ministry of Health and Population. National Committee for the Control of Viral Hepatitis. Available at: https://www.pasteur.fr/.../nsp-10-April-2008-final.pdf Accessed 15 September 2014.
3. Boutros S1, Skordis J. HIV/AIDS surveillance in Egypt: current status and future challenges. East Mediterr Health J 2010;16(3):251-8.
4. Kent AS, Eisenberg L. Occupational Deaths amongst Healthcare Workers. Emerg Infect Dis 2005;11(7):1003-8.
5. WHO: Sharps injuries: Global burden of disease from sharps injuries to health-care workers. Available from http://www.who.int/quantifying_ehimpacts/publications/9241562463/en/ Accessed 15 September 2014.
6. Standard precautions in health care. Available at: http://www.who.int/csr/resources/publications/EPR_AM2_E7.pdf Accessed 20 September 2014.
7. Guide to Infection Prevention for Outpatient Settings: Minimum Expectations for Safe Care. Available from http://www.cdc.gov/HAI/pdfs/guidelines/Outpatient-Care-Guide-withChecklist.pdf Accessed on 20 September 2014.
8. Bloodborne Pathogens. Occupational Safety and Health Administration Available from https://www.osha.gov/SLTC/etools/hospital/hazards/bbp/bbp.html Accessed on 20 September 2014.
9. Employee Training Quiz - Workplace Bloodborne Pathogens http://www.osha-safety-training.net/ Accessed on 20 September 2014.
10. CDC Center for disease prevention and control. The National Institute for Occupational Safety and Health (NIOSH) Workplace Safety & Health Topics Available at: http://www.cdc.gov/niosh/topics/bbp/occupations.html Accessed 20 September 2014.
11. Lakens D. Calculating and reporting effect sizes to facilitate cumulative science: a practical primer for t-tests and ANOVAs. Front Psychol 2013;4:863.
12. Fritz CO, Morris PE, Richler JJ. Effect size estimates: current use, calculations, and interpretation. J Exp Psychol Gen 2012;141(1):2-18.
13. Saleh DA, Elghorory LM, Shafik MR, Elsherbini EE. Improvement of knowledge, attitudes and practices of health care workers towards the transmission of blood-

-borne pathogens: an intervention study. J Egypt Public Health Assoc 2009;84(5-6):423-41.

14. Denic LM1, Ostric I, Pavlovic A, Dimitra KO. Knowledge and occupational exposure to blood and body fluids among health care workers and medical students. Acta Chir Iugosl 2012;59(1):71-75.

15. Adib-Hajbaghery M, Lotfi MS. Behavior of healthcare workers after injuries from sharp instruments. Trauma Mon 2013;18(2):75-80.

16. Mukti AG, Treloar C, Suprawimbarti, Asdie AH, D'Este K, Higginbotham N, Heller R. A universal precautions education intervention for health workers in Sardjito and PKU Hospital Indonesia. Southeast Asian J Trop Med Public Health 2000;31(2):405-11.

17. Abu Salam ME, Anwar El-Shazly HM, Dewidar MA. Infection control awareness among healthcare providers in family health settings in Shebin El-kom district, Menoufia Governorate, Egypt. Menoufia Med J 2014;27:840-6.

18. Alkandari A, Aljodar S, Adnan Albahhouh H, Makboul G, El-Shazly M. Knowledge, attitudes and self-reported behavior of primary health care workers for Hepatitis B and C Virus and other health care associated Infection. Greener Journal of Medical Sciences 2013;3(1):18-31

19. Fayaz SH, Higuchi M, Hirosawa T, Sarker MA, Djabbarova Z, Hamajima N. Knowledge and practice of universal precautions among health care workers in four national hospitals in Kabul, Afghanistan. J Infect Dev Ctries 2014;15;8(4):535-42.

20. Mohamed SA, Wafa AM. The Effects of an Educational Program on Nurses Knowledge and Practice Related to Hepatitis C Virus: A Pretest and Posttest Quasi-Experimental Design. Australian Journal of Basic and Applied Sciences 2011;5(11):564-70.

21. Amin T, Al Wehedy A. Healthcare providers' knowledge of standard precautions at the primary healthcare level in Saudi Arabia. Healthcare Infection 2009;14: 65-72.

22. Alnoumas SR , Enezi FA, Isaeed MM, Makboul G, El-Shazly MK. Knowledge, attitude and behavior of primary health care workers regarding health care-associated infections in Kuwait. Greener J Med Sci 2012; 2: 92-8.

23. McGaw CD , Tennant I, Harding HE, Cawich SO, Crandon IW, Walters CA. Healthcare workers' attitudes to and compliance with infection control guidelines in the operating department at the University Hospital of the West Indies, Jamaica. Int J Infect Control 2012;8(3):1-9. Available from: www.ijic.info/article/download/10411/7403 Access on 5 May 2015

24. El ghatey AY, Mahrous FM and Gendy JF. Impact of Universal Infection Control Intervention Program for Nurses at Asser Hospital. J Am Sci 2013;9(12):940-8.

25. Moyo GM. Factors Influencing Compliance With Infection Prevention Standard Precautions Among Nurses Working At Mbagathi District Hospital, Nairobi, Kenya. 2013 Available at: http://nursing.uonbi.ac.ke/sites/default/files/chs/nursing/nursing/Factors%20Influencing%20Compliance%20With%20Infection%20Prevention%20Standard%20Precautions%20Among%20Nurses.pdf Access on 1 March 2015.

26. Ferrer LM, Cianelli R, Norr KF, Cabieses B, Araya A, Irarrázabal L, Bernales M. Observed use of standard precautions in Chilean community clinics. Public Health Nurs 2009;26(5):440-8.

Prevalence of Premenstrual Dysphoric Disorder among Medical Students of Umm Al-Qura University, Makkah Al-Mukaramah, Kingdom of Saudi Arabia

Reda A. Goweda (1)
Mohammad M. Alkot (2)
Fatimah A. Alturkistani (3)
Raghad J. Alhajaji (4)
Sara S. Aljebali (5)
Zubaida A. Baashr (6)

(1) M.D. Family Medicine Department, Faculty Of Medicine, Suez Canal University, Egypt.
(2) M.D. Family Medicine Department, Menoufia University, Egypt.
(3) Pathology resident, KSA.
(4) Family medicine resident, KSA.
(5) GP, Ministry of Health, KSA.
(6) Psychiatry resident, NG, KSA .

Correspondence:
Reda Goweda
Faculty of Medicine, Suez Canal University
Ismailia city, Kilo 4.5
Egypt
Mobile: 0096654645197-00201003583933
Email: redagoweda@yahoo.com

Abstract

Background: Premenstrual Dysphoric Disorder (PMDD) is a severe and disabling form of premenstrual syndrome (PMS) affecting 3-8% of women. PMDD was added to the list of depressive disorders in the Diagnostic and Statistical Manual of Mental Disorders (DSM-V) in 2013.

Objective: To assess the prevalence of PMDD among female medical students of Umm Al-Qura University(UQU), Makkah Al-Mukaramah, K.S.A.

Methods: A cross-section study was conducted on randomly selected 183 female medical students. A semi-structured and pretested self-administered questionnaire was employed for data collection. The criteria proposed by DSM-V were used to diagnose PMDD.

Result: Most of the participants were single (90.8%) and non-smoker (96. 2%). The prevalence of PMDD among students was 36.6%. There was no significant difference between students with PMDD and those without, regarding physical symptoms. Lack of energy, easy fatigability and lethargy are the most prevalent symptoms (81.9%). Also, 29.6% experienced joint or muscle pain, 58.5 % complained of breast tenderness or swelling and 63.9% suffered from headache.

Conclusions: The study revealed a high prevalence of PMDD among medical students with high overall frequency of abnormal mood and behavior more than that of the somatic complaints.

Keywords: Prevalence, PMDD, Female, Medical, Students

Introduction

Premenstrual dysphoric disorder (PMDD) is a diagnosis used to indicate serious premenstrual distress associated with deterioration in functioning (1). PMDD affects 3-8% of women worldwide in their reproductive years (2). From the clinical point of view significant premenstrual problems with mood and behavioral changes have been recorded since ancient times (1). Most women in their reproductive age experience one or more mild emotional, psychogenic or physical symptoms for one to two days before the onset of menses. These symptoms, such as breast soreness and bloating, are mild, do not cause severe distress or functional impairment, and are not considered to represent premenstrual syndrome (PMS) (3). Up to eighty percent of women report one or more physical, psychological, or behavioral symptoms during the luteal phase of their menstrual cycle without experiencing substantial disruption to their daily activities. Mild to moderate symptoms of PMS that affect some facet of the woman's life, occurs in 20 to 32 percent of premenopausal women, however, the more severe symptoms of PMDD affect 3 to 8 percent of premenopausal women (3).

The etiology of PMDD is still an active area of research. While the timing of symptoms suggests a hormonal fluctuation as the cause of PMDD, a demonstrable hormonal imbalance in women with PMDD has not been identified. In fact, levels of reproductive hormones in women with and without PMDD are indistinguishable (4).

PMDD is a severe form of premenstrual syndrome. Like PMS, PMDD follows a predictable, cyclic pattern. Symptoms begin in the late luteal phase of the menstrual cycle (after ovulation) and end shortly after menstruation begins (5). On average, the symptoms last six days but can start up to two weeks before menses. The most intense symptoms occur two days before and one day after the start of menstrual blood flow, and cease shortly after the start of menses (6). PMDD have both physical and emotional symptoms. The most debilitating symptoms are emotional and include "irritability, depression, mood lability, anxiety, feelings of 'loss of control', difficulty concentrating and fatigue."(7) The physical symptoms include "abdominal bloating, breast tenderness, headache and generalized aches" (8).

Many organizations have published diagnostic criteria for PMDD including the American College of Obstetricians and Gynecologists, the Royal College of Obstetricians and Gynecologists, the International Society for the Study of Premenstrual Disorders, American Psychiatric Association as well as Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition [DSM-V] (9,10). In 2013, PMDD became a disorder with official diagnostic criteria in the DSM-V. The DSM-V lists the following eleven signs as possible symptoms experienced by those with PMDD (9,11) :

Marked lability (e.g., mood swings), marked irritability or anger, markedly depressed mood, marked anxiety and tension, decreased interest in usual activities, difficulty in concentration, lethargy and marked lack of energy, marked change in appetite (e.g., overeating or specific food cravings), hypersomnia or insomnia, feeling overwhelmed or out of control and physical symptoms (e.g., breast tenderness or swelling, joint or muscle pain, a sensation of 'bloating' and weight gain). According to the DSM-V, a diagnosis of PMDD requires the presence of at least five of these symptoms with one of the symptoms being one of (marked lability, irritability, depressed mood or anxiety and tension). These symptoms should occur during the week before menses and remit after initiation of menstrual blood flow. In order to meet criteria for the diagnosis, the symptoms should be charted prospectively for two consecutive ovulation cycles in order to confirm temporal and cyclical nature of symptoms. The symptoms should also be severe enough to affect normal work, school, or social activities or relationships with others (9).

Management of premenstrual dysphoric disorder (PMDD) includes both non-pharmacologic and pharmacologic therapies. Non-pharmacologic therapy includes aerobic exercise, consumption of complex carbohydrates and frequent meals, relaxation training, light therapy, sleep deprivation, and cognitive-behavioral therapy (CBT). The efficacy of lifestyle interventions (e.g. diet, exercise, and vitamin supplementation) and psychotherapeutic interventions for PMDD remains unclear (3,9).

Methodology

This was a cross-section study, conducted on female medical students of UQU, Makkah Al-Mukaramah, KSA during the academic year 2013/2014. A multistage stratified systematic random sampling technique was used to select the participants. Out of all faculty students 183 were selected according to the following inclusion and exclusion criteria.

Inclusion criteria: All medical menstruating female students

Exclusion criteria: Currently pregnant students, chronic illnesses (e.g. diabetes, hypertension), psychiatric disorders such as depression, anxiety, currently using hormonal contraceptives, Intern medical students and those who had an irregular menstrual cycle.

A semi-structured, self-administered questionnaire was used for data collection. The questionnaire included demographic data and possible symptoms of PMS according to DSM -V. A pilot study was done on 19 (10% of the calculated sample size) female students to assess its validity, highlight problems associated with data collection tools, and to ensure standardization. The criteria proposed by DSM -V were used to diagnose PMDD. Symptoms must have been present in most of menstrual cycles of the previous year, and must be associated with significant distress or interference with the usual activities (e.g. school, social life).

The study was conducted after getting ethical approval from the ethical committee of the Faculty of medicine. Participation was voluntary and non-obligation was offered. A written consent was taken from the participants after explanations of the objectives and methodology of the study. The participants were told that, their information will be kept with complete confidentiality and there would be no attempt to abuse their information.

Data Analysis

Data were analyzed using SPSS version 20. Descriptive analytical parameters were used to summarize the socio-demographic and clinical characteristics of the study participants. Summary tables and graph were used for descriptive purpose. The different socio-demographic, gynecologic and obstetric characteristics variables were presented, compared, analyzed and frequency distributions of the variables were interpreted. Chi-square test was used to assess the association of different factors with the PMS. A p-value less than 0.05 was considered significant.

Results
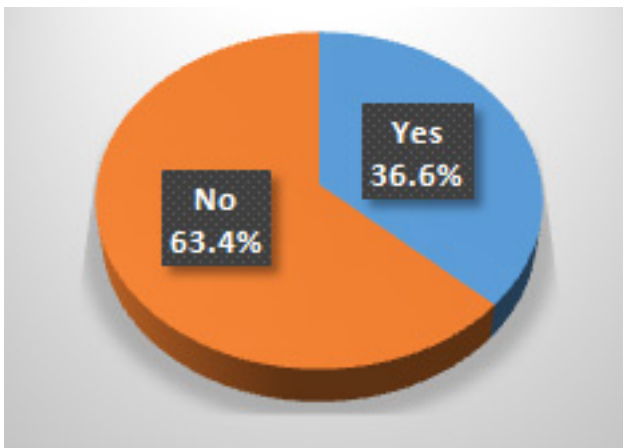
Figure 1: Prevalence of premenstrual dysphoric disorder among medical students of umm Al-Qura university

The study was carried out on female medical students of UQU (183). Their age ranged from 18 to 25 years, with mean age of 19.66 ± 3.92. Their socio-demographic data showed that most of them were single (90.8%) and 8.7 % were married, however 0.5 % were divorced. The prevalence of PMDD was 36.5%. There was no significant difference between students with PMDD and without regarding physical symptoms. Lack of energy, easy fatigability and lethargy are the most prevalent symptoms (81.9%). 29.6% experienced joint or muscle pain, 58.5 % complained of breast tenderness or swelling and 63.9% suffered from headache. There was no significance between students with PMDD and without regarding demographic characteristics and physical symptoms.

Discussion

PMDD is a multifactorial syndrome that occurs with varying degrees of severity and thus may have a range of potential adverse effects on workability, social activities and interpersonal relationships. Epidemiologic studies indicate that as many as 80% of women in the United States experience emotional, behavioral, or physical premenstrual symptoms (11). Unfortunately, there are no national studies to determine the epidemiological features of PMDD among the university students at Umm Al-Qura University so this cross sectional study was conducted to clarify the burden of problem among the medical students. In the current study the prevalence of PMDD among female medical students who met DSM-V criteria was 36.6 % which is higher than most of the previous studies on the general population, for example, a study done by Cohen et al. (12) reported that, in women aged 36-44 years the prevalence of PMDD was 6.4% (12). Also a study by Rivera-Tovar and Frank (13) showed that, 4.6% of 217 female university students had PMDD. A study done by Steiner et al. (14) on girls in the age group of 12-18 years showed a prevalence of premenstrual symptoms to be 8.3%; however a study conducted in Pakistan among young college girls reported a slightly higher prevalence as 18.2% (15).

Also prevalence values of 17.2% and 18.2% were obtained also in Nigeria (16) and Croatia (17) respectively. Also a very recent Indian study (18) revealed that prevalence of PMDD was 12.22%.

Table 1: Socio-demographic characteristics of the medical students of umm Al-Qura university

Socio-demographic characters		Female medical students (No. 183)	
		No	%
Marital status	Single	166	90.8
	Married	16	8.7
	Divorced	1	0.5
Academic year	Basic education	73	39.9
	Clinical education	110	60.1
Smoking	Yes	7	3.8
	No	176	96.2

Table 2: Duration of symptoms of PMDD among medical students of umm Al-Qura university

Symptoms of PMDD	Duration of symptoms of PMDD		
	Most of the month	Some of the month	Have not symptoms at all
Have marked mood swings	43(23.5%)	97(53%)	43(23.5%)
Have marked irritability or anger or increased interpersonal conflict	34(18.6%)	87(47.5%)	62(33.9%)
Feel markedly depressed, hopeless.	24(13.1%)	50(27.3%)	109(59.6%)
Anxious or worried for the good reason, tension and feeling of being (keyed up)	30(16.4%)	86(47%)	67(36.6%)
Felt decreased interest in usual activity	33(18%)	60(32.8%)	90(49.2%)
Subjective sense of difficulty in concentrating	34(18.6%)	61(33.3%)	88(48.1%)
Lack of energy, easy fatigability and lethargy	55(30.1%)	95(51.9%)	33(18.1%)
Unhappy that she has been overeating or having specific food craving	31(16.9%)	46(25.1%)	106(57.9)
Unhappy that she has had difficulty sleeping or increase in sleeping times	55(30.1%)	51(27.9%)	77(42.1%)
Unhappy that she has been out of control	55(30.1%)	0(0.0%)	128(69.9%)
Have persistent anger for the good reason	37(20.2%)	94(51.4%)	52(28.4%)
Thought of harming herself	4(2.2%)	19(10.4%)	160(87.4%)
Breast tenderness or swelling	88(48.1%)	19(10.4%)	67(41.5%)
Headache	106(57.9%)	11(6.0%)	66(36.1%)
Joint or muscle pain	33(18.1%)	23(12.5%)	127(69.4%)

Table 3: The association of demographic and physical symptoms with PMDD

Demographic and physical symptoms	Female medical students (No. 183)			x^2	P value
		Yes (N.& %)	No (N. & %)		
The academic Year	Preclinical years	28(41.8%)	45(38.3%)	0.159	0.755
	Clinical years	39(58.2%)	71(61.2%)		
Marital status	Single	62(92.5%)	104(89.7%)	0.815	0.866
	Married	5(7.5%)	11(9.5%)		
	Divorced	0(0.0%)	1(0.9%)		
Smoking	Smoker	2(3.0%)	5(4.3%)	0.203	0.717
	Non-smoker	65(97.0%)	111(95.7%)		
Breast tenderness or swelling	Present	36(53.7%)	71(61.2%)	0.977	0.352
	Absent	31(46.3%)	45(38.8%)		
Headache	Present	40(59.7%)	77(66.4%)	0.821	0.425
	Absent	27(40.3%)	39(33.6%)		
Joint or muscle pain	Present	14(20.9%)	42(36.2%)	4.688	0.032
	Absent	53(79.1%)	74(63.8%)		

Table 4: The association of psycho-behavioral symptoms with PMDD

		Female medical students (No. 183)		χ²	P value
		With PMDD (No & %)	Without PMDD (No & %)		
Have marked mood swings	Yes	61(91.0%)	79(68.1%)	12.434	0.000
	No	6(9.0%)	37(31.9%)		
Have marked irritability or anger or increased interpersonal conflict	Yes	56(83.6%)	65(56.0%)	14.387	0.000
	No	11(16.4%)	51(44.0%)		
Feel markedly depressed, hopeless. Or she has self-deprecating thoughts	Yes	48(71.6%)	26(22.4%)	42.732	0.000
	No	19(28.4%)	90(77.6%)		
Anxious or worried for the good reason, tension and feeling of being (keyed up)	Yes	61(91.0%)	55(47.4%)	34.837	0.000
	No	6(9.0%)	61(52.6%)		
Felt decreased interest of usual activity	Yes	41(35.3%)	52(77.6%)	30.357	0.000
	No	15(22.4%)	75(64.7%)		
Subjective sense of difficulty in concentrating	Yes	50(74.6%)	45(38.8%)	21.846	0.000
	No	17(25.4%)	71(61.2%)		
Lack of energy, easy fatigability and lethargy	Yes	65(97.0%)	85(73.3%)	16.192	0.000
	No	2(3.0%)	31(26.7%)		
Unhappy that she has been overeating or having specific food craving	Yes	33(49.3%)	44(37.9%)	2.234	0.162
	No	34(50.7%)	72(62.1%)		
Unhappy that she has had difficulty sleeping or increase in sleeping times	Yes	51(76.1%)	55(47.4%)	14.359	0.000
	No	16(23.9%)	61(52.6%)		
Unhappy that she has been out of control	Yes	33(49.3%)	22(19.0%)	18.534	0.000
	No	34(50.7%)	94(81.0%)		
Have persistent anger for the good reason	Yes	52(77.6%)	79(68.1%)	1.888	0.179
	No	15(22.4%)	37(31.9%)		
Thought of harming herself	Yes	14(20.9%)	9(7.8%)	6.670	0.012
	No	53(79.1%)	107(92.2%)		
Suffering from any psychiatric disorder now or in the past	Yes	3(4.5%)	3(2.6%)	.479	0.670
	No	64(95.5%)	113(97.4%)		

The prevalence of the current study was in accordance with the prevalence of studies done by Issa et al. (7) and Serfaty et al. (19) who reported prevalence of 36.1% and 35% respectively. Theses variations may be due to oral contraceptive pills that reduce the severity and frequency of the symptoms of PMDD (20). It can also attribute to different cultural and socioeconomic background, diagnostic criteria and confusion of participants regarding their physical and emotional symptoms. The reason for the high prevalence rate of PMDD among participants of the current study may be due to stress related learning or can be justifiable by the fact that the vast majority of participants are single.

In this study there was no significant difference between students with PMDD and without regarding physical symptoms which is not in agreement with a study by Brahmbhatt et al. (21) who reported that, the overall frequency of somatic complaints was more than that of the abnormal mood and behavior.

In the current study, lack of energy, easy fatigability and lethargy are the most prevalent symptoms (81.9%) in contrast to the results of Minakshi et al., (22) who reported marked persistent irritability as the most frequent (96.29%) symptom. However the mood swings came second in frequency (76.5%) which is in agreement with the results of a study by Minakshi et al. (22). A study in Ethiopia reported that, the most common psycho-behavioral symptoms experienced by the participants were loss of interest in doing things (77.5%), followed by depressed mood (74.6%), anger feeling (57.2%), and lack of concentration (46.8%) (23).

In the current study 29.6% experienced joint or muscle pain, 58.5 % complained of breast tenderness or swelling and 63.9% suffered from headache. This was in accordance with the Ethiopian study that reported physical symptoms as follows, breast tenderness by (68.2%), back pain by (66.5%), weakness by (61.9%), generalized body pain by (60.1%), and headache by (57.8%) of the participants (23).

All of the PMDD patients in the current study confirmed that the symptoms have significant impact on their academic performance, social activities and engagement based on DSM-V criteria for diagnosis of PMDD. Borenstein et al. (24) reported that women diagnosed with PMDD have significantly lower quality of life, increased absenteeism from work, decreased work productivity, impaired relationships with others and increased visits to health providers, compared with control women.

In the present study there was no significance between students with PMDD and without regarding demographic characteristics and physical symptoms while there was a high significance regarding most of the mood and behavior parameters.

Conclusion

PMDD has more or less a high prevalence rate among medical students of UQU which necessitates more effort for early detection, and management to ensure continuity of care for their general welfare, better health and life quality as well as better scholastic achievement.

References

1. Endicott J. History, evolution, and diagnosis of premenstrual dysphoric disorder. J Clin Psychiatry. 2000. 61 Suppl 12:5-8.
2. Yonkers KA, O'Brien PM, Eriksson E. Premenstrual syndrome. Lancet. 2008;371(9619):1200-1210.
3. Grady-Weliky TA. Clinical practice. Premenstrual dysphoric disorder. N Engl J Med. 2003 Jan 30. 348(5):433-8.
4. Hantsoo, Liisa; Epperson, C. Neill (2015-11-01)."Premenstrual Dysphoric Disorder: Epidemiology and Treatment". Current Psychiatry Reports 17 (11): 87.doi:10.1007/s11920-015-0628-3. ISSN 1535-1645. PMID 26377947.
5. Steiner, M; Pearlstein, T; Cohen, LS (2006). "Expert guidelines for the treatment of severe PMS, PMDD, and comorbidities: the role of SSRIs". J Womens Health (Larchmt) 15 (1): 57-69. doi:10.1089/jwh.2006.15.57. PMID 16417420.
6. Biggs WS, Demuth RH (October 2011). "Premenstrual syndrome and premenstrual dysphoric disorder". Am Fam Physician 84 (8): 918-24.PMID 22010771.
7. Issa BA, Yussuf AD, Olatinwo AW, Ighodalo M. Premenstrual dysphoric disorder among medical students of a Nigerian university. Ann Afr Med. 2010 Jul-Sep. 9(3):118-22.
8. Rapkin, AJ; Lewis, EI (November 2013). "Treatment of premenstrual dysphoric disorder". Womens Health (Lond Engl) 9 (6): 537-56. doi:10.2217/whe.13.62.PMID 24161307
9. "Premenstrual Syndrome, Management (Green-top Guideline No. 48)". Royal College of Obstetricians & Gynaecologists. Retrieved 2015-11-05.
10. Diagnostic and Statistical Manual of Mental Disorders (5th Edition). Washington, DC, USA: American Psychiatric Association. 2013. ISBN 978-0-89042-554-1. line feed character in |title= at position 54 (help)
11. Boyle CA, Berkowitz GS, Kelsey JL. Epidemiology of premenstrual symptoms. Am J Public Health. 1987 Mar. 77(3):349-50.
12. Cohen LS, Soares CN, Otto MW, et al. Prevalence and predictors of premenstrual dysphoric disorder (PMDD) in older premenopausal women. The Harvard Study of Moods and Cycles. JAffect Disorder 2002;70:125-32.
13. Rivera-Tovar AD, Frank E. Late luteal phase dysphoric disorder in young women. AmJ Psychiatry 1990;147:1634-6
14. Steiner M , Peer M , Palova E, Freeman EW, Macdougall M, Soares CN. The premenstrual symptoms screening tool revised for adolescents (PSST-A): prevalence of severe PMS and premenstrual dysphoric disorder in adolescents. Archives of Women's Mental Health Feb 2011,Vol 14, issue 1, pp 77-81
15. Tabassam S, Afridi B, Aman Z et al. Premenstrual Syndrome: Frequency and Severity in young college girls. Journal of Pakistan medical association Vol. 55, No. 12, December 2005
16. Adewuya AO, Loto OM, Adewumi TA (2008) Premenstrual dysphoric disorder among Nigerian University students: Prevalence, co-morbid conductions, and correlates. Arch Womens Ment Health 11(1): 13-18.
17. Rojnic Kuzman M, Hotujac L (2007) Premenstrual dysphoric disorder A neglected diagnosis? Preliminary study on a sample of Croatian students. Coll Antropol 31(1): 131-137.
18. Minakshi N. Parikh, Nimesh C. Parikh,Sweta K. Parikh. Premenstrual Dysphoric Disorder In Adolescent Girls In Western India; GUJARAT MEDICAL JOURNAL / MARCH-2015 Vol. 70 No. 1
19. Serfaty D, Mangneron AC (1997) Premenstrual syndrome in France: Epidemiology and therapeutic effectiveness of 1000 mg micronized.
20. American College of Obstetricians and Gynecologists. ACOG practice bulletin no. 15: Premenstrual syndrome Obstet Gynecol. 2000;95(4)

21. Brahmbhatt S, Sattigeri BM, Shah H, Kumar A, Parikh D. A prospective survey study on premenstrual syndrome in young and middle aged women with an emphasis on its management. Int J Res Med Sci 2013;1: 69-72

22. Minakshi N. Parikh, Nimesh C. Parikh,Sweta K. Parikh. Premenstrual Dysphoric Disorder In Adolescent Girls In Western India; GUJARAT MEDICAL JOURNAL / MARCH-2015 Vol. 70 No. 1

23. Fikru Wakjira Tolossa and Mebratu Legesse Bekele. Prevalence, impacts and medical managements of premenstrual syndrome among female students: cross-sectional study in college of health sciences, Mekelle University, Mekelle, Northern Ethiopia. Tolossa and Bekele BMC Women's Health 2014, 14:52

24. Borenstein JE, Dean BB, Endicott J, et al. Health and economic impact of the premenstrual syndrome. J Reprod Med2003;48:515-24.

Health Risk Behaviors among adolescents in Qatar

Hamad Eid Al Romaihi (1)
Hamda Qotba (2)
Rasha ElSayed Salama (3)
Mansoura Salem Ismail (4)
Nagah Abdel Aziz Selim (5)

(1) Dr. Hamad Eid Al Romaihi, Consultant Community Medicine. Manager of Health protection and CDC, Supreme council of heath Qatar
(2) Dr. Hamda Qotba, Consultant Community Medicine Community Medicine Department, consultant community medicine Primary health care Qatar
(3) Dr. Rasha ElSayed Salama (Salama RE, M.Sc., PhD community medicine) Lecturer community Medicine, Suez Canal University Egypt
(4) Dr. Mansoura Salem Ismail , (Ismail M, M.Sc., PhD family medicine) A/Professor of family medicine, Suez Canal University, Egypt. A/Professor of Family Medicine in Clinical Medicine, WCMCQ Ex., Asst. Program Director, Family Medicine, PHCC - HMC
(5) Dr. Nagah Abdel Aziz Selim Consultant Physician of Public Health And Preventive Medicine, Director of Community Medicine Residency Program, Primary Health Care Corporation, Qatar, A/Professor of Public Health And Preventive Medicine, Faculty of Medicine, Cairo University

Correspondence:
Dr. Mansoura Salem Ismail ,
A/Professor of family medicine,
Suez Canal University,
Egypt
Email: mansoura70@hotmail.com

Abstract

Introduction: Health risk behaviors among adolescents seriously threaten their wellbeing. Identifying socio-demographic relationships with health risk behaviors helps to contemplate prevention efforts. Little is known about health risk behaviors among adolescents in Qatar.

Aim: To measure the prevalence of health risk behaviors among adolescents in the secondary schools and identify the sociodemographic determinants.

Methodology: A cross-sectional survey was conducted in the governmental and independent schools using multistage cluster sampling.

Results: 561 adolescents participated in the study, response rate 90.9%. Unlicensed driving in the past 30 days was the most prevalent health risk behavior (43.7%) while involvement in a physical fight was 38.3%. Not wearing seat belts attained (31.4%), 21.9 % current smokers, 20% exceeded speed limits while driving, 19.3% were current shisha smokers, 18.9% carried a weapon and 12.1% had ever used inhalants

Conclusion: Prevalence of health risk behaviors is at high levels. Male gender and older were the strongest determinants.

Key words: Health risk behaviour, adolescents, Qatar

Introduction

Adolescence is a journey from the world of the child to the world of the adult. WHO has defined adolescence as the period between 10 and 19 years of age in which rapid growth and development with biologic, psychological, and emotional changes occurring simultaneously.(1) Of the 1.2 billion adolescents worldwide, about 85% live in developing countries, with the remainder in the industrialized world. (2) Adolescence is a period of change and experimentation, where risk behaviors are tried and sometimes maintained to the detriment of future health: illegal substances are used for the mere thrill of engaging in antiestablishment activities, as a means of escape from a harsh reality, or simply as a means of fun with the minimum of effort.(3) Many lifestyle diseases have their roots in adolescence such as cardiovascular diseases, cancers, diabetes, chronic bronchitis, obesity, malnutrition, mental and behavioral disorders, accidents and violence, alcohol and drug dependency, HIV/AIDS and other sexually transmitted infections which contribute 58.4% of morbidity and 68.4% of mortality globally.(4) Preventing risky behaviors and promoting healthy choices among adolescents can therefore yield outcomes, not just during adolescence, but also during adulthood. Healthy and developed adolescents have a better chance of becoming healthy, responsible and productive adults, leading to greater skills, fewer work days lost to illness, longer working lives and increased productivity and progress. (5) Adolescents need an environment that protects them from trauma, excessive stress, abuse, and violence (or fear of violence); and provides positive, close relationships with family, adults (within and outside family) and peers. Such an environment motivates and supports the healthy development and positive behavioral choices of adolescents. Studies done in Gulf Corporation Council countries show that prevalence of current smoking among adolescents ranges from 20%-29% in Saudi Arabia (6), 19% in the United Arab Emirates (7), 19.6% in Yemen (8) and 4.6% in Oman which is much lower than other studies. (9) The prevalence of ever drinking alcohol (4.3%) (96) in Oman is much less than that found among university students in Lebanon (49.4%).(10) In Oman 33.9% of secondary school students liked to drive fast and 33.3% reported driving without a license. (9) In Qatar smoking is increasing among all youths (15-18 years old) from 13% in 1998 to 18% in 2001 according to the Global Youth Tobacco Survey (GYTS). (11) Road traffic injuries in Qatar represent a major burden particularly among young Qataris. They are the third leading cause of death, particularly among the young adults. (12) In Qatar emerging behaviors between secondary school students like smokeless tobacco use (sweeka) and smoking in the schools has been raised, however little is known about the accurate prevalence and magnitude of the problem. Health risk behaviors such as smoking, alcohol abuse, drug abuse, unsafe behaviors, and aggressive behaviors not only influence individual's health but also create burdens for the nation and society as a whole. Besides, some of the risk factors of risky behaviors can be modified. Adolescents spend a long time in school in which they get to know other people and join peer groups that may influence their behavior. School settings might also be a suitable environment to exchange illegal materials.

Methodology

Cross sectional survey of school students grade 10 to 12. Total number of governmental and Independent secondary schools in Qatar is 49 schools; divided into 22 schools for boys and 27 schools for girls and affiliated directly to the Ministry of Education and the Supreme Education Council. Total number of students in secondary schools during the academic year 2008/2009 was 18410 students.

Ethical Considerations

Parental permission was obtained before students' participation through a formal letter; the participation was voluntary and privacy and confidentiality were ensured. Students' desks were spread throughout the classroom to minimize the chance that students see each others' responses. Students also were encouraged to use an envelope, provided by the data collector, to enclose their responses after they completed the questionnaire. Data entry; (SPSS) version #16; proportions mean and SD were used.

Results

617 students were approached and 561 students actually completed the questionnaires where 56 students were absent, refused or returned incomplete questionnaires which gave a response rate of 90.9%. The study shows that almost two thirds (63.4%) of the students lay in the age group of 16 and 17 years. Almost both genders were equally represented as 51% of them were males, while the rest were females. The highest frequency of the studied students was 10th graders (41.7%) while the least were the 12th graders (28.0%). Regarding nationality, approximately half of the students were Qatari (51.3%). Most of the students (56.1%) came from a family consisting of 6 to 9 persons while the least (19.6%) came from a family with 1 to 5 persons as shown in Table (1). Father's education for around half of the study sample (47.8%) was of secondary or university level while the least (5.7%) were only able to read and write. Mother's education followed the same trend; 46.1% had mother's education of secondary or university level, but the least (6.4%) had postgraduate education level. About 45.6% of the students get daily allowance between 5-10 Riyals while 8.7% get between 21-50 Riyals as shown in Table (2). Unlicensed driving in the past 30 days was the most prevalent health risk behavior among secondary school students. A percent of 43.7 students reported driving without license in the past 30 days. This was followed by involvement in a physical fight in the past 12 months, where 38.3% of the studied students did actually get involved in a physical fight. Not wearing seat belts also attained a high rank, where 31.4% of the studied group did not fasten their seat belts while they are in the car. Only 6.8%, 4.1% and 1.8% of the studied group had

Figure 1: Prevalence of health risk behaviors among studied secondary schools students
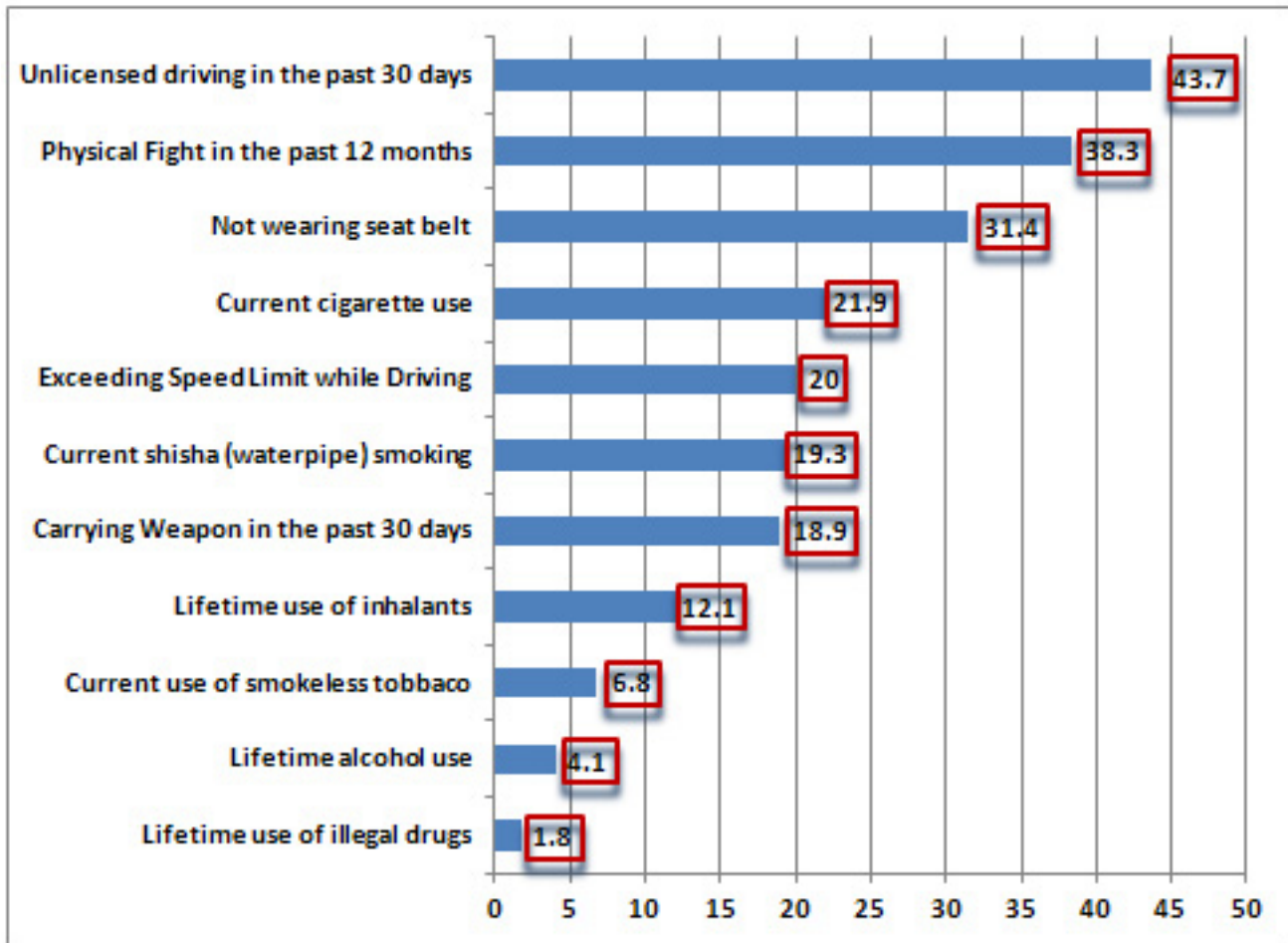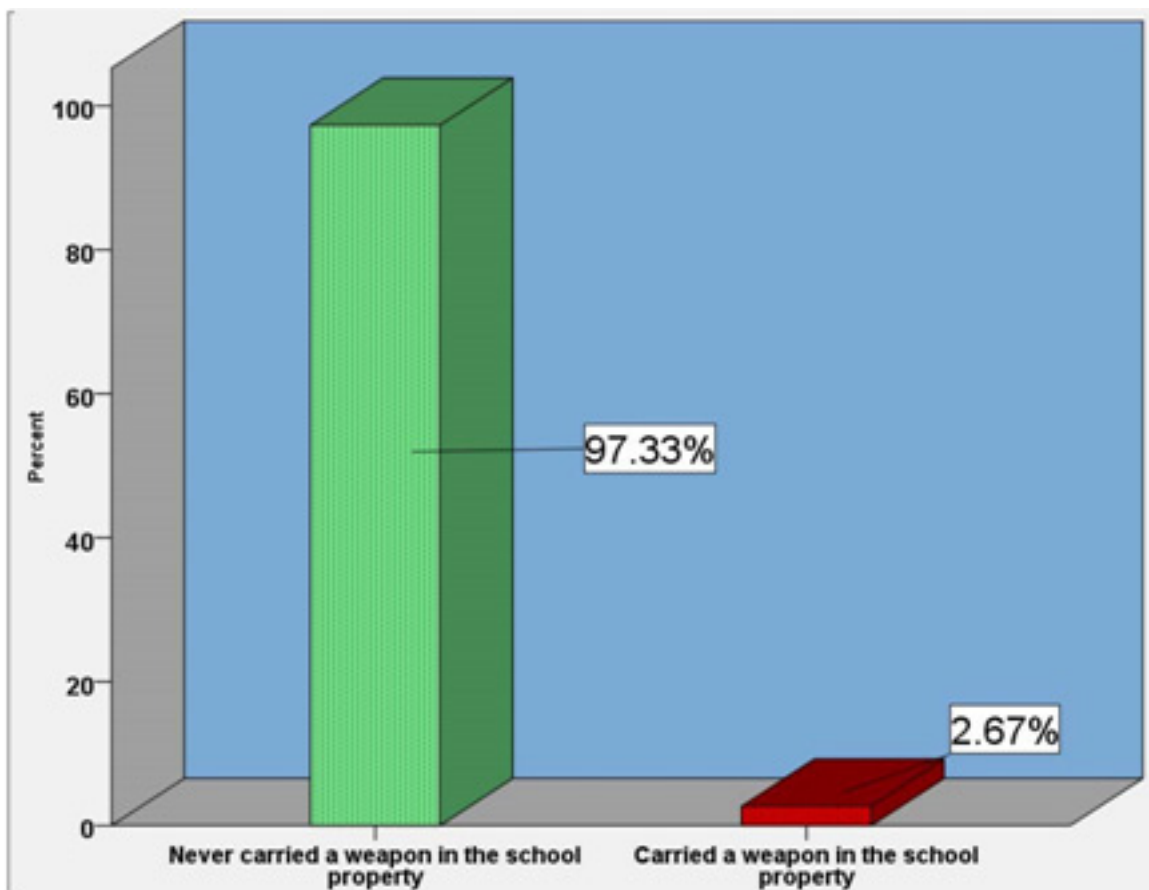

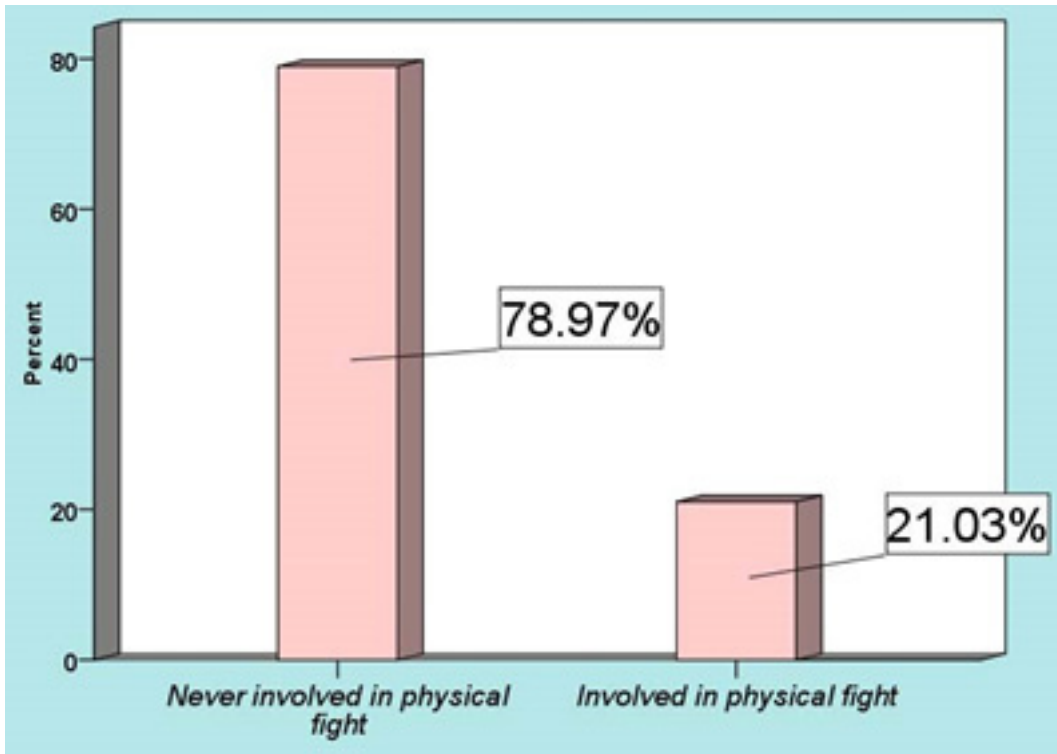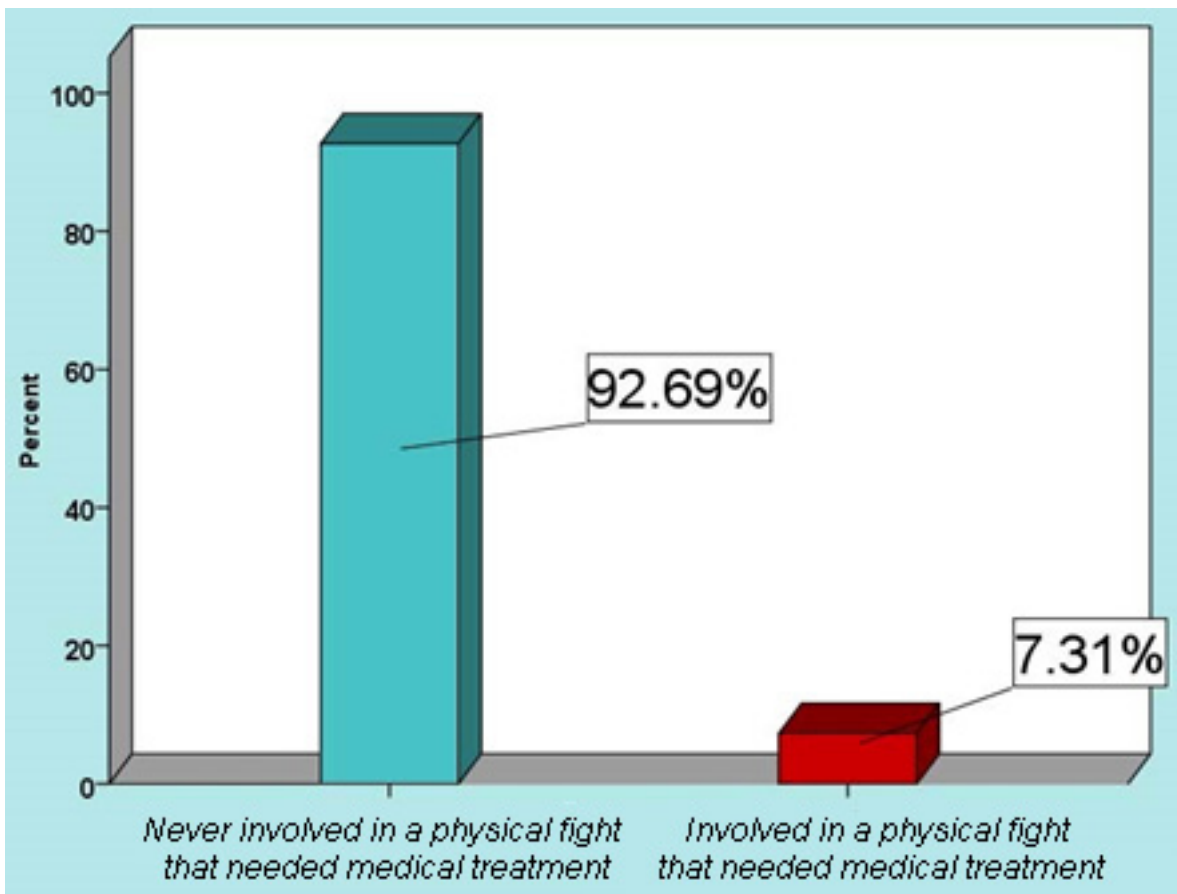**Figure 2: Carrying weapon in the school property**

Figure 3: Physical fight in the school property during the past 12 months

Figure 4: The need of medical treatment after involvement in physical fight

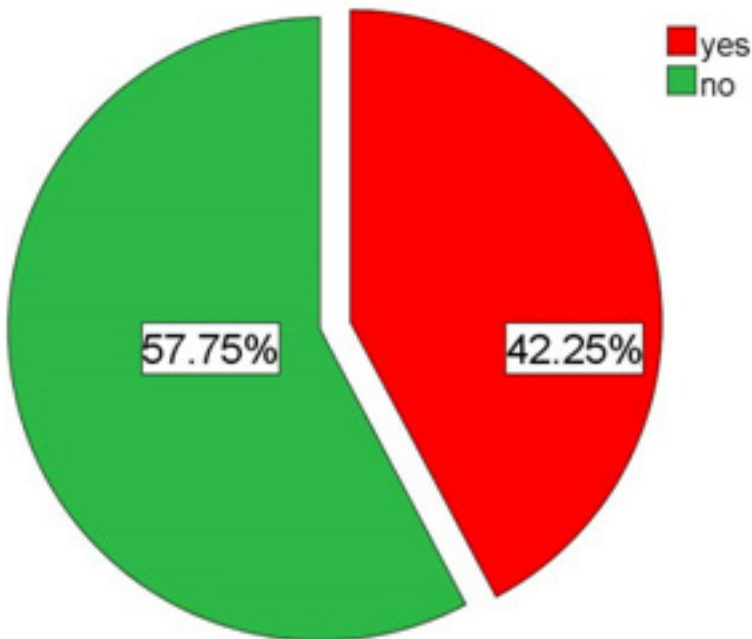**Figure 5: Lifetime cigarette use**
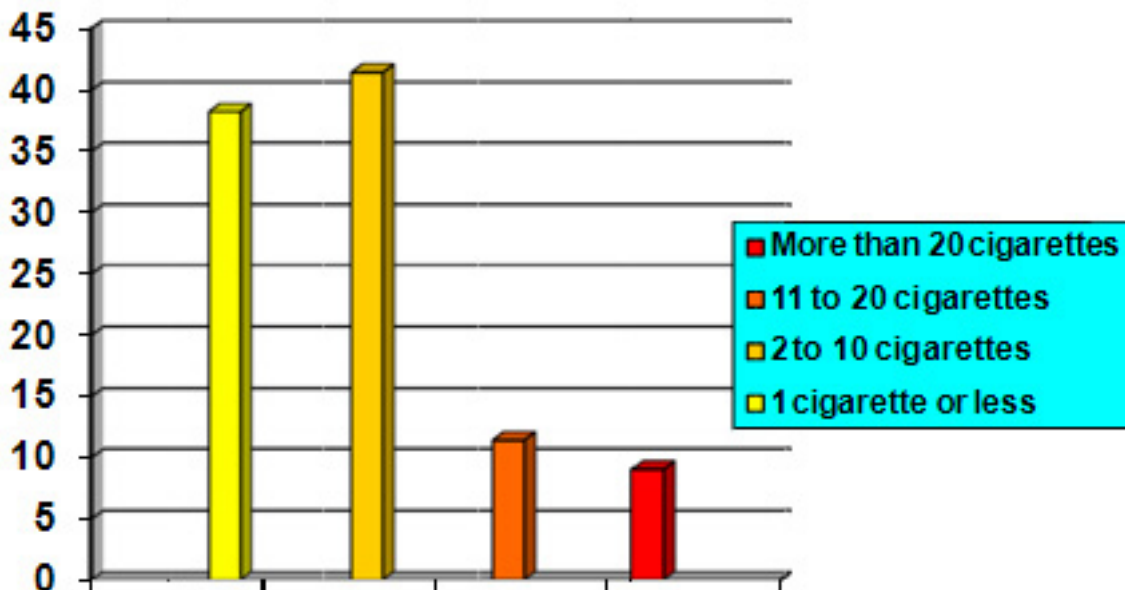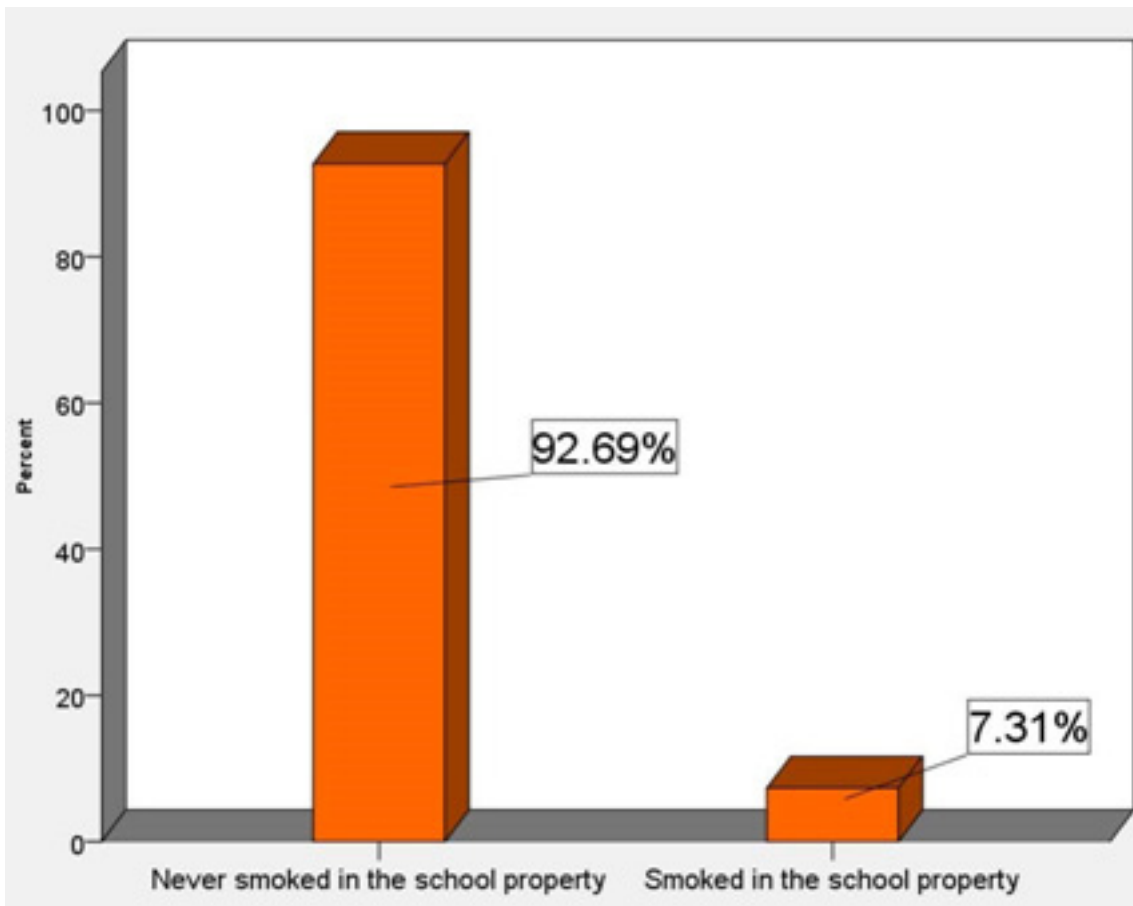
Ever Tried Cigarette Smoking

**Figure 6: Number of cigarettes smoked per day (n=123)**

used smokeless tobacco, ever used alcohol and ever used illegal drugs, respectively, as shown in Figure (1). It can be determined that there is a statistically significant relation with a p value of (0.01) between age and unlicensed driving. Students who were older in age (17 and 18 or more years) were more likely to drive without license in the past 30 days; 50.6% and 49.2% respectively. According to gender, males were found to be more prone to unlicensed driving (66.8%). This relation was proven to be statistically significant (p < 0.001). Among students who get 21-50 riyals, 57.1%reported unlicensed driving while among students who get < 5 riyals 32.8% reported this behavior and the difference was found to be statistically significant (p = 0.005) as shown in Table (3). It can be

determined that among younger students (15 years old) 38.6% did not wear seatbelts while among older students (18 years or more) 21.3% did not wear seat belts and the difference was found to be statistically significant (p =0.018). According to gender, females were found to be more prone to not wearing seat belts (44.7%) while among males 18.5% did not wear seatbelts. This relation was statistically significant (p <0.001). The prevalence of having never worn a seat belt was significantly higher among Qatari 44.1% than Non-Qatari 17.9% (chi-square 44.50, df 1, p <0.001). Among students who had fathers with preparatory level education the prevalence of having never worn a seat belt was higher (43.0%) than students who had postgraduate fathers (21.9%) and the difference

Figure 7: Prevalence of smoking in the school property during the past 30 days

Figure 8: Percentage of the students who smoked and tried to quit cigarette smoking
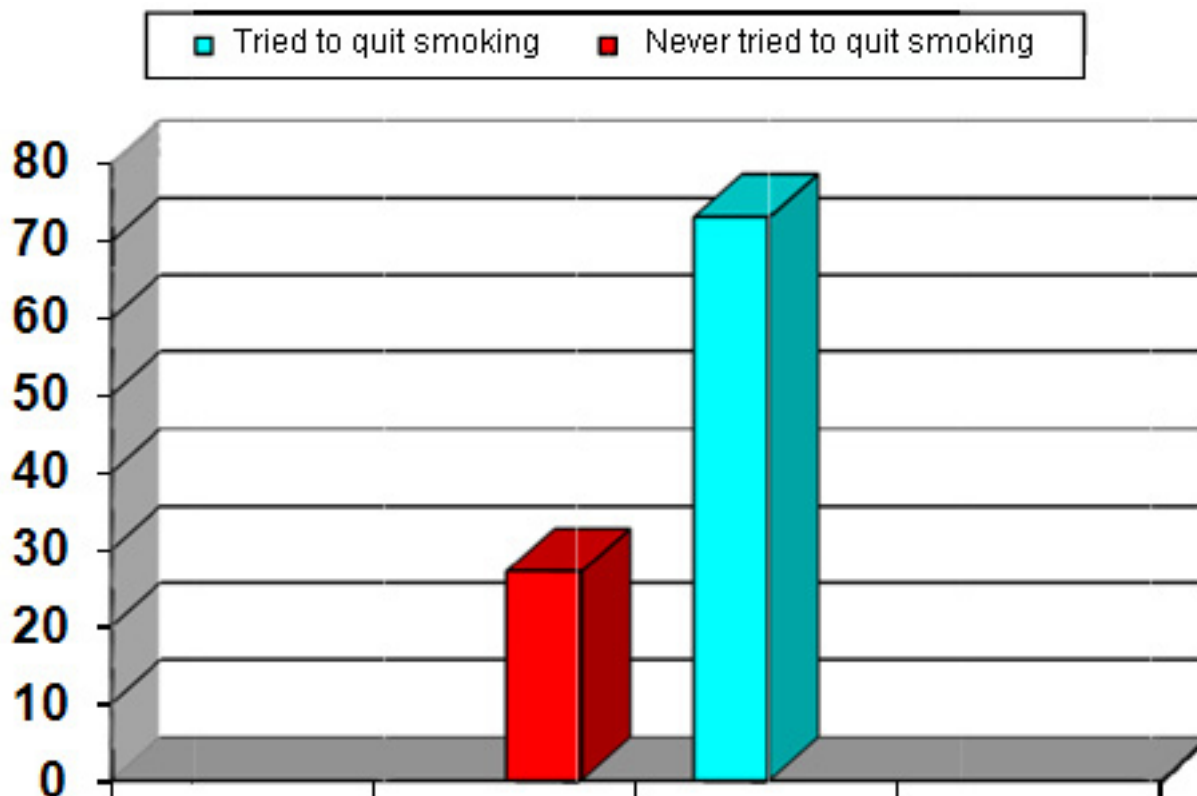
was proven to be statistically significant (p = 0.008). Also there was a statistically significant difference (p = 0.005) between mothers' education and having never worn a seat belt. Prevalence of having never worn a seat belt increased with amount of daily allowance the students get, which was statistically significant (p =0.016), as shown in table (4). A percentage of 20.0% of secondary schools students reported exceeding speed limits. It can be determined that there is a statistically significant relation (p =0.002) between age and exceeding speed limits. Males were found to be more prone to exceed speed limits (33.6%) while among females 5.8% reported the same behavior and the difference was statistically significant (p <0.001). The prevalence of exceeding speed limits was significantly higher among Qatari (25.0%) than Non-Qatari (14.7%) with a p value of 0.002. There is a statistically significant relation between father and mother education and exceeding speed limits. Regarding daily allowance, the prevalence of exceeding speed limits increased with amount of daily allowance the students get, as shown in table (5). This study showed a percent of 18.9 of secondary school students reported carrying a weapon in the past month. Carrying weapons is a male predominant risk behavior. Among males 25.5% carried a weapon in the past month while among females 12.0% reported the same behavior and the difference was statistically significant(p <0.001). The prevalence of having carried a weapon was higher among students who had fathers and mother who can read and write, as shown in Table (6). The majority of secondary schools students who had never carried a weapon in the school property in the past 30 days was 97.3% while the rest had carried a weapon in the school property as shown in Figure (2). There is a statistically significant relation between gender and physical fight in the past 12 months (p < 0.001). The distribution of secondary school students who were involved in a physical fight by parent's education and daily allowance was not statistically significant as shown in Table (7). A percentage of 21% of all secondary school students were involved in a physical fight in the past 12 months and 7.3% of them needed medical treatment by doctor or nurse after involvement in a physical fight as shown in Figures (3 & 4). As regards cigarette smoking 42.2% of all secondary school students had ever tried cigarette smoking, even one or two puffs, as shown in Figure (5). A percent of 21.9 of students had smoked cigarettes on at least 1 day during the 30 days before the survey. The prevalence of current cigarette use was higher among older students (18 years or more) 34.4% than younger students (15 years old) 9.6% and the difference was statistically significant (p <0.001). According to gender, males were found to be more prone to current cigarette use (36.0%) while among females (7.3%) currently smoked cigarettes and the difference was proven to be statistically significant (p<0.001). The prevalence of current cigarette use was higher among students who had mothers with secondary level of education (31.8%) while lower among students who had mothers with primary level of education and the difference was statistically significant (p =0.002) as shown in Table (8). There is 7.3% of secondary school students who smoked cigarettes in the school property in the past 30 days before the survey. The highest prevalence of

smoking in the school property was among male students (14.0 %) while there was just one female student (0.4%), as shown in Figures (6 & 7). A percentage of 72.7 who smoked tried to quit during the last 12 months as shown in Figure (8). The prevalence of current water pipe use among all secondary school students was 19.3%. Where there is a statistically significant relation between age and current shisha (water pipe) smoking (p < 0.001), current shisha (water pipe) use was significantly higher among male students (26.2%) than among female students (12.0%) and the difference was proven to be statistically significant (p <0.001).The prevalence of current water pipe use was significantly higher among Non-Qatari (24.5%) than Qatari students (14.2%). The prevalence of current shisha smoking was higher among students who get 11 to 20 riyals (29.1%) while lower among students who get less than 5 riyals (11.9%) and the difference was found to be statistically significant (p= .043), as shown in Table (9). The prevalence of life time inhalant use among secondary school students was 12.1%. Lifetime inhalant use is a female prominent health risk behavior. Among female students 16.0% had ever used inhalants while among male students 8.4% had ever used inhalants and the difference was statistically significant (p= 0.006), as shown in Table 10.

Discussion

This study was designed to explore the patterns of health risk behaviors among secondary school students in Qatar. The response rate among students was (90.9%) achieved. The mean age of secondary school students in Qatar was 17. The percentage of male students who participated in the study was 51% while 49% were female students which makes both genders comparable and consistent with Qatar statistics authority estimation that 50 % of secondary schools students were males and 50% were females. Most of the students (41.7%) were in the 10th grade. Almost half of the studied students, 51.3%, were Qatari while the leftover were non-Qatari which slightly differs to the distribution of the students by nationality during academic year 2007-2008 that is mentioned in the Qatar Statistics Authority with 63% for Qatari and 37% for Non-Qatari. (13) This difference may be attributed to the large increase in the number of expatriate residents, especially during the past four years. Most of the students (56.1%) came from families consisting of 6-9 persons, with a mean of 7 persons. The mean of family size is 7 persons in Qatar and Bahrain. These figures are considered as average numbers of family size in the gulf region. (14, 15) The present study showed that most of the parents of students had university and secondary schools level. A percent of 23.4, 24.4 of the fathers were secondary schools or university graduates respectively, while 3.5% and 22.6% of the mothers were secondary schools or university level respectively, which is similar to the results of the family health survey done in Qatar that showed that 31.4% of males and 33.8% of females are secondary/university graduates. (16). The present study showed that almost half 43.7% of secondary schools students drove a car without license in the past 30 days. Our findings replicated the findings of other studies;

in Oman a study done addressing health compromising behaviors among secondary school students showed that 33.4% of adolescents drove cars without a license. (9) Another study among Victorian learner drivers showed that 73% of them had driven a motor vehicle prior to obtaining their permit; at an average age of 16 years on public roads and 13 years elsewhere. (17) The high prevalence of unlicensed driving in Qatar can be explained by the availability of a big number of cars in the houses because of the affluent economic situation in the State of Qatar; next to the laxity of parents in granting the cars for adolescents. This study demonstrated that the prevalence of unlicensed driving is significantly higher among male students than female students (66.8% compared to 22.0%, respectively). This difference was demonstrated in another study on adolescents done in Oman which showed that 57.5% of male students and 12.2% of female students drove a car without a license.(9) To some extent the higher prevalence among the students, specifically female students, may be explained by time of conducting the study in March which was the time of camping in Qatar and the parents possibly will allow them to off road drive the cars in the desert. Age was strongly associated with unlicensed driving. The prevalence of unlicensed driving was found to be significantly higher with older students. This finding is consistent with another study done in Iowa in USA. (18) The prevalence of having never worn a seat belt in this study was 31.4%. This finding replicates the finding of a youth risk behavior survey done in Thailand which shows that 50.1% of adolescents had never worn a seat belt when riding in a car. (19) Another study done in India had shown that 52.4% of adolescents reported not always wearing a seat belt and about 18.5% reported rarely or never wearing a seat belt. (20) In Saudi Arabia a study conducted on students revealed that those who are wearing the seat belt as driver accounted for not more than 14% while those who wear it as passenger were only 7 %. (21) On the other hand USA youth risk behavior surveillance system showed significant linear decrease in the percentage of the high school students who rarely or never wore a seat belt during 2001 to 2007 from 26% to 11 %. (22) Our study demonstrated that the prevalence of having never worn a seat belt was significantly higher among female students than male students (44.7% compared to 18.5% respectively). Other studies had shown higher rates of rarely or never worn a seat belt among male students. Youth risk behavior surveillance in US shows that the prevalence of having rarely or never worn a seat belt was higher among male (13.6%) than female (8.5%) students.(23) On the other hand another study in Qatar done on people involved in RTAs showed that 67.4% of females and 66.1 % of males' did not wear seatbelts at the time of the road traffic crash. (24) Very high prevalence of never worn a seat belt among females students may be explained by the fact that most of female students usually sits in the back seats of cars and the law in Qatar gives the choice for passengers in the back seat either to use or not to use the seat belt; in other words its optional. The prevalence of having never worn a seat belt was significantly higher among Qatari (44.1%) than Non-Qatari (17.9%). The difference may be explained by the

high traffic violation fines which can be relatively affordable for Qatari than non- Qatari residents. High speed driving is a major cause of road traffic accidents and injuries which is the most common cause of deaths among adolescents. Motor-vehicle related injuries kill more young adults aged 15 to 19 years than any other single cause in the United States. (25) Studies showed that young beginner drivers are more likely than older drivers to perform risky driving behaviors such as speeding, close following, and smaller gap acceptance. (26) The crashes of young beginners are more likely than those of older drivers to involve single vehicle events, speeding, and driver error, reflecting their risk taking tendencies and inexperience. (27) The study shows that 20% of the secondary schools students exceeded speed limits while driving. A study done in Oman had shown that 33.9% of adolescents liked to drive fast (9) and another study done in Canada shows that among young drivers aged between 16-20 years and involved in road traffic accidents around 4.3% of male drivers were exceeding the speed limit compared with 1.6% of young female drivers. (28) Exceeding speed limit was significantly higher among older students .This finding was consistent with another study. (9) Exceeding speed limit was significantly a male prominent health risk behavior and this finding is comparable to the finding done in an Oman study which showed that 42.1% of male students and 26.3% of female students liked to speed while driving.(9) The prevalence of exceeding speed limits was significantly higher among Qataris (25.0%) than Non-Qataris (14.7%). This finding may be explained by a high desire to buy new cars, adjust cars, race and speed drive among Qatari than Non- Qatari residents. Also the prevalence of exceeding speed limits was significantly higher among students who had parents who are only able to read and write. This finding may be explained by the fact that lower level of parent's education could be a reason for low level of awareness and perceived seriousness of accidents and injuries resulting from high speed driving. This study indicates that the prevalence of exceeding speed limits increased significantly with a higher amount of daily allowance. This may be because students who get a higher amount of money can buy new cars and adjust them to speed drive. Violence has probably always been a part of human experience. Around the world, newspapers and the broadcast media report daily on violence by gangs, in schools, or by young people on the streets. The main victims and perpetrators of such violence, almost everywhere, are themselves adolescents and young adults. (29) Participating in physical fights and carrying of weapons are very serious health risk behaviors among adolescent violence, and forms basic types of violence. Our study shows that 18.9% of students had carried a weapon on at least 1 day during the 30 days before the survey. Although we have a different culture and population structure than that of the US, our findings were found to be consistent with the youth risk behavior surveillance done in US in 2007 which had shown that 18.0% of high school students had carried a weapon at least 1 day during the past 30 days before the survey. (23) Lower prevalence of carrying a weapon among adolescents was documented by the youth risk behavior survey done in Thailand which

shows that 8.5% of them had carried a weapon. (19) The current study indicates that the prevalence of having carried a weapon was significantly higher among male than female students. This finding is comparable to the finding of US YRBSS 2007 (23); which show that the prevalence of having carried a weapon was 28.5% among male students and 7.5% among female students. Higher prevalence of carrying a weapon among males in our study may be explained by the fact that some are common for security cultural practices like keeping thick sticks inside cars in case of facing any danger, is regularly practiced. Our study shows that lower grade students (10th and 11th grade) have higher prevalence of having carried a weapon than higher grade students (12th grade). This is maybe because older adolescents (18 years or more) are considered legally responsible for their actions under the Qatar law, causing them to be more cautious. The prevalence of having carried a weapon was detected to be significantly higher among Qatari than Non-Qatari students; this finding may be explained by the same cultural theory of security. Although the present study had showed that only 2.7% of the students had carried a weapon in the school property during the past month which was lower than the prevalence of youth risk behavior, surveillance US 2007 shows 5.9% of students exhibit the same behavior. This figure represents a major challenge to schools authority regarding school safety. In agreement with another study (9) our study shows that the prevalence of having carried a weapon in the school property was higher among males than females. This is biologically and psychologically plausible, and is consistent with the fact that violent actions are more the nature of boys than girls, especially in disciplined areas like school property. Involvement in physical fighting is very common among school students in many parts of the world. The present study shows 38.3% of students had been in a physical fight one or more times during the 12 months before the survey. This finding replicated the finding of other studies. (30, 31) A study done in Chile showed that 40.7% of school going adolescents had been involved in one or more physical fight in the month prior to survey. (30) In examining the relation between physical fight during the past 12 months and socio-demographic determinants, the only factor of statistical significance was gender. The prevalence of having been in a physical fight was higher among males than females. Cigarette use has spread throughout the world as a major source of morbidity and mortality and is a serious public health problem. (32) The present study shows that 42.2% of students had ever tried cigarette smoking (even one or two puffs). This finding was found to be higher than the prevalence shown by Qatar 2007 Global Youth Tobacco Survey which indicated that 22.2% of the students had ever smoked cigarettes. (33) The high prevalence in our study may be explained by the difference in age groups studied (secondary school students) and GYTS students. On the other hand, the prevalence of lifetime cigarette use was reported to be lower than that in youth risk behavior surveillance which showed that 50.3% of the students had ever tried cigarette smoking. (23) The prevalence of current tobacco use among secondary school students was 21.9%. This finding is inconsistent with Qatar 2007 GYTS which show about 8.4% students currently smoke cigarettes and is also inconsistent with a study done in Oman which shows that 4.6% of the students were currently smokers. (9) Higher prevalence may be explained by the time trend difference in prevalence and the rising epidemic of smoking among adolescents. The current study shows that current tobacco use was significantly related to age of the students. In agreement with another study done in the UAE, the prevalence of current cigarette use was higher among older students than younger students. (34) This study indicates that the prevalence of current smoking is significantly higher among males than females. This finding is consistent with Qatar 2007 GYTS which shows that the prevalence of current smoking among male students was 15.4% and 3.2% among female students. The gender difference may be explained by social acceptability in Arabian Gulf Countries of the smoking habit among males in general. However, the prevalence of current smoking among female students may be underestimated because of reporting bias. Current study showed that mother education was significantly related to current cigarette smoking. This finding was not consistent with other studies showing that cigarette smoking was inversely related to parental education level (35). Another study in Italy found little relationship between parental education and health risk behaviors (36). This finding may have resulted from a variety of societal and individual factors that vary by socioeconomic status and culture. The present study showed that among male students who currently smoked cigarettes 43.6% of them smoked between 2 to 10 cigarettes per day and 10.6% were heavy smokers and smoked more than 20 cigarettes per day, while among female students 70% of them smoked 1 cigarette or less per day while no female students were heavy smokers. This finding may be explained by the social acceptance of male smoking while females may face social stigma and find it difficult to smoke in open public places in a conservative and Islamic country. Our study demonstrates higher prevalence of smoking in the school property among male students than female students. The prevalence of smoking during the past 30 days in the school property was 14.0% among male students while just only 1 female student (0.4%) reported the same behavior. This finding may be because most of the male students who smoked usually prefer to smoke with their friends in the school toilets (personal observation) or any hidden corner in the school; on the other hand female students are less likely to exhibit this behavior in the school property because it may be seen as a social stigma. In agreement with other studies (37, 38, 39), most of the students who currently smoked cigarettes, had tried to quit smoking. The recent increase in the use of water pipes for tobacco smoking in the Eastern Mediterranean Region represents both a modern renaissance of an old public health threat and the emergence of a new tobacco epidemic. The prevalence of current shisha (water pipe) use was 19.3 %, similar to the prevalence reported among Egyptian secondary school students that found 19% of them had tried a water pipe. (40) Other studies done in Arab countries also showed an increasing prevalence of water pipe smoking much more

than that observed in Qatar. In the Syrian Arab Republic, about half of university students report having ever used a water pipe, and about a quarter of males currently smoke it. (41) In Lebanon, 30.6% of male students and 23.4% of female students at Beirut universities reported current, weekly water pipe use in 2001. (42) This study demonstrated that there is a statistically significant relation between age and current shisha (water pipe) use. The prevalence of current shisha (water pipe) use is higher among older students than among younger ones. This finding may be because cafes serving shisha (water pipe) legally do not offer it to people younger than 18 years old. In agreement with another study done in Lebanon the prevalence of current shisha (water pipe) use was significantly higher among males than females.(42) On the other hand the prevalence of current water pipe use among female students was higher than current cigarette use among female students. This finding may be because there is more social acceptance for shisha water pipe than smoking cigarettes. It is believed to promote social and family gathering in some Arabic countries. In our study the prevalence of current shisha (water pipe) use was significantly higher among Non-Qataris (24.5%) than Qataris (14.2%). This finding could be explained by the fact that shisha (water pipe) use may be more popular in the culture of other Arab Countries in the Eastern Mediterranean Region than in Qatar. Also the study shows a significantly higher prevalence of current shisha (water pipe) use among students who get 11-20 Riyals, than students who get less than 5 Riyals. This may be because the price of smoking a shisha (water pipe) in a cafe varies between 5 to 20 Riyals which can be only afforded by the students who get a higher allowance. The use of volatile solvents and inhalants occurs in all regions of the world and is a problem in many countries. These substances are often used by children and adolescents and the health consequences of their use are particularly significant. In our study the prevalence of life time inhalant use among secondary school students was detected as 12.1%. This finding is consistent with other studies. In Europe, rates of ever use of inhalant for students between 15 and 16 year olds varied between 18% in Ireland and 3% in Bulgaria. (43) Another study done among university students in Egypt showed that 18.2% of the students had ever sniffed substances such as petrol products, paints and sprays. (44) Higher prevalence of lifetime inhalant use among female students was documented in our study. This finding replicates the findings of other studies. Studies among school students from the sixth to 10th grade in Florida have documented significantly higher rates among females than males for lifetime and current use. (45) In Ontario, Canada, the annual rates of glue and solvent use among students in the seventh to 12th grades in 2007 was higher for females than for males. (46) Use among very young girls has also been reported in southern African countries. (47) The study shows a significantly higher prevalence of lifetime inhalant use among 11th grade students than 10th grade students. This finding may be because high grade students are generally more prone to exhibit health risk behaviors than those in lower grades.

Limitations of the Study

This study is self-reported, and the extent of under reporting or over reporting of behaviors cannot be determined. This study did not investigate all the six categories of priority health risk behaviors in the youth health risk behavior surveillance system adopted by centers for disease control and prevention (CDC) due to feasibility and time factor limits. Social desirability bias cannot be excluded.

Conclusion

The present study concludes that: The prevalence of health risk behaviors among secondary school students in Qatar was found to attain a relatively high level. Behaviors leading to unintentional and intentional injuries were the most common health risk behaviors among secondary school students in Qatar. Most of the health risk behaviors were strongly associated with gender; significantly higher among male students than females except for the life time inhalant use and never wearing seat belt, which were significantly higher among female students. Qatari students were found to have significantly higher prevalence of never wearing seatbelts, exceeding speed limits, carrying a weapon in the past month prior to study, than non-Qataris who had a significantly higher prevalence of current water pipe smoking than Qatari students.

Recommendations

Increasing awareness among secondary school students about dangerous effects associated with health risk behaviors through a progressive school-based health education programs throughout secondary school curriculum. Establishment of youth friendly health services in youth centers or primary health care centers offering effective health services and addressing the needs of adolescents. Increasing the cooperation between the traffic department in the ministry of interior and secondary schools to increase traffic awareness and to address prevention programs regarding accidents and injuries. Youth risk behavior studies should be repeated every two years to monitor time trend prevalence of health risk behaviors.

References

1- World Health Organization. Programming for adolescent health and development. WHO, Geneva, 1999.
2- World Health Organization, The second decade: Improving adolescent health and development. Geneva, 2001 (WHO/FRH/ADH/98.18 Rev 1).
3- World Health Organization. Technical Discussions: The year of Youth Facts for Action. Youth and Drugs. WHO Publication, Geneva, 1989.
4- World Health Organization .World health report 1999: making a difference. Geneva, 1999.

5- Centers for Disease Control and Prevention (CDC). Increasing Physical Activity: A Report on Recommendations of the Task Force on Community Preventive Services. MMWR 2001; 50(No. RR-18).

6- Al Yousef M, Karim A. Prevalence of smoking among high school students. Saudi medical journal, 2001, 22(10): 8723–4.

7- Bener A, Al-Ketbi LM. Cigarette smoking habits among high school boys in a developing country. Journal of the Royal Society of Health, 1999, 119(3):166–9.

8- Mooij T. Safe schools and positive social behavior: an evaluation of the "Safe schools" campaign in continuing education. Nijmegen, Institute for Applied Social Sciences, University of Nijmegen, 2001.

9- Jaffer YA, Afifi M, Al Ajmi F, knowledge attitude and practices of secondary school pupils in Oman. Eastern Mediterranean Health Journal. 2006. Vol 12. Nos1/2.

10- Karam E. Use and abuse of licit and illicit substances: prevalence and risk factors among students in Lebanon. European addiction research, 2006, (4): 189–197.

11- Gulf Tobacco Control Comittee, Gulf Plan For Tobacco Control In The Corporation Council States And The Strategy Of Implementation 1st edition (2006) . Executive Board of the Health Minister's council for Cooperation Council States. Saudi Arabia.

12- Bener A: The neglected epidemic: Road traffic accidents in a developing country: State of Qatar. Int J Inj Contr Saf Promot 2005; 12:45–47.

13- Qatar Statistics Authority. Qatar Population and Social statistics. Annual abstract 2008

14- Al-Jaber K, Farid S. Qatar Family Health Survey 1998. Doha: Ministry of health: King Fahd National Library, 2000.

15- Musaiger A, Al-sayyad J. Nutritional status of mothers and preschool children in Bahrain. Bahrain: Bahrain center for studies and research, 1999.

16- Al-Jaber K A, Farid S. Qatar Family Health Survey 1998. Doha: Ministry of health: King Fahd National Library, 2000.

17- Harrison W. Investigation of the driving experience of a sample of Victorian learner drivers.Acc Anal & Prev, 885-891.

18- Schootman M. Safety behavior among Iowa junior high and high school students. American journal of public health, 1993, 83(11):1628–30.

19- Hetrakul P, kongskon R. Youth risk behavior survey: Bangkok, Thailand. Journal of adolescent health 2005 ;(36):227-235.

20- Sharma R, Grover V, Chaturvedi S. Health-Risk Behaviors Related to Road Safety among Adolescent Students. Indian Journal Medical Sciences, December 2007, (61): 656-662.

21- Aba-alkhail B, Melaat W, Albar H. Traffic accident in Jeddah city for year 1417. Jeddah, Saudi Arabia: King Ab.aziz university press, 1997.

22- CDC. The Health Consequences of Smoking: A Report of the Surgeon General. Atlanta, GA: U.S. Department of Health and Human Services, 2004. Available at: http://www.cdc.gov/tobacco/data_statistics/sgr/sgr_ 2004/index.htm#full.

23- Centers for Disease Control and Prevention. Youth Risk Behavior Surveillance— United States, 2007. Morbidity and Mortality Weekly Report 2008; 57(SS-4):1- 131.

24- Munk M, Carboneau D, Herdan M, Ali F. Seatbelt Use in Qatar in Association with Severe Injuries and Death in the Prehospital Setting. Pdm, 2008, 23:6, 547- 552.

25- Romanowicz P, Gebers M. Teen and senior drivers. Sacramento, CA: California Department of Motor Vehicles, 1990.

26- Jonah B. Sensation seeking and risky driving: a review and synthesis of the literature. Acc Anal Prev 1997; 29:651–65.

27- Williams A, Preusser D, Ulmer R. Characteristics of fatal crashes of young drivers: implications for licensing policies. J Public Health Policy 1995;16:347– 60.

28- Mao Y, Zhang J, Robbins G, Clarke K, Lam M, Pickett W. Factors affecting the severity of motor vehicle traffic crashes involving young drivers in Ontario, Injury Prevention Journal 1997; (3): 183–189.

29- Reza A, Krug E, Mercy J. Epidemiology of violent deaths in the world. Injury Prevention, 2001, 7:104–111.

30- Rudatisikira E, Mulla A, Siziya S. Prevalence and correlates of physical fighting among school-going adolescents in Santiago. Ren Bars Psiquitr 2008; (3):197-202.

31- Mahalik J, Burns S, Syzdek M. Masculinity and perceived health behaviors as predictors of men's health behaviors. Soc Sci Med 2007, 64:2201-2209.

32- Louie D. The effects of cigarette smoking on cardiopulmonary function and exercise tolerance in teenagers. Canadian respiratory journal, 2001, 8:289–91.

33- 100. World Health Organization. Qatar Global Youth Tobacco Survey. (GYTS) Fact Sheet.2007.

34- Mandil A, Hussein A, omer H, Turki G, gaber I. Characteristics and risk factors of tobacco consumption among university of Sharjah students,2005. Eastern Mediterranean Health Journal 2007, (13): No 6.

35- Lowry R, Kann L, Collins JL, Kolbe LJ. The effect of socioeconomic status on chronic disease risk behaviors among US adolescents: JAMA 1996;276(10) 792-797.

36- Tuinstra J, Groothoff J, Van Den Heuvel W. Post D socioeconomic differences in health risk behavior in adolescents do they exist? Soc Sci Med. 1998:47(1)67-74.

37- Haddad L, Malak M. Smoking habits and attitudes towards smoking among university students in Jordan. International journal of nursing studies, 2002, 39(8):793–802.

38- Hasim TJ. Smoking habits of students in College of Applied Medical Science, Saudi Arabia. Saudi medical journal, 2000, 21(1):76–80.

39- Bener A, Stewart T, Al-Ketabi L. Cigarette smoking habits among high school boys in the United Arab Emirates. International quarterly of community health education, 1999, 18:209–22.

40- Gadalla S, Aboul Fotouh A, El-Setouhy M, Mikhail N, Fatma Abdel-Aziz F, Mostafa K. Mohamed MK, Kamal A, Ebenezer Israel E: Prevalence of smoking among rural secondary school students in Qalyubiyah Governorate. Journal of the Egyptian Society of Parasitology, 2005, 33(3 suppl):1031–50.

41- Maziak W, Fouad FM, Asfar T, Hammal F, Bachir EM, Rastam S, Essenberg T, Ward KD. Prevalence and characteristics of narghile smoking among university students in Syria. International journal of tuberculosis and lung disease, 2004, 8(7):882–9.

42- Tamim H, Terro A, Kassem H, Ghazi A, Abou Khamis T, Hay MM, Musharrafieh U. Tobacco use by university students, Lebanon, 2001. Addiction, 2003, 98(7):933–9.

43- Observatorio Europeo de las Drogas y las Toxicomanı́as. Informe anual 2007: el problema de la drogodependencia en Europa. Luxemburg: Oficina de Publicaciones Oficiales de las comunidades Europeas 2007, Available from: http://www.stats05.emcdda.europa.eu/en/elements/eyetab02-en.html.

44- Refaat A, Practice and awareness of health risk behaviour among Egyptian university students. Eastren Meditreanean Health Journal 2004, (10):72-81.

45- Siqueira L, Crandall L. Inhalant use in Florida youth. Subst Abuse 2006;27:27– 35.

46- Adalaf E, Paglia A. Drug use among Ontario students 1997–2007. Available from: http://www.camh.net/Research/Areas_of_research/ Population_Life_Course_Studies/OSDUS/OSDUHS2007_DrugDetailed_ final.pdf.

47- World Health Organization. Substance use in Southern Africa. Knowledge, attitudes, practices and opportunities for intervention. Summary of Characteristics and risk factors of tobacco consumption among university of Sharjah students baseline assessments in the Republic of South Africa, the United Republic of Tanzania and the Republic of Zambia; Available from: http://www.who.int/mental_health/media/en/707.pdf.

Can Structured Education Improve Metabolic Outcome and Quality of Life in Diabetes? A Systematic Review of Randomised Controlled Trials

Osama Moheb Ibrahim Mohamed (1)
Mohamed Hassanein (2)

(1) Osama Moheb Ibrahim Mohamed, MBBCh, MSc , MD Family medicine, MSc Diabetes Cardiff, UK , Consultant Family Medicine, Ambulatory Health Services, SEHA corporate, Abu Dhabi, UAE
(2) Mohamed Hassanein, FRCP-Lon, FRCP-Edin, MPhil. Consultant Endocrinology, Dubai Hospital, Dubai Health Authority, Dubai, UAE

Correspondence:
Dr. Osama Moheb Ibrahim Mohamed
Ambulatory Health Services, SEHA corporate, Abu Dhabi, UAE
Email: osamamohebibrahim@gmail.com

Abstract

Background: Diabetes people who want to live a good quality of life will need to be educated about management of their illness. Although structured education is essential to provide diabetic patients with the necessary self-management knowledge and skills to achieve accepted glycaemic control still there is a controversy on the effectiveness of the current structured diabetes education Programs (SDEP).

Objective: To evaluate the effectiveness of SDEP on metabolic outcomes and quality of life among diabetic patients.

Methods: A systematic review of randomized controlled trials (RCT) published between 2002 and 2013 on SDEP.

Results: This study identified 19 trials (9378 participants); 12 of them had low risk of bias, 3 had unclear risk of bias and 4 had high risk of bias. The number of participant per study ranged from 84 to 1054 participants. All included studies used HbA1c as a primary outcome measure and most of studies measured psychosocial outcomes e.g. quality of life and depression.

Thirteen out of 19 trials demonstrated a significant glycated haemoglobin (HbA1c) reduction in intervention group compared to control group at the end of the intervention while 6 trials did not demonstrate a significant change. Seven trials out of 16 demonstrated statistically significant reduction in Body Mass Index(BMI) or weight in intervention group. Nine trials evaluated the effect of structured diabetes education on quality of life, 3 of them reported significant improvement in the intervention group compared to the control group at the end of intervention.

Conclusion: The results of this systematic review showed that structured diabetes education has a positive impact on biomedical and quality of life on diabetic patients especially with some degree of reinforcement at additional points of contacts. Further research is needed to evaluate the effect of education on longer duration.

Key words: Structured education, metabolic outcome, diabetes, quality of life

Introduction

The Global prevalence and burden of diabetes has reached epidemic proportions in most populations. It was estimated that 366 million of the world population were diabetics in 2011; by 2030 this number will be increased to 552 million. Diabetes is a major leading cause of death; 4.6 million died due to diabetes complications in 2011. The cost of treatment of diabetes and its complications was 11% of total world healthcare expenditures in 2011. (1)

The importance of patient education is evident from studies reporting that patients who never attended structured diabetes education showed four-fold increased risk of diabetes complications. (2)

Many studies showed that only 26 - 36 % of diabetic patients had attended a course to help them manage their diabetes since diagnosis(3, 4). The average duration of a diabetic patient visit with a primary care provider was 16.1 minutes; of all primary care office consultations 14.3% received diet or nutrition counselling, 10% received exercise counselling, and 3.6% received weight-management counselling. (5) Studies have shown that there is 50-80% shortage of knowledge and skills in patients with diabetes and the recommended glycaemic control is achieved in less than 60% of diabetic patients (6)
.
Globally, structured education is considered an important tool for Diabetes management; in the UK, the national institute for health and clinical excellence (NICE), Clinical Excellence guidelines for diabetes (7) and National Service Framework for Diabetes (8) adopted providing a structured diabetes education from the time of diagnosis. Similarly the American Diabetes Association (ADA) recommended that diabetes education should be started from the time of diagnosis as well. (9)

Health education of diabetic patients is a therapeutic action that helps patients to acquire the necessary knowledge and to develop abilities and skills to improve self-management (10). Although it is well known that lifestyle modification and good compliance to management are important, adults with chronic diseases are often having difficulties to achieve these changes.(11)

Many factors of the educational process might be related to this difficulty. Adults have different abilities from school-age children in their accumulated experience, maturity, independence, and self-determination. They need to know the reasons for learning something new, and they only acquire new knowledge and skills if the topic being addressed is related to their daily life routine(12). Learning process can occur with continuous motivation and stimulation throughout the treatment so a specific structured education is important to promote, update, and maintain proper health related knowledge, attitudes and skills. (13)

Studies of diabetes education programmes have reported conflicting results on the outcomes; some studies of structured diabetes education reported improvement of self-efficacy, biomedical outcomes and quality of life (14).

On one hand some trials conducted with Type 2 diabetes demonstrated better dietary and medication adherence, more frequent self-monitoring blood glucose (SMBG), physical activity (15), enhancement of self-efficacy(16) and is likely to be cost effective compared to usual diabetes care (17). Another study to evaluate the impact of SDEP on type 1 diabetic patients (18) on biomedical and quality of life parameters showed a significant reduction in HbA1c at 6 months in intervention group, sustained at around 0.5% at 1 year after the course (19). The cost-benefit analysis demonstrated that it is better than current standard practice and has modest effects on survival, and yields significant improvements in quality of life.(20)

On the other hand in a study (21) of adults with newly diagnosed type 2 diabetes, SDEP demonstrated benefits in weight control, quitting smoking and health beliefs about diabetes but no difference in A1c at 12 months after diagnosis. The follow up study(22) of the same patients demonstrated a favourable effect on body mass index, risk factors, beliefs and health practices, but no effect on the level of HbA1c in the intervention group at one and three years compared to control group.

Because of controversy on the effectiveness of SDEP, this study was aiming to review the impact of latest evidence and recommendation regarding diabetes education and to discuss the differences in studies design which could have had an impact on outcome.

Methods

1) **Study design:** this was a systematic review to study the impact of SDEP on self-management of patients with diabetes.
2) **Eligibility criteria:**   randomized controlled trials studying the impact of SDEP on promoting diabetes self-management and met the following criteria were included: randomized controlled trials, studies published in the English language, studies identified from an electronic database, studies meeting the definition of SDEP by NICE(7), documented specific learning objectives and delivered by a trained diabetes educator. Articles published between years 2002 and 2013 for type 1 and type 2 diabetes regardless of the age of participants and considered HbA1c as a primary outcome measure, were included. Articles and reviews which present the author's opinion rather than evidence, and education programmes published before year 2002, were excluded
3) **Information sources:** the PubMed and Cochrane databases were searched for relevant RCT in structured diabetes education between January 2002 and August 2013. Key word searches were based on the search terms and included RCT, controlled clinical trials, random allocation, diabetes, SDEP.
4) **Selection of included trials:** titles, abstracts and key words of every study were screened for selection of eligible articles. Full articles were reviewed for more assessment

Figure 1
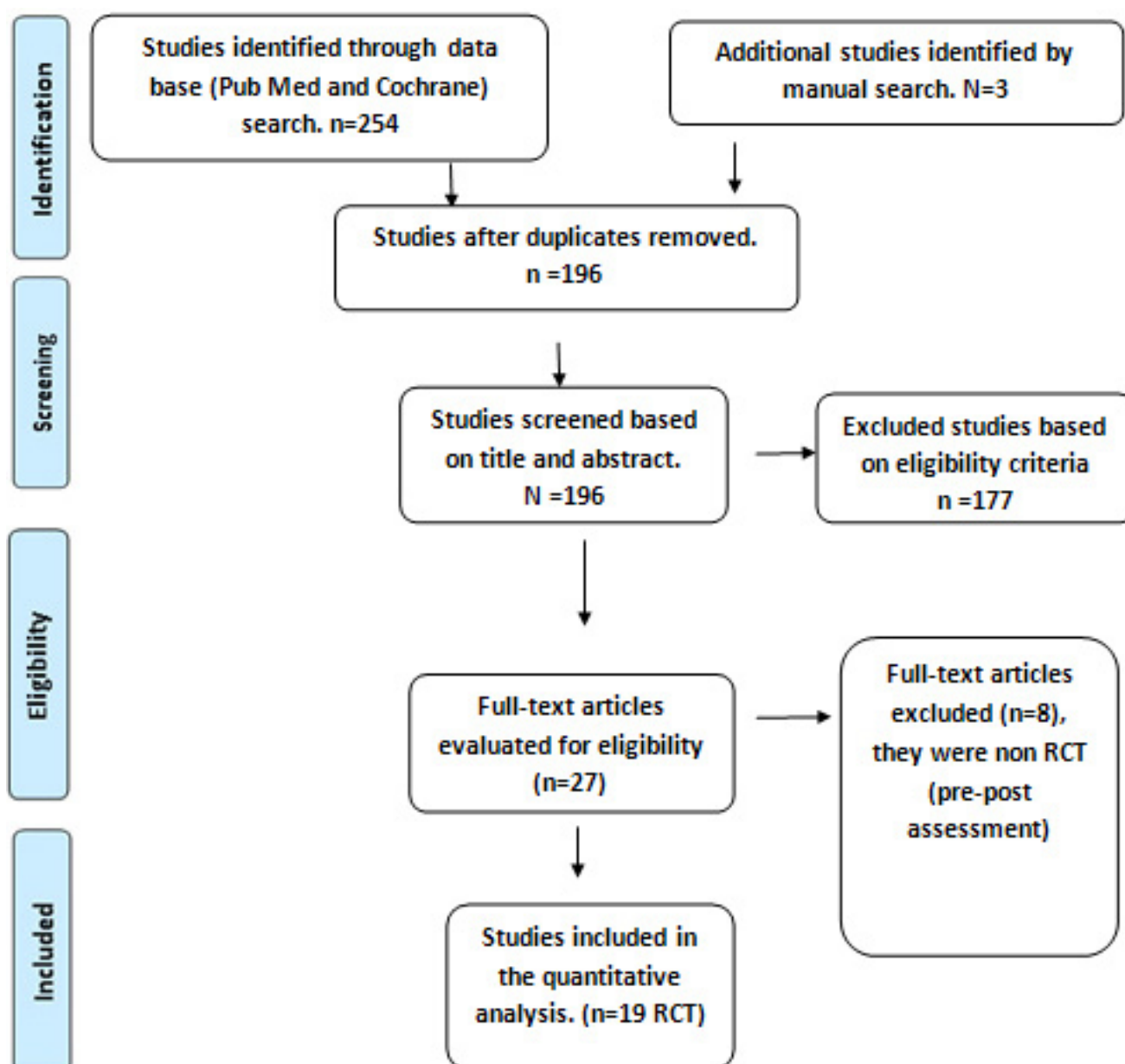
if there were indications based on titles and abstracts suggesting that the study met the eligibility criteria study selection were performed by the researchers to identify the included studies according to the inclusion and exclusion criteria, with disagreement resolved by discussion between researchers. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (23) chart was used to present the flow of information through different phases of study selection. (Figure 1)

5) Data items: information was extracted from individual studies regarding:
1) Participant characteristics including age, number of participants.
2) Type of intervention including number of teaching sessions, duration of intervention.
3) Type of outcome measures including HbA1c, cholesterol and triglycerides, blood pressure, BMI, knowledge, quality of life and hypoglycemic episodes.

6) Data collection process: data extraction forms were developed by the researchers to present the extracted data. Data extraction forms included the following: general characteristics of included studies, risk of bias assessment of every included RCT, systolic and diastolic blood pressure, BMI, lipids, quality of life and episodes of hypoglycaemia.

7) Risk of bias in included studies: The validity of eligible RCT was determined by the following parameters according to Cochrane's tool for assigning risk of bias(24); the adequacy of sequence generation, randomization and concealment of allocation, data collectors and, outcome assessors, blindness and completing primary outcome. Trials were classified as (low risk i.e. low risk of bias), (high risk i.e. high risk of bias), and (unclear risk of bias i.e. lack of information regarding the research methods used).

8) Summary measures: Mean and standard deviation was used to assess the difference between continuous data, significant change was considered if p - value > 0.05%.Knowledge and quality of life data were extracted

only if validated questionnaire score was used. Hypoglycemia is evaluated by the number of hypoglycemic episodes per person per year; symptomatic hypoglycemia is evaluated by patient self-report and medical records using number of episodes/person/year; severe hypoglycemia is defined as an event requiring assistance of another person. (25)

9) Outcome measurements: HbA1c is an indicator that reflects glucose levels in the blood over a three month period, Blood pressure (BP) and blood lipids (cholesterol and triglycerides), BMI and weight, Episodes of acute complications; hypo glycaemia, Quality of life indicators, Patient's knowledge

Results

1. Study Selection: The search strategy of two electronic databases Pub Med-NCBI -National library of Medicine identified 125 studies and Cochrane library identified 129 studies; another 3 studies were identified by manual search, giving a total number of 257. After excluding the duplicates the remaining studies were 196; of these 177 studies were excluded based on abstract screening for eligibility as they were irrelevant to the current study. Twenty seven full articles were evaluated for eligibility based on inclusion and exclusion criteria resulting in exclusion of another 8 articles that were irrelevant. Nineteen studies(18, 21, 22, 26-41) were assessed and met the eligibility criteria. The processes of filtering the searched studies was presented in Figure 1 according to PRISMA flow chart.(23)

2. Study Characteristics: A total of 19 studies (18, 21, 22, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41) were included. They have a combined population size of 9387 patients. The included studies were generally focused on evaluations of metabolic control, quality of life and self-management in both type 1 and type 2 diabetes. Topics that were covered in the intervention groups were nutrition, weight, HbA1c level, blood lipids, blood pressure, quality of life and psychosocial aspects. The interventions were derived by trained certified health care personnel in 15 trials (18, 22, 28-30, 32-41) while educator qualifications were mentioned in the remaining 4 trials (26,27,31,37). All the studies used group approach to their intervention except one study which used group training followed by one to one education during the follow up visits(35). The control group in all the included studies received the usual care without any specific intervention. The number of participants per study ranged from 84 to 1054 participants and assessment of outcomes were at baseline in all studies and extended up to 3/6/12/18 months and 2 / 5 years in 2 RCTs (36, 42). Inclusion criteria were mentioned in all included studies. The age of participants ranged from 18 to 75 years in type 1 and T2DM. All included studies used HbA1c as a primary outcome measure. The studies were ordered by type date and size (most recent and largest first). Table 1 shows more details about characteristics of included studies.

3. Risk of bias assessment in included RCT
The quality of studies and risk of bias were assessed according to Cochrane's tool for assessing risk of bias (35). The quality of included studies was generally satisfactory; there were 3 studies (28,29,38) classified as unclear risk of bias because it was not clear in these studies whether the data collectors and outcome assessors were blind or not. Four (31,35,39,41) out of 19 studies were classified as high risk of bias because the methods used to generate the allocation sequences and conceal the allocation were not clear. The rest of studies (12 out of 19 studies) (18, 21, 22, 26,27, 30, 32, 33, 34, 36, 37, 40) were classified as low risk of bias because the methods used to generate and conceal the allocation and to describe the blinding methods of data collection and outcome assessment were clear. Table 2 demonstrated Risk of bias assessment of included RCT according to Cochrane's tool for assigning risk of bias.

4. Primary outcomes
All included studies 18, 21, 22, 26-41 measured HbA1c at baseline and at the end of the intervention Table 3. There were no significant differences between intervention and control groups before the intervention in all included trials. After intervention and follow up period 13 studies (18,26,2 7,28,29,31,32,33,34,35,36,37,41) out of 19 demonstrated significant reductions in A1c in the intervention group compared to control group where A1c levels were shown to have decreased in intervention groups, the remaining 6 studies 21, 22,30,38,39,40 did not demonstrate a significant change in A1c after the intervention. Three studies (21, 22, 46) followed the patients for a long period: two of them (46, 47) demonstrated a significant impact of structured diabetes education in 2 and 5 years consecutively, on the other hand one study 22 did not demonstrate significant difference after 3 years follow up. All studies (21,26,27, 28,29,33,,34,37,38,39) that assessed A1c after one year or less demonstrated significant change except one study 21 that reported insignificant reduction in A1c level in both intervention group and control group after one year of follow up in a relatively large number of participants (824 adults) compared to the other included trials.

5. Secondary outcomes
5.1 Blood Pressure: Blood Pressure measurement was a secondary outcome in a few structured diabetes studies. Only 7 studies (22,26,27,29,36,38,40) evaluated BP in a follow period ranging from 6 months to 3 years. 6 of them demonstrated no significant difference between intervention group and control group or pre and post structured diabetes education. Only one study (35) demonstrated significant BP reduction.

5.2 Body mass index and weight : Sixteen studies (26, 27,28,29,30,22,31,32,33,34,35,36,21,40,41,18) evaluated the impact of structured diabetes education in BMI or wt.; duration of follow up ranged from 6 months to 3 years. Only 7 trials (21,22,27,33,34,35,40) out of the 16 studies demonstrated statistically significant reductions in BMI or weight in intervention group compared to control group at the end of the studies, whereas BMI and weight in the

Table 1: Characteristics of studies included in the systematic review of randomized controlled trials assessing the effect of structured diabetes education programmes on metabolic outcomes and quality of life in Diabetes (also continued next page)

Author / study Duration	Intervention	Inclusion criteria	Participant numbers study/control	Educators Training	Assessment / follow up	Age	Outcome measures
Bosi et al., 2013[26] /12-month	DM specific modules include charts and other materials to facilitate patient SMBG and improve quality of life.	Adults with T2DM not on insulin HbA1c (7–9 %.)	501 / 553	Not mentioned	At baseline, months 3, 6, 9, and 12	Aged 35–75 years	BGI, SMBG, HbA1c , QoL
Mohamed et al., 2013[27] /12-month	SDEP, four educational sessions (10-20 patients per session), lasting for 3-4h.to discuss LSM , KAP ,PE, DSMT	Adults with type 2	215 / 215	Not mentioned	At baseline and one-year	Above 18 years	HbA1C, lipid, ACR, BMI, BP, SMBG and KAP
Beverly et al., 2013[28] / 12-month	SDEP specific cognitive behavioural strategies and techniques for implementing self-care behaviours five sessions over 6 weeks	Adults: 18–75 years with T 1 or 2 DM for one year (A1C ≥7.5%)	149 / 69	Qualified Diabetes educator	At baseline and 3, 6, and 12 months	Aged 18-75 years	HbA1C, QoL, BMI, BP, SMBG
Adachi et al.,2013[29] 6 months	A structured individual-based lifestyle education program to reduce the HbA1c level in type 2 diabetes 3 or 4 sessions	Adults with type 2 diabetes	113 / 102	Trained , registered dietitians	At base line / 6 months	Mean age 61.3	HbA1c, BMI, BP, FPG, lipid profiles, QoL
Coates et al., 2013[30] /24 months	SDEP that focused on insulin adjustment to elaborate diet and life style, delivered on 4 consecutive weekly sessions, for 3 hours	Adolescents aged 13- 19 years	70 / 65	Trained diabetes nurse	At baseline, months 3, 6, 12 and 24	Mean age 15+.13	HbA1c, weight, hypoglycaemia , BMI, FBG, QOL
Khunti et al.,2012[22] /3 years	SDEP for six hours to support the diabetic to increase knowledge and understanding of what having diabetes means, empower patient to make their own decisions	Adults T 2 DM	437 / 387	Trained healthcare professionals	At base line / 4/8/12 months and 3 years	Above 18 years	HbA1c, BP, QOL weight, lipids, smoking status, PE,
Tan et al.,2012[31] /3 months	SDEP consisted of monthly sessions - two were face-to-face and one was a telephone follow-up to support healthy life style and hypoglycaemia awareness.	Adults >18 years HbA1c >7%.	82 / 82	Not mentioned	At base line / 3 months	Mean age 54 ±10.74 years	HbA1c, Medication adherence, Dietary intake, PE, SMBG
Sperl-Hillen, et al., 2011[32] /3 months	DEP consistent with the AADE7 Self-Care behaviours. The AADE7 content areas were healthy eating, monitoring, taking medications, problem solving, risk reduction, healthy coping, and being active.	Adults with type 2 DM	489 / 134 3 arms trial 246 = GE 243 = IE	Trained diabetes educators	Baseline 3/6/12 months	Mean age; 61 ±8 years	HbA1c, weight, blood pressure and QOL
Weinger et al., 2011[33] /12-month	A structured behavioural intervention consisted of five 2-hour sessions, for 6 weeks that included behavioural support for implementing self-care behaviours and cognitive behavioural strategies	Adults with type 1 or 2 DM, HbA1c > 7.5%.	149 / 75 3 arms trial 74 = GE 73 = IE	Diabetes educators	Baseline 3/ 6/ 12 months	Range; 18-70 years	HbA1c, MBI, Lipid Profiles, SMBG and QOL

Abbreviations: SMBG; self-monitoring blood glucose, **LSM;** Life Style Modification, **SDEP;** Structured Diabetes Education Program**, PE;** Physical Activity, **BGI;** blood glucose index**, QoL;** Quality of Life, **KAP;** Knowledge, Attitude and Practices**, ACR;** Albumin Creatinine Ratio, **BMI;** Body mass Index, **BP ;**Blood Pressure, **FBG ;**Fasting Blood Glucose, **AADE7;** American Association of Diabetes Educators Seven;**, IE ;** Individual education, **GE ;** Group education**, DSMT;** Diabetes self-management training**, T2DM;**Type 2 Diabetes Mellitus, **BP:** Blood Pressure

Table 1: (continued) Characteristics of studies included in the systematic review of randomized controlled trials assessing the effect of structured diabetes education programmes on metabolic outcomes and quality of life in Diabetes

Author / study Duration	Intervention	Inclusion criteria	Participant numbers study/control	Educators Training	Assessment / follow up	Age	Outcome measures
McGowan et al 2011[34] / 12 months	Programme topics : self-management behaviours, self-efficacy and coping with emotional distress, LSM and glycaemic target , a 4-day training workshop	Adults with type 2 diabetes	169 / 152	Trained educators	At baseline / 6 months	Mean age; 55±59 years	A1c, lipids
Trento et al ., 2010 5 years[35] (ROMEO)	SDEP, 50 minutes diabetes education every 3 months in small groups followed by one to one physician education to plan meals, increase PE, improve metabolic control and smoking cessation.	Adults Patients with T2DM	421 / 394	Trained Physicians, Nurses and Dieticians	Baseline /1/2/3/4 years	Mean Age; 69.3 ± 8 year	HbA1c, FBG, BMI, BP, lipid Profiles , QoL, Knowledge and health behaviours
Melkus et al., 2010[36] / 24 months	SEDP consisted of a series of 11 weekly group sessions. The first 6 sessions (each 2 hr. in duration) provided DSMT based on AADE standards.	Above 18 with T2DM	57 / 52	Trained educators	Baseline 3, 6, 9, 12 and 24 months	Mean Age; 57.3 ± 14.4 year	HbA1c, BP, FBG, Lipid Profiles , PE,BMI, QOL, SMBG
Braun et al., 2009[37] 12 months	A brief structured education programme consisted of 7 educational classes of 45 minutes about diabetes self-management	T2DM on insulin therapy age >65	83 / 72	Not clearly mentioned	At base line / 6 months	Mean Age; 76.2±6.3	HbA1c, , SMBG, knowledge , QOL, hypoglycaemia
Davies, et al.,2008[21] /12-month	SDEP to raise the importance of LSM, PE ,DM follow up, glycaemic targets and food intake	Adults with T2DM	437 / 387	Trained educators	At baseline, 8 and 12 months	Mean Age 59.5 years	HbA1c , BP, weight, lipids, smoking status, PE, QOL
Sturt et al ., 2008[38] / 6 months	SDEP to improve patient self confidence in managing their diabetes and reduced diabetes anxiety levels. one to one education with a 12 week diabetes manual	Adults with T2DM	245 / 245	Trained Practice nurses	Baseline / 6 /12 months	Mean Age; 62 years	A1c, BP, TC, BMI, Confidence to self-care, diabetes related stress
Cooper et al., 2008[39] /12-month	Physical activity, LSM target A1c in a SDEP consists of 2-hour sessions weekly for 8 weeks	Adults with T2DM	53 / 59	Trained diabetes specialised nurses	At baseline /6 and 12 months	Ages range; 21–75 years	HbA1c, BMI, BP, lipids and QOL
Deakin et al., 2006[40] 14 months.	SDEP to improve knowledge and diabetes self-care. 2 hours per week for 6weeks (12 hours)	Adults with type 2 diabetes	314 / 291	Diabetes research Dietician	Baseline / 14 months	Mean age 61.3± 9.7	HbA1C, BMI, blood pressure, and QOL
Trento et al., 2004[41] / 5 years	Group sessions every 3 months to plan meals, increase PE, improve A1c, smoking cessation.	Adults with T2DM	42 / 42	Physicians and diabetes educator	Baseline /4/8/12 months	-	HbA1c , blood lipids pressure, weight, PE, smoking status, QOL
DAFNE Study Group., 2002[18] 6 months	SDEP over five consecutive days (38 h), to groups of 6-8 people to adjust insulin dose and improve self-care	Age > 18 T1DM 2 A1c 7.5-12%	68 / 72	Trained diabetes educators	At baseline / 6 months	Mean age; 40±9 years	HbA1c, severe hypoglycaemia, impact of diabetes QOL

Abbreviations: SMBG; self-monitoring blood glucose, **LSM;** Life Style Modification, **SDEP;** Structured Diabetes Education Program, **PE;** Physical Activity, **BGI;** blood glucose index, **QoL;** Quality of Life, **KAP;** Knowledge, Attitude and Practices, **ACR;** Albumin Creatinine Ratio, **BMI;** Body mass Index, **BP ;**Blood Pressure, **FBG ;**Fasting Blood Glucose, **AADE7;** American Association of Diabetes Educators Seven;**, IE ;** Individual education, **GE ;** Group education, **DSMT;** Diabetes self-management training, **T2DM;**Type 2 Diabetes Mellitus, **BP:** Blood Pressure

Table 2: Risk of bias assessment of included RCT according to Cochrane's tool for assigning risk of bias

References	Sequence generation	Allocation concealment	Data Collectors Blinded	Outcome Assessors Blinded	Completed Primary outcome	Risk of bias
Bosi et al ,2013[26]	adequate	adequate	adequate	adequate	Completed	Low risk of bias
Mohamed et al , 2013[27]	adequate	adequate	adequate	adequate	Completed	Low risk of bias
BEVERLY et al ,2013[28]	adequate	adequate	adequate	adequate	Completed	Unclear risk of bias
Adachi et al .2012[29]	adequate	adequate	adequate	adequate	Completed	Unclear risk of bias
Coates et al ,2013[30]	adequate	adequate	adequate	unknown	Completed	Low risk of bias
Khunti et al,2012[22]	adequate	adequate	adequate	adequate	Completed	Low risk of bias
Tan et al.2012[31].	unknown	unknown	Single blind	Single blind	Completed	High risk of bias
Sperl-Hillen, et al, 2011[32].	adequate	adequate	adequate	adequate	Completed	Low risk of bias
Weinger et al 2011[33]	adequate	adequate	adequate	adequate	Completed	Low risk of bias
McGowan et al, 2011[34]	adequate	adequate	adequate	adequate	Completed	Low risk of bias
Trento et al ., 2010[35]	adequate	unknown	unknown	unknown	completed	High risk of bias
Melkus et al, 2010[36]	adequate	adequate	adequate	adequate	Completed	Low risk of bias
BRAUN et al 2009[37].	adequate	adequate	adequate	adequate	Completed	Low risk of bias
Davies, et al,2008[21]	adequate	adequate	adequate	adequate	Completed	Low risk of bias
Sturt et al ., 2008[38]	adequate	adequate	unknown	unknown	completed	Unclear risk of bias
Cooper et al, 2008[39]	adequate	adequate	unknown	unknown	Completed	High risk of bias
Deakin et al,2006[40]	adequate	adequate	adequate	adequate	Completed	Low risk of bias
Trento et al 2004[41]	adequate	unknown	unknown	unknown	Completed	High risk of bias
DAFNE Study Group, 2002[18]	adequate	adequate	adequate	adequate	Completed	Low risk of bias

remaining 9 trials (18, 26, 28, 29, 30, 31, 32, 36, 41) were shown to have no significant difference in intervention group compared to control group.

5.3 Cholesterol and triglycerides: Ten trials (18, 21, 26, 27,29,33,35,36,38,40) reported lipid profile as an outcome in included structured diabetes education trials. Only 2 trials (27, 21) demonstrated significant reductions in cholesterol in intervention group compared to control group at the end of follow up period of one year and 2 years respectively.

5.4 Quality of life: Only 9 trials (18, 21, 26, 33, 35, 36, 38, 40, 41) evaluated quality of life in structured diabetes education as a primary or secondary outcome in included studies. 3 studies (18, 36, 41) reported significant improvement in the intervention group compared to the control group at the end of intervention. All the include trials used validated questionnaires with specific scores for assessment of quality of life. One study (36) reported significant improvement only in bodily pain and vitality scales of quality of life at the end of 3 years follow up. One study (35) reported significant improvement in quality of life in intervention group at the end of 5 years follow up, and one study (18) reported a significant improvement in all domains of quality of life in

intervention group compared to control group at the end of the study at the end of 6 months follow up in type 1 DM.

5.5 Diabetes patients' Knowledge: Six trials (27, 31, 35, 37, 40, 41) reported the results of knowledge assessments in structured diabetes education. All of them demonstrated that there is statistically significant improvement in intervention group compared to study group at the end of intervention.

5.6 Hypoglycaemic episodes reported in structured diabetes education: Four trials (18, 30, 37, 40) only evaluated the effect of structured diabetes education in frequency of hypoglycaemia. One study (37) demonstrated statistically significant decrease in hypoglycaemia episodes in intervention group compared to control group at the end of follow up. One study (30) used mean days per month in which hypoglycaemia was experienced at baseline 1, 3, 6, 12 and 24 months. There was no significant difference between study and control groups during the study period. One study(37) assessed symptomatic hypoglycaemia by patient self-report and medical records using number of episodes/person/year and reported statistically significant reduction in mean episodes of hypoglycaemia in

Table 3: Effect of structured diabetes education programmes from included studies on HbA1c in diabetic patients

Reference and Study duration	Mean ±SD Baseline HbA1c		P- Value	Mean ±SD follow up HbA1c		P- Value
	Intervention	Control		Intervention	Control	
Bosi et al 2013[26] /12-month	7.4	7.3	> 0.05	6.01	6.03	0.013
Mohamed et al,2013[27] / 12 months	8.67±1.2	8.5± 0.5	> 5	7.87±1.38	8.42±199	0.012
BEVERLY et al ., 2013[28] 12-month	9.2 ± 1.0	8.5 ± 0.5	> 0.05	8.48±1.4	7.85± 0.9	0.03
Adachi et al .2013[29] 6 months	7.6±1.4	7.3±1.1	> 0.05	6.7±1.2	7.0±7.0	0.004
Coates et al , 2013[30] 24 months	8.73±1.54	9.04±1.42	> 0.05	8.99	9.53	> 0.05
Khunti et al, 2012[22] 3 years	8.3±2.2	7.7±1.9	0.27	6.73	6.89	0.81
Tan et al.2012[31] 3 months	9.8	9.6	> 0.05	8.75 ± 1.75	9.67 ± 2.01	0.03
Sperl-Hillen, et al , 2011[32] 12-months	8.1	8.0	0.06	8.66	7.63	0.01
Weinger et al 2011[33] 12-months	9.12±1.1	8.8	> 0.05	8.45± 1.3	8.69± 1.3	0.04
McGowan et al, 2011[34]	6.8±1.2	7.1± 1.5	> 0.05	6.4± (0.6)	6.7± 1.0	0.02
Trento et al ., 2010[35] 5 years /ROMEO	7.75 ± 1.57	7.81 ± 1.43	> 0.05	7.30 ± 0.9	8.80±1.2	<0.001
Melkus et al , 2010[36]	8.02 + 2.09	8.28 + 2.25	> 0.05	8.0% + 2.41	7.2+ 2.15	0.0001
BRAUN et al 2009[37] 12.months	8.3±1.5	7.7±1.3	0.85	7.7±1.5	7.6±1.5	0.02
Davies, et al,2008[21] 12-months	8.3±2.2	7.9 ± 2.0	> 0.5	6.81	6.69	0.52
Sturt et al ., 2008[38] 6 months	8.92 ±1.44	8.69±1. 42	> 0.5	8.35± 1.41	8.37±1.40	> 0.5
Cooper et al, 2008[39] 12-months	8.5 ±2.3	7.8 ±2.2	> 0.5	8.5±2.3	8.5±2.3	> 0.5
Deakin et al,2006[40] 14 months	7.7 ±1.6	7.7±1.6	> 0.5	7.1 ± 1.1	7.8 ± 1.6	> 0.5
Trento et al,2004[41] 5 years	7.4 ± 1.4	7.4 ± 1.4	> 0.5	7.3 ± 1.0	9.0 ± 1.6	0.001
DAFNE Study Group, 2002[18] 6 months	9.4 ± 1.2	9.3 ± 1.1	> 0.5	8.4± 1.2	9.4 ± 1.3	<0.0001

intervention group compared to control group. One study (40) used a validated questionnaire to assess perceived frequency of hypoglycaemia (scored 0-6) baseline, (scored -3 to +3) 2 months post intervention; higher scores indicate greater perceived frequency of hypoglycaemia.

One study (18) assessed symptomatic and severe hypoglycaemia. Patients recorded severe hypoglycaemic episodes (episodes causing coma or requiring the assistance of another person) in diaries. They measured satisfaction with perceived frequency of hypoglycaemia by The diabetes treatment satisfaction questionnaire. There was no significant difference in severe hypoglycaemia in intervention group compared to control group after 6 months, with regard to perceived frequency of hypoglycaemia there was significant decrease in intervention group compared to control group at six months duration.

Discussion

Statement of principal findings: The present study looked at the impact of structured diabetes education in biomedical and psychosocial aspects in people with diabetes. Health care providers usually prescribe medication and life style modifications but only patients implement these important recommendations so this study tried to investigate the effectiveness and obstacles of current diabetes education programmes in improving diabetes self-care.

This study identified 19 trials (18, 21, 22, 26-41) that evaluated the effectiveness of SDEP. 12 studies (18, 21, 22, 26, 27, 30, 32, 33, 34, 36, 37, 40) had low risk of bias, 3 trials (28,29,38) had unclear risk of bias and 4 trials (31,35,39,41) had high risk of bias. Thirteen (18, 26, 27, 28, 29, 31,32, 33, 34, 35, 36, 37, 41) out of 19 trials (18, 21, 22, 26-41) demonstrated a significant HBA1c reduction in intervention group compared to control group at the end of the intervention while 3 trials did not demonstrate a significant change. A systematic review of 71 trials (42) showed reductions in A1C and systolic blood pressure in patients who received structured diabetes education. Four trials (18, 30, 37, 40) only evaluated the effect of structured diabetes education in frequency of hypoglycaemia; one study (37) demonstrated statistically significant decrease in hypoglycaemia episodes in intervention group compared to control group at the end of follow up.

Only 7 studies (22, 26, 27, 29, 36, 38, 40) evaluated BP in a follow period ranging from 6 months to 3 years without demonstrating any significant change. Seven trials (26, 27, 28, 29, 30, 22, 31, 32, 33, 34, 35, 36, 21, 40, 41, 18) out of 16 trials (26, 27, 28, 29, 30, 22, 31, 32, 33, 34, 35, 36, 21, 40, 41, 18) demonstrated statistically significant reductions in BMI or weight in intervention group compared to control group at the end of the studies. Ten trials (18, 21, 26, 27 29, 33, 35, 36, 38, 40) reported lipid profile as an outcome in included structured diabetes education; only 2 trials (27, 21) demonstrated significant reductions in cholesterol in intervention group compared to control group. Nine trials (18, 21, 26, 33, 35, 36, 38, 40, 41) evaluated quality of life in structured diabetes education as a primary or secondary outcome in included studies; 3 of them (18, 36, 41) reported significant improvement in the intervention group compared to the control group at the end of intervention. Six trials (27, 31, 35, 37, 40, 41) reported the results of knowledge assessments in structured diabetes education all of them demonstrated significant improvement in the intervention group.

Interventions with longer duration of education and more frequent reinforcement showed more significant and sustainable changes where the educational programme was delivered at the base line in groups then followed by contentious reinforcement education during routine care by their physicians using tailored diabetes education according to the patients' needs as reported in the trial (35). On the other hand SDEP that was not followed by reinforcement educational messages failed to demonstrate

significant improvement in HbA1c as reported in 2 trials (21, 40).

Quality of study design: Although the SDEP were delivered by trained certified health care personnel in 16, (18, 21, 22, 28, 29, 30, 31, 32, 33, 34, 35, 63, 38, 39, 40, 41) out of 19 (18, 21, 22, 26-41) trials, (only 3 trials (26,27,37) did not mention educator qualifications) the exact training details were not mentioned in any of the included trials. As mentioned in patient education working group report 32 (7), the diabetes education program should have four criteria to be effective: structured written curriculum conducted by trained educators and be audited and quality assured. In this systematic review all the included studies have not mentioned any information regarding auditing and quality assurance of the educational programs. All trials mentioned a structured written diabetes education.

The quality of included studies was generally satisfactory; about one third of included trials were considered to have either high (31,35,39,41) or unclear risk (28,29,38) of bias because the data collectors or assessors were not blind, The good thing is the method of randomization and allocation concealment were mentioned in 16 trials (18, 21, 22, 26, 27, 28, 29, 30, 32, 33, 34, 36, 37, 38, 39, 40). Randomization produces similar groups in known and unknown variable and validity to statistical tests used in the trial because the deference between intervention and control groups should have the same difference between the two groups if selected from the general population. (43) Allocation concealment prevents over or underestimation of the intervention. It was estimated that the effect of intervention is 40% larger in trials without adequate allocation concealment. (44)

Most, (12 out of 19) of included trials (18, 27, 28, 29, 30, 31, 33, 34, 36, 37, 39, 41) had small sample sizes ranging from 89 to 314 patients which are likely to have been under powered; moreover very few studies mentioned power calculation and sample size justification to estimate the proper sample size.

The importance of sample size calculation in RCT has been addressed in many studies, and according to the Consolidated Standards of Reporting Trials (CONSORT) 45 statement these calculations must be reported and justified in published articles. Four factors affected sample size and should be considered in all trials: type I error (α), power, event rate in the control group, and a treatment effect of interest (46).

Attrition: Three included studies (26,35,40) had fairly high levels of drop-out between initial recruitment and reporting of results; the remaining 16 trials (18, 21, 22, 27, 28, 29, 30, 31, 32, 33, 34, 36, 37, 38, 39, 41) had not mentioned whether there were drop out or not. The 3 trials (26, 35, 40) that had mentioned drop out did not report that intention to treat analysis had been carried out. Misleading results can be produced by attrition if the motivated patients remained in the study while the other patients discontinued. (47)

Simplicity of educational message: It was observed that whenever the education message is simple, and followed by reinforcement, the education outcomes were significantly better as shown in most of included studies. On the other hand if the message was too long and not patient- centred, the outcomes were not significantly improved. This observation was clear in one included study (38), where the education programme manual included 320 papers i.e. too complicated programme. An RCT (48) showed that brief educational messages attached to laboratory test results represent a simple and sustainable way to bring about improvements in diabetes care.

Follow up and duration of intervention: Most of included trials (18,26,27,28,29,31,32,33,34,35,36,37,41) reported improvement in HbA1c level 6-12 months after the intervention then most of patient could not retain the same HbA1c control after a further 6-12 months of the intervention. These findings were consistent with another study which demonstrated that self-management education improves glycated haemoglobin levels at immediate follow up; the benefit declines 1-3 months after the intervention ceases, however, suggesting that learned behaviours' change over time. (49)

Group versus one to one intervention: One study 38 used one to one education, which did not demonstrate a significant change in outcome parameters especially HbA1c. These findings were consistent with a study 50 of a systematic review found that individual education did not appear to be significantly different compared to usual care.

Education Approach: All the included studies used the didactic method as a teaching approach which is consistent with a study (51) which included such intervention. Diabetes intervention education should shift from didactic teaching approaches towards more patient-centred or 'empowerment' approaches. Diabetes education should consider more emphasis on the impact of diabetes on the quality of life of the individuals and their families. Teaching coping Strategies and behaviour change strategies such as self-directed goal setting are now recognized as essential components of diabetes self-management to be consistent with the most recent recommendations of Diabetes Attitudes Wishes and Needs 2 study. (52)

Quality of life: Only 9 trials (18,21,26,33,35,36,38,40,41) evaluated quality of life in structured diabetes education as a primary or secondary outcome in the included studies. Three of these studies (18, 36, 41) reported significant improvement in the intervention group compared to the control group at the end of intervention. All the included trials used validated questionnaires with specific scores for assessment of quality of life. One study (36) reported significant improvement only in bodily pain and vitality scales of quality of life at the end of 3 years follow up. Another study (35) reported significant improvement in quality of life in intervention group at the end of 5 years follow up, and only one study (18) reported a significant improvement in all domains of quality of life in intervention

group compared to control group at the end of the study at the end of 6 months follow up in type 1 DM.

The improvement of QOL in the included studies is in line with the results of a meta-analysis study (53) which showed that people with diabetes experience improvement in QOL from participation in diabetes self-management training programs. The lack of QOL improvement in 6 trials (21, 26, 33,35,38,40,) out of 9 could be due to short follow up period as observed in one study. (54) It showed that self-management education has little effects on the quality of life in a relatively short term follow up (less than 2 years) and it showed also that the improvement of quality of life occurs in long term interventions (more than 2 years).

Strengths: This systematic review collected the impact of structured diabetes education in a standard method of critical appraisal. The work was proceeded by a detailed protocol including all the study details which was approved by the supervisor.

Limitations: Synthesis of results was conducted by a narrative review not a meta- analysis. Included studies were limited to English language only.

Conclusion: Overall the results of this systematic review showed that structured diabetes education programmes have a significant positive impact on biomedical parameters especially HbA1c in most of the included studies. Quality of life improvement was reported only on long term interventions on diabetic patients. These findings support an ongoing model of education for the sustainability of outcomes; the optimum interval and contact time needs further assessment.

Recommendations: Based on the findings of this systematic review, it is clear that structured diabetes education has a short and long term positive effect especially on HbA1c and quality of life. It is recommended that all people with diabetes should be engaged in a structured diabetes education programme which is consistent with NICE55, ADA56, IDF57 and many other organizations' recommendation.

Long term research to evaluate the effectiveness of structured diabetes education on the diabetes complications and mortality rate is recommended because of the natural progressing history of diabetes and the educational message may decline over time and may need reinforcement.

References

1) International Diabetes Federation. IDF Diabetes atlas fifth edition. Brussels, Belgium: International Diabetes Federation .2011. Available at: http://www.idf.org/sites/default/files/da5/5eDiabetesAtlas_2011.pdf
2) Nicolucci A, Cavaliere D, Scorpiglione N, Carinci F, Capani F, Tognoni G, Benedetti M. A comprehensive assessment of the avoidability of long-term complications of diabetes. Diabetes Care. 1996; (19): 927-933.

3) Diabetes UK. (2009). Diabetes UK survey of people with diabetes. Available at: http://www.diabetes.org.uk/Documents/Reports/Members'_survey_report_22.01.2010.pdf

4) American Association of Diabetes Educators. Diabetes Education Fact Sheet 09-10. 2007. Available at: http://www.diabeteseducator.org/export/sites/aade/_resources/pdf/research/Diabetes_Education_Fact_Sheet_09-10.pdf

5) Woodwell DA and Cherry DK. National Ambulatory Medical Care Survey .Advance data from vital health statistics, number 346.Maryland: National Centre For health Statistics 2004. Available at: http://www.cdc.gov/nchs/data/ad/ad346.pdf

6) Diabetes UK. National Diabetes Audit 20011-12.: Report, Care process and treatment targets. Available at http://www.hscic.gov.uk/catalogue/PUB12421/nati-diab-audi-11-12-care-proc-rep.pdf

7) Department of Health. National service framework for diabetes. Structured Patient Education in Diabetes 2005.available at: http://www.dafne.uk.com/uploads/135/documents/structured_patient_education_diabetes_report.pdf

8) National Institute for Health and Clinical Excellence Guidance 87. Type 2 diabetes: the management of type 2 diabetes .National Institute for health and Clinical excellence (NICE), London, UK. May 2009. Available at; http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0033486/

9) American Diabetes Association (ADA). Position statement: Standards in Medical Diabetes care. Diabetes Care. 2010; 33:S11-61.

10) American Diabetes Association (ADA). National standards for diabetes and self-management education program: American Diabetes Association review criteria. Diabetes Care. 1998; 21(suppl 1):95-98.

11) Anderson RM. Funnel MM, Hunt C, Kulkarni K, Rubin RR, and Yarborough P. Educational principles and strategies: A Core Curriculum for Diabetes Education. Chicago, IL: Port City; 1999; 5-27.

12) Bartlett E. Historical glimpses of patient education in the United States. Patient education and counseling. 1986; 8 (2): 135--149.

13) Jerel J, Alva M. International Consensus Standards of Practice for Diabetes Education. Brussels, Belgium: International Diabetes Federation; 1997. Available at; https://www.idf.org/webdata/docs/International%20standards.pdf

14) Fan L, Sidani S. Effectiveness of diabetes self-management education intervention elements: a meta-analysis. Canadian Journal of Diabetes. 2009; 33 (1): 18-26

15) King D, Glasgow R, Toobert D, Strycker L, Estabrooks P, Osuna D, Faber A. Self-efficacy problem solving, and social-environmental support are associated with diabetes self-management behaviors. Diabetes care. 2010; 33 (4): 751--753.

16) Shi Q, Ostwald S, Wang S. Improving glycaemic control self-efficacy and glycaemic control behaviour in Chinese patients with Type 2 diabetes mellitus: randomised controlled trial. Journal of clinical nursing. 2010; 19 (3-4): 398--404.

17) Gillett M, Dallosso H, Dixon S, Brennan A, Carey M, Campbell M, Heller S, Khunti K, Skinner T, Davies M. Delivering the diabetes education and self-management for ongoing and newly diagnosed (DESMOND) programme for people with newly diagnosed type 2 diabetes: cost effectiveness analysis. British Medical Journal. 2010; 341-351.

18) DAFNE Study Group .Training in flexible, intensive insulin management to enable dietary freedom in people with type 1 diabetes: dose adjustment for normal eating (DAFNE) randomised controlled trial. British Medical Journal. 2002; 325(7367):746-749.

19) Samann A, Muhlhauser I, Bender R, Kloos C, Muller U. Glycaemic control and severe hypoglycaemia following training in flexible, intensive insulin therapy to enable dietary freedom in people with type 1 diabetes: a prospective implementation study. Diabetologia. 2005; 48(10):1965-1970.

20) Shearer A, Bagust A, S, Erson D, Heller S, Roberts S. Cost-effectiveness of flexible intensive insulin management to enable dietary freedom in people with Type 1 diabetes in the UK. Diabetic Medicine. 2004; 21 (5): 460--467.

21) Davies M, Heller S, Skinner T, Campbell M, Carey M, Cradock S, Dallosso H, Daly H, Doherty Y, Eaton S, Fox C , Oliver L, Rantell K, Rayman G, Khunti K, on behalf of the Diabetes Education and Self-Management for Ongoing and Newly Diagnosed Collaborative. Effectiveness of the diabetes education and self-management for ongoing and newly diagnosed (DESMOND) programme for people with newly diagnosed type 2 diabetes: cluster randomised controlled trial. British Medical Journal. 2008; 336 (7642): 491-495.

22) Khunti K, Gray L, Skinner T, Carey M, Realf K, Dallosso H, Fisher H, Campbell M, Heller S, Davies M. Effectiveness of a diabetes education and self-management programme (DESMOND) for people with newly diagnosed type 2 diabetes mellitus: three year follow-up of a cluster randomised controlled trial in primary care. British Medical Journal. 2012; 344.

23) Liberati A, Altman D, Tetzlaff J, Mulrow C, G\Otzsche P, Ioannidis J, Clarke M, Devereaux P, Kleijnen J, Moher D. The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration. Annals of internal medicine. 2009; 151 (4): --65.94.

24) Higgins J, Altman D. Assessing risk of bias in included studies. Cochrane Handbook for Systematic Reviews of Interventions: Cochrane Book Series. 2008: 187--241.

25) American Diabetes Association. Defining and Reporting Hypoglycemia in Diabetes. A report from the American Diabetes Association Workgroup on Hypoglycemia. Diabetes Care. 2005. 28 (5); 1245-1249

26) Bosi E, Scavini M, Ceriello A, Cucinotta D, Tiengo A, Marino R, Bonizzoni E, Giorgino F, on behalf of the PRISMA Study Group. Intensive Structured Self-Monitoring of Blood Glucose and Glycemic Control in Noninsulin-Treated Type 2 Diabetes The PRISMA randomized trial. Diabetes care. 2013; 36 (10): 2887--2894

27) Mohamed H, Al-Lenjawi B, Amuna P, Zotor F, Elmahdi H. Culturally sensitive patient-centred educational programme for self- management of type 2 diabetes: A

A randomized controlled trial. Primary Care Diabetes. 2013; 7(3):199-206.

28) Beverly E, Fitzgerald S, Sitnikov L, Ganda O, Caballero A, Weinger K. Do older adults aged 60--75 years benefit from diabetes behavioral interventions? Diabetes care. 2013; 36 (6): 1501--1506.

29) Adachi M, Yamaoka K, Watanabe M, Nishikawa M, Kobayashi I, Hida E, et al. Effects of lifestyle education program for type 2 diabetes patients in clinics: a cluster randomized controlled trial. British Medical Journal. Public Health. 2013; 13(1): 467.

30) Coates V., Chaney D., Bunting B., Shorter W, Shevlin M, McDougall A et al. Evaluation of the Effectiveness of a Structured Diabetes Education Programme (CHOICE) on Clinical Outcomes for Adolescents with Type 1 Diabetes: A Randomised Controlled Trial. Journal of Diabetes & Metabolism .2013; 4:280.

31) Tan M, Magarey J, Chee S, Lee L, Tan M. A brief structured education programme enhances self-care practices and improves glycaemic control in Malaysians with poorly controlled diabetes. Health education research. 2011; 26 (5): 896--907.

32) Sperl-Hillen J, Beaton S, Fernandes O, Von Worley A, Vazquez-Benitez G, Parker E, Hanson A, Lavin-Tompkins J, Glasrud P, Davis H, Adams K, Parsons W, Spain CV. Comparative effectiveness of patient education methods for type 2 diabetes: a randomized controlled trial. Archives of internal medicine. 2011; 171 (22): 2001--2010.

33) Weinger K, Beverly E, Lee Y, Sitnokov L, G, A O, Caballero A. The effect of a structured behavioral intervention on poorly controlled diabetes: a randomized controlled trial. Archives of internal medicine. 2011; 171 (22): 1990--1999.

34) McGowan P .The Efficacy of Diabetes Patient Education and Self-Management Education in Type 2 Diabetes. CANADIAN JOURNAL OF DIABETES. 2011; 35(1):46-53.

35) Trento M, Gamba S, Gentile L, Grassi G, Miselli V, Morone G, Passera P, Tonutti L, Tomalino M, Bondonio P, Cavallo F, Porta M; ROMEO Investigators. Rethink Organization to iMprove Education and Outcomes (ROMEO). A multicenter randomized trial of lifestyle intervention by group care to manage type 2 diabetes. DIABETES CARE. 2010; 33(4):745-747.

36) Melkus G, Chyun D, Vorderstrasse A, Newlin K, Jefferson V, Langerman S. The effect of a diabetes education, coping skills training, and care intervention on physiological and psychosocial outcomes in black women with type 2 diabetes. Biological research for nursing. 2010; 12 (1): 7--19.

37) Braun A, Kubiak T, Kuntsche J, Meier-H\"Ofig M, M\"Uller U, Feucht I, Zeyfang A. SGS: a structured treatment and teaching programme for older patients with diabetes mellitus-a prospective randomised controlled multi-centre trial. Age and ageing. 2009; 38 (4): 390--396.

38) Sturt J. One-to-one structured education using the Diabetes Manual: evidence of effectiveness. Diabetes and Primary Care. 2008; 10 (6): 363--370.

39) Cooper H, Booth K, Gill G. A trial of empowerment-based education in type 2 diabetes-Global rather than glycaemic benefits. Diabetes research and clinical practice.

2008; 82 (2): 165--171.

40) Deakin T, Cade J, Williams R, Greenwood D. Structured patient education: the Diabetes X-PERT Programme makes a difference. Diabetic Medicine. 2006; 23 (9): 944--954

41) Trento M, Passera B, Borgo E, Tomalino M, Bajardi M, Cavallo F, et al. A 5-Year Randomized Controlled Study of Learning, Problem Solving Ability, and Quality of Life Modi?cations in People With Type 2 Diabetes Managed by Group Care. Diabetes Care. 2004; 27 (3): 670-675.

42) Warsi A, Wang P, Lavalley M, Avorn J, Solomon D. Self-management education programs in chronic disease: a systematic review and methodological critique of the literature. Archives of Internal Medicine. 2004; 164 (15): 1641--1649.

43) Altman D, Bl. Treatment allocation in controlled trials: why randomise? British Medical Journal. 1999; 318 (7192): 1209--1209.

44) Schulz K, Grimes D. Allocation concealment in randomised trials: defending against deciphering. The Lancet. 2002; 359 (9306): 614--618.

45) Moher D, Hopewell S, Schulz K, Montori V, G\Otzsche P, Devereaux P, Elbourne D, Egger M, Altman D. CONSORT 2010 explanation and elaboration: updated guidelines for reporting parallel group randomised trials. Journal of clinical epidemiology. 2010; 63 (8): 1--37

46) Schulz K, Grimes D. Sample size calculations in randomised trials: mandatory and mystical. The Lancet. 2005; 365 (9467): 1348--1353.

47) Dumville J, Torgerson D, Hewitt C. Research methods: Reporting attrition in randomised controlled trials. British Medical Journal. 2006; 332 (7547): 969-971.

48) Foy R, Eccles M, Hrisos S, Hawthorne G, Steen N, Gibb I, Croal B, Grimshaw J. A cluster randomised trial of educational messages to improve the primary care of diabetes. Implementation Science. 2011; 6 (1): 129.

49) Norris S, Lau J, Smith S, Schmid C, Engelgau M. Self-Management Education for Adults With Type 2 Diabetes A meta-analysis of the effect on glycemic control. Diabetes care. 2002; 25 (7): 1159--1171.

50) Duke S, Colagiuri S, Colagiuri R. Individual patient education for people with type 2 diabetes mellitus. Cochrane Database Syst Rev. 2009; 1 (1). DOI: 10.1002/14651858. CD005268.pub2.

51) Norris S, Engelgau M, Narayan K. Effectiveness of Self-Management Training in Type 2 Diabetes A systematic review of randomized controlled trials. Diabetes care. 2001; 24 (3): 561--587.

52) Peyrot M, Burns KK, Davies M, Forbes A, Hermanns N, Holt R, Kalra S, Nicolucci A, Pouwer F, Wens J, Willaing I, Skovlund SE.. Diabetes Attitudes Wishes and Needs 2 (DAWN2): a multinational, multi-stakeholder study of psychosocial issues in diabetes and person-centred diabetes care. Diabetes research and clinical practice. 2013; 99 (2): 174-184

53) Cochran J, Conn V. Meta-analysis of quality of life outcomes following diabetes self-management training. The Diabetes Educator. 2008; 34 (5): 815--823.

54) Newman S, Steed L, Mulligan K. Self-management interventions for chronic illness. The Lancet 2004; 364:1523-1537.

55) NICE Technology Appraisal 60 Guidance on the use of patient-education models for diabetes April 2003. Available from. http://guidance.nice.org.uk/TA60
http://www.nice.org.uk/nicemedia/live/11496/32610/32610.pdf

56) Funnell MM, Brown TL, Childs BP, Haas LB, Hosey GM, Jensen B, Maryniuk M, Peyrot M, Piette JD, Reader D, Siminerio LM, Weinger K, Weiss MA.. National standards for diabetes self-management education. Diabetes care. 2012; 35 (Supplement 1): 101--108.

57) IDF- Position Statement: Self-Management Education, international Diabetes Federation, Belgium, Brussiles.2011. Available at: http://www.idf.org/education/self-management-education

Zika Virus Update and Biological Control of Aedes species mosquito (*A. Aegypti* and *A. albopictus*)

Lesley Pocock

Correspondence:
Lesley Pocock
medi+WORLD International
Macleay Island
Queensland, Australia
Email: lesleypocock@mediworld.com.au

Abstract

This paper provides an update on the Zika virus and as the MEJFM is going to press, the WHO advises that there is now an increasing accumulation of evidence of an association between the Zika virus and microcephaly. It may take a further 4-6 months to prove.

The paper also covers recently announced Australian research and successful 5 country trials on the biological control of the carrier mosquito, the Aedes aegypti mosquito.

Key words: Zika virus, Dengue fever, chikungunya virus, biological control, Wolbachia

Introduction

As the MEJFM is going to press, the WHO advises that there is now an increasing accumulation of evidence of an association between the Zika virus and microcephaly. It may take a further 4-6 months to prove.

WHO will convene an advisory group on mosquito control in 3-4 weeks (end of March 2016).
The WHO declared the outbreak an international health emergency on February 1, 2016 citing a 'strongly suspected' relationship between the Zika virus, which is carried by mosquitoes, and infection in pregnancy and microcephaly.

The disease has been linked to severe birth defects in Brazil and has spread to nearly 30 countries and territories.

But also as we are going to press, Australian researchers at the University of Melbourne, Australia who have been working on a biological control approach to Dengue fever have announced on the 19th February, 2016 good results of biological control of the carriers, the Aedes aegypti mosquito. The same mosquito is responsible for carrying the Zika virus and the chikungunya virus as well as Dengue fever.

The biological control involves releasing populations of mosquitoes that have been infected with a commonly occurring species of bacteria, called Wolbachia.

The bacteria effectively inoculate the mosquitoes against the dengue virus. The treated populations then out-compete their dengue-carrying rivals, greatly reducing their numbers. Small-scale trials of the strategy started in 2011, and have so far been carried out in Queensland (Australia), Vietnam, Indonesia and Brazil.

The largest trial so far started in 2014, with the release of Wolbachia-infected mosquitoes throughout Townsville, northern Australia.

The viruses that cause dengue and Zika are very closely related. Both are members of the Flavivirus family, which also includes the yellow fever and West Nile viruses. Both are transmitted by the same species of mosquito, known as Aedes aegypti.

"We have done the experimental work and it's currently winding its way through pre-publication," said researchers.

"It shows that Wolbachia blocks Zika in an almost identical way, so where we've put it out to block dengue the mosquito populations are also resistant to Zika."

With the possibility, even if it's a small possibility, that dengue viruses might evolve resistance against wolbachia an 'insurance policy' has also been created by Australian scientists working on the problem so that "we could have a solution to cover the possibility that Dengue viruses would evolve resistance to wolbachia.

This second wolbachia mosquito combination will effectively prevent the possibility of Dengue viruses escaping the blocking effect of wolbachia".

It will take time to verify and inoculate all mosquito populations, so in the meantime I will follow with an overview of Zika, its mode of transmission, treatment approaches and a list of currently infected areas.

In one of the first studies published related to the recent Zika outbreak, researchers in Brazil documented the eye abnormalities in babies with a traditionally rare condition called microcephaly. Babies with the condition are born with abnormally small brains, which can be connected with other complications. It's not unusual for vision problems to be associated with microcephaly.

They found that in one-third of babies with microcephaly - after a presumed Zika infection before they were born - there was an additional eye abnormality that could threaten their vision.

Ten of the 29 babies observed had irregularities in one or both eyes, and about 80% of the mothers reported Zika-like symptoms during their pregnancy.

For the most part, only about one in five people with Zika ever shows symptoms, which most commonly include fever, rash, joint pain, and red eyes, though there have been cases of a temporary neurological disorder Guillain-Barre Syndrome associated with Zika.

It's Zika's connection to microcephaly that's particularly concerning. This connection has raised concerns about pregnant women contracting the virus.

The best way to prevent infection is to avoid being bitten by the mosquitoes that transmit the disease, by either avoiding travel to areas where the virus is being transmitted, or wearing long clothes and using mosquito repellent.

Regions/Countries where Zika has been found

AMERICAS
• Barbados
• Bolivia
• Brazil
• Colombia
• Commonwealth of Puerto Rico, US territory
• Costa Rica
• Curacao
• Dominican Republic
• Ecuador
• El Salvador
• French Guiana
• Guadeloupe
• Guatemala
• Guyana
• Haiti
• Honduras
• Jamaica
• Martinique
• Mexico
• Nicaragua
• Panama
• Paraguay
• Saint Martin
• Suriname
• U.S. Virgin Islands
• Venezuela
OCEANIA/PACIFIC ISLANDS
• American Samoa
• Samoa
• Tonga
AFRICA
• Cape Verde

Currently there has been no evidence of Zika infected mosquitos in the Middle East.

Medical Aspects for Healthcare Providers

It is not yet known if a woman who is not pregnant and is bitten by a mosquito and infected with Zika virus, will have a risk with future pregnancies.

When a woman is infected with Zika virus while she is pregnant the virus usually remains in the blood of an infected person for only a few days to a week. The virus will not cause infections in an infant that is conceived after the virus is cleared from the blood. There is currently no evidence that Zika virus infection poses a risk of birth defects in future pregnancies. A women contemplating pregnancy, and who has recently recovered from Zika virus infection, should consult her healthcare provider after recovering.

For those babies infected with Zika Babies with microcephaly can have a range of other problems, depending on how severe their microcephaly is. Microcephaly has been linked with the following problems:

• Seizures
• Developmental delay, such as problems with speech or other developmental milestones (like sitting, standing, and walking)
• Intellectual disability (decreased ability to learn and function in daily life)
• Problems with movement and balance
• Feeding problems, such as difficulty swallowing
• Hearing loss
• Vision problems

These problems can range from mild to severe and are often lifelong. In some cases, these problems can be life-threatening. Because it is difficult to predict at birth what problems a baby will have from microcephaly, babies with microcephaly often need close follow-up through regular check-ups with a healthcare provider to monitor their growth and development.
|
To date, there are no reports of infants getting Zika virus through breastfeeding. Because of the benefits of breastfeeding, mothers are encouraged to breastfeed even in areas where Zika virus is found.

Spread of the virus through blood transfusion and sexual contact have been reported.

Symptoms
• About 1 in 5 people infected with Zika virus become ill (i.e., develop Zika).
• The most common symptoms of Zika are fever, rash, joint pain, or conjunctivitis (red eyes). Other common symptoms include muscle pain and headache. The incubation period (the time from exposure to symptoms) for Zika virus disease is not known, but is likely to be a few days to a week.
• The illness is usually mild with symptoms lasting for several days to a week.
• People usually don't get sick enough to go to the hospital, and they very rarely die of Zika.
• Zika virus usually remains in the blood of an infected person for about a week but it can be found longer in some people.

Diagnosis & Reporting
Based on the typical clinical features, the differential diagnosis for Zika virus infection is broad. In addition to dengue, other considerations include leptospirosis, malaria, rickettsia, group A streptococcus, rubella, measles, and parvovirus, enterovirus, adenovirus, and alphavirus infections (e.g., Chikungunya, Mayaro, Ross River, Barmah Forest, O'nyong-nyong, and Sindbis viruses).
Preliminary diagnosis is based on the patient's clinical features, places and dates of travel, and activities. Laboratory diagnosis is generally accomplished by testing serum or plasma to detect virus, viral nucleic acid, or virus-specific immunoglobulin M and neutralizing antibodies.
In 2016, Zika virus disease became a nationally notifiable condition. Healthcare providers are encouraged to report suspected cases to their state or local health departments to facilitate diagnosis and mitigate the risk of local transmission. State health departments are encouraged to report laboratory-confirmed cases to CDC through ArboNET, the national surveillance system for arboviral disease.

There are no commercially available diagnostic tests for Zika virus disease.

During the first week after onset of symptoms, Zika virus disease can often be diagnosed by performing reverse transcriptase-polymerase chain reaction (RT-PCR) on serum. Virus-specific IgM and neutralizing antibodies typically develop toward the end of the first week of illness; cross-reaction with related flaviviruses (e.g., dengue and yellow fever viruses) is common and may be difficult to discern. Plaque-reduction neutralization testing can be performed to measure virus-specific neutralizing antibodies and discriminate between cross-reacting antibodies in primary flavivirus infections.

References

Sydney Morning Herald: http://www.smh.com.au/national/zika-virus-australian-dengue-researchers-may-have-solution-20160203-gmkpx3.html#ixzz3zRb2fQmv
JAMA OPHTHALMOLOGY: http://archopht.jamanetwork.com/article.aspx?articleid=2491896.
WHO: http://www.who.int/mediacentre/factsheets/zika/en/