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Original Article

HAVE WE DONE ENOUGH WITH DIABETIC EDUCATION? A PILOT STUDY

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ABSTRACT

Background: Patients' education and empowerment are essential parts of a disease management. Patients have to be educated on the disease as well as lifestyle changes that they need to practise for a holistic and consistent improvement in their disease status. This study examined patients' knowledge on diabetes and nutrition as well as the role of dietician in the patient education.

Methods: This was a cross-sectional study of patients aged more than 18 years, in a primary care centre in Kuala Lumpur. Patients responded to a pre-tested self-administered questionnaire which contains socio-demographic profiles of patients, knowledge on diabetes and nutrition. Patients were also asked on dietician consultation and the number of dietician visits. Patients were conveniently selected on the data collection days. Only consented patients and those who could understand Malay or English language were selected.

Results: There were 110 patients who participated in the study. Overall the patients had good knowledge on diabetes and nutrition. The mean total knowledge score was 71.2% ± 9.34. Domains such as diabetes complications, exercise, meal practice, food sources and proportion need reinforcement. Only 60 (54.9%) patients had seen a dietician. Patients who had seen dietician showed significantly higher level of knowledge score (p=0.04). However frequent meeting with the dietician did not show any significant improvement in the knowledge (p=0.10). Factors such as patients' gender, ethnicity, level of education, employment status, glycaemic level, duration of illness and body mass index did not show any significant association with the overall diabetic and nutrition knowledge.

Conclusion: There is still a need to improve the overall diabetic education particularly in areas that patients were lacking such as diabetes complications, exercise, meal practice, food sources and proportion. It is equally necessary to encourage all diabetics to see a dietician since it helps to improve their level of knowledge as shown in this study.

Keywords: Diabetes, dietician, knowledge, nutrition, glycaemic control.
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INTRODUCTION

Worldwide physicians are facing the challenge on controlling the ever growing epidemic of type 2 diabetes; the disease which is strongly related to over nutrition and sedentary lifestyles. The Third Malaysian National Health Morbidity Survey in 2006 reported that the prevalence of adults with glucose intolerance was nearly 5% and diabetes mellitus was 14.9%. This also means there were nearly 1.5 million adults affected by the disease and there is an increment of about 3.3% in the prevalence of diabetes over the last decade.[1] It was also reported that both genders were equally affected, particularly among the urban population.[1]

Besides the strong efforts in preventing the disease, there should be also efforts in tightening the current diabetic management in order to ensure good glycaemic control hence to prevent or slow down the disease progression. Regardless of the advancement in diabetic treatment, many studies had shown that patients' involvement in the care of diabetes is a paramount important.[2,3,4] Lifestyle changes in diabetics are still vital in the overall treatment regime.[2,3] It is well understood that maintaining lifestyles changes for a long period are often difficult for patients.[5] Likewise, dedicated physicians are facing the challenge of giving support for the lifestyle changes as well as monitoring the disease process and progression in the diabetics.[5]

In order for patients to be motivated and actively involved in the diabetic management, they need to understand about the illness, the importance of treatment and the necessary lifestyle changes including physical activity and good diet and nutrition for them.[4] A good quality diabetes care supports the idea of having a good education programme, improvement in the

mode of delivery such as using information technology and importantly listening to patients.[5] Regular assessment and reinforcement of patients' skills and knowledge are necessary; any misconception has to be corrected.[2,4,5] This in turn will ensure the success of the self care management of diabetics.

Currently it is estimated that more than 90% of the diabetics received their care from primary care doctors.[5] Therefore it is elemental to review the current status of diabetic education at the primary care level. This study examined the level of knowledge on diabetes and nutrition among the type 2 diabetic patients attending a primary care centre in Kuala Lumpur. It also looked into the association of the knowledge with patients' socio-demographic profiles, duration of diabetes, level of glycaemic control and frequency of dietician consultation.

METHODS

Subjects and study design

This was a cross sectional study done in a primary care centre in Kuala Lumpur among diabetic patients. On average, there were 60 diabetics attending the centre for follow up daily. This centre was run by family physicians and medical officers. There were also 2 trained diabetic nurse educators and a dietician at the centre. Prior to the doctors' consultation, all diabetic patients need to see a diabetic nurse educator for their blood glucose check, body weight and blood pressure measurements. In this study, patients were selected conveniently from the pre-consultation pool. As this pilot study was a part of medical students' elective project, data collection was limited over the last 10 working days in April 2008. The patients were approached by research assistants to identify whether they were eligible for the study. The inclusion criteria were patients who had been diagnosed to have type 2 diabetes mellitus and aged more than 18 years. Patients who could not understand either Malay or English language were excluded from this study. Consent from the patients was obtained prior to the data collection. The selected patients were given a set of self-administered pre-tested questionnaire. Minimal assistance was given by trained research personnel if the patients had difficulty in answering any of the questions.

Study instrument

This study used a set of questionnaire which consisted of 3 parts. The first part comprised patient's socio-demographic data (age, gender, ethnicity, education level and employment status), body mass index, duration of diabetes and recent HbA_{1c}. The second part consisted of questions on general knowledge on nature, risk factors, complications of diabetes, habits to control diabetes and knowledge on nutrition. 1 mark would be given for correct answers to questions on knowledge and 0 for wrong or do not know responses. The total score would be the percentage of correct answer over 68 questions. A higher percentage score indicates better knowledge on general diabetic and diabetic diet. The third part, the patients were asked whether they had ever seen a dietician and number of dietician visits. These questions were generated based on expert opinions and literature review. Initial set of the questionnaire was in English language and it was later translated to the Malay language by a bilingual person. The questions had been pre-tested on 10 diabetic patients from a different clinic, looking into the comprehension of the questions as well as duration of time to answer the questions. Based on the pre test results, the questions were amended and rephrased for the final version of the questionnaire. On average, the total time used to answer the questionnaire was approximately 20 minutes.

Ethical consideration

This study had been approved by the research and ethical committee of Universiti Kebangsaan Malaysia (UKM) medical faculty. Written consent had been obtained from all the patients involved in this study prior to the data collection.

Statistical analysis

Data were analysed using SPSS for windows version 12.0 (SPSS Inc Chicago, USA). Descriptive analysis such as frequencies was used to illustrate patients' responses to the questions on knowledge. Total knowledge score was shown as mean ±SD. Student's t test was used to test differences in the mean knowledge score for independent variables. Confidence interval of 95% and p value of less than 0.05 were set as the level of significance.

RESULTS

Socio demographic characteristics of the patients

Only 55% of the total patients approached were eligible for this study. A total of 110 patients agreed and participated. The majority of them were females (69; 62.7%) and Malays (74; 67.3%). These patients had at least secondary education level (75; 68.1%), were unemployed (74; 67.3%) with total monthly income of less than RM2500 (96; 87.3%). The mean age of the patients was 58.3 years (SD±10.4, range 28-83 years). The majority of the patients (84; 76.4%) had diabetes for less than 10 years and the mean duration of diabetes was 6.2±6.2 years. Only half of the patients (60; 54.5%) had at least one consultation with dietician. There were 45.5% (50) of the patients had HbA_{1c} d"6.5%. The majority of the patients (86; 78.2%) were obese (Table 1).

Knowledge score

Overall, most of the patients had good knowledge about diabetes and nutrition. The mean total score was 71.2% ± 9.34. The median score was 72.1%, with quartile range of 64.8% to 77.9%. The highest score was 89.1% and the lowest score was 36.8%. Respondents were less knowledgeable on topics of diabetic complication and exercise. Many of them

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Table 1: The association between the mean total knowledge score with patients' profile

Characteristics	Number (%)	Knowledge score, mean (SD)	p value
Gender			
Male	41 (37.3%)	70.8 (10.1)	0.73
Female	69 (62.7%)	71.4 (8.8)	
Ethnicity			
Malay	74 (67.3%)	71.4(9.8)	0.72
Non-Malay	36 (32.7%)	70.7(8.4)	
Education level			
Primary school	35 (31.9%)	68.9(9.7)	0.09
Secondary school or more	75 (68.1%)	72.2(9.0)	
Employment status			
Yes	36 (32.7%)	70.79(8.8)	0.77
No	74 (67.3%)	71.35(9.6)	
Duration of diabetes			
<10 yearse	85 (77.3)	70.5(9.4)	0.15
≥10 years	25 (22.7)	73.5(8.8)	
Dietician consultation			
Yes	60 (54.5)	72.8(7.6)	0.04
No	50 (45.5)	69.2(10.4)	
Frequency of dietician consultation			
None	50 (45.5)	69.2(10.4)	0.10
Once	27 (24.5)	71.7(7.6)	
More than once	33 (30.0)	73.7(8.4)	
Body mass index			
< 25 kg/m^2	24 (21.8)	67.8(10.8)	0.05
≥ 25 kg/m^2	86 (78.2)	72.1(8.7)	
HbA_{1c}			
< 6.5%	50 (45.5)	69.8(10.5)	0.18
≥ 6.5%	60 (54.5)	72.3(8.1)	

included liver failure as diabetic complication (68; 61.8%) and once a week exercise was adequate to control their diabetes (69; 62.7%) (Table 2). For nutrition, many did not know that they should not share the same food with others (62; 56.4%). More than half did not know the proportion of potato, noodle, watermelon, pharatta, sweet potato, red bean and lemon juice they are allowed to take (Table 3).

Association between knowledge score with socio-demographic profiles, duration of diabetes, level of glycaemic control and frequency of consultation with dietician

The only significant factor that was found to have an association with the total knowledge score was seeing dietician (p=0.04). However the frequency of dietician consultation was not associated with a higher knowledge score (p=0.10) (Table 1). There were no significant association between the total knowledge score and the patients' gender, ethnicity, level of education, employment status, body mass index, duration of illness and glycaemic level.

Table 2: Descriptive analysis of the knowledge on diabetes

Item	Correct n (%)	Incorrect n (%)
Diabetes mellitus can be cured	89 (80.9)	21 (19.1)
Diabetes mellitus can be controlled	103 (93.6)	7 (6.4)
Diabetes mellitus is an inherited disease	74 (67.3)	36 (32.7)
Complications of diabetes mellitus are:		
• Cancer	85 (77.3)	25 (22.7)
• Blindness	102 (93.6)	8 (6.4)
• Kidney failure	107 (97.3)	3 (2.7)
• Liver failure	42 (38.2)	68 (61.8)
• Delayed wound healing	105 (95.5)	5 (4.5)
• Heart attack	92 (83.6)	18 (16.4)
• Stroke	89 (80.9)	21 (19.1)
Diabetes mellitus can be controlled by :		
• Correct dietary intake	106 (96.4)	4 (3.6)
• Reducing weight	98 (89.1)	12 (10.9)
• Exercise 30 minutes once a week	41 (37.3)	69 (62.7)
• Medication	93 (84.5)	17 (15.5)

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Table 3: Descriptive analysis of the knowledge on nutrition and diabetic diet

Item	Correct n (%)	Incorrect n (%)
Eat at regular time everyday	97 (88.2)	13 (11.8)
Eat in small quantity	100 (90.9)	10 (9.1)
Eat at least 3 times per day	70 (62.7)	40 (37.3)
Carbohydrate sources are from simple starch	56 (50.9)	54 (49.1)
Control fat and cholesterol intake	105 (95.5)	5 (4.5)
Need more vitamin and mineral compared to normal person	57 (51.8)	53 (48.2)
If eat outside, diabetic patient should :		
• Share food	48 (43.6)	62 (56.4)
• Avoid steam food	79 (71.8)	31 (28.2)
• Avoid fast food restaurant	97 (88.2)	13 (11.8)
• Avoid food which had been prepared earlier	73 (66.4)	37 (33.6)
• Order food with less salt	95 (86.4)	15 (13.6)
• Order drink with less sugar	105 (95.5)	5 (4.5)
• Order food with less fat	99 (90.0)	11 (10.0)
• Order meal in small amount	99 (90.0)	11 (10.0)
Food that should be taken in small amount:		
• Cereal (oat)	75 (68.2)	35 (31.8)
• Chocolate	98 (89.1)	12 (10.9)
• Durian	98 (89.1)	12 (10.9)
• Jam	96 (87.3)	14 (12.7)
• Potato	46 (41.8)	64 (58.2)
• Honey	86 (78.2)	24 (21.8)
• Noodle	54 (49.1)	56 (50.9)
• Puding	87 (79.1)	23 (20.9)
• Condensed milk	99 (90.0)	11 (10.0)
• Water melon	35 (31.8)	75 (68.2)
Food that should be taken in moderate amount:		
• Cream cracker biscuit	84 (76.4)	26 (23.6)
• Fruit in can	95 (86.4)	15 (13.6)
• Red bean	46 (41.8)	64 (58.2)
• Cake	88 (80.0)	22 (20.0)
• Sweet Potato	42 (38.2)	68 (61.8)
• Rice	79 (71.8)	31 (28.2)
• Pie	78 (70.9)	32 (29.1)
• Pharatta	42 (38.2)	68 (61.8)
• Whole meal bread	69 (62.7)	41 (37.3)
• Tosai	65 (59.1)	45 (40.9)
Food that can be taken in large amount :		
• Plain water	108 (98.2)	2 (1.8)
• Lemon juice	43 (39.1)	67 (60.9)
• Barley	64 (58.2)	46 (41.8)
• Cendol	105 (95.4)	5 (4.6)
• Fruit juice	80 (72.8)	30 (27.2)
• Coffee	98 (89.1)	12 (10.9)
• Milo	104 (94.5)	6 (5.5)
• Carbonate drink	109 (99.1)	1 (0.9)
• Cordial drink	106 (96.3)	4 (3.7)
• Chinese tea	72 (65.5)	38 (34.5)
Food high in calories are:		
• Plain water	85 (77.3)	25 (22.7)
• Ice cream	82 (74.5)	28 (25.5)
• Orange	72 (65.5)	38 (34.5)
• Chocolate cake	93 (84.5)	17 (15.5)
• Margarine	89 (80.9)	21 (19.1)
• Cooking oil	90 (81.8)	20 (18.2)
• Rice	80 (72.7)	30 (27.3)
• Pharatta	90 (81.8)	20 (18.2)
• Water spinach	82 (74.5)	28 (25.5)
• Watermelon	64 (58.2)	46 (41.8)

DISCUSSION

In general, majority of the patients had good basic knowledge on diabetes and nutrition. Most of them knew about the nature of diabetes and it can be inherited. However topics on diabetes complications and exercise need to be emphasised. Many of them chose liver failure as one of the diabetic complications. The wrong understanding on liver failure as diabetes complication may inadvertently interfere in the treatment and subsequently glycaemic control.[2] Thus there is a need for the topic on diabetic complications to be reviewed during patients' education and to correct any misunderstanding.

The benefit of doing regular exercise not only for chronic disease patients but to the general population is a well known fact. In addition, the benefit of exercise in improving insulin sensitivity and glycaemic control had also been documented.[6] The minimum level of exercise recommended should be more than 3 to 5 times per week of 30 minutes with moderate-intensity aerobic physical activity.[2,6] However, whether this information had been delivered adequately to the diabetics is questionable. Almost two third of the patients gave the wrong response on exercise. The statement of 'diabetes mellitus can be controlled by exercise of 30 minutes once a week' was answered true by them. This level of exercise is definitely inadequate.[2] Furthermore, majority of the patients in this study (78.2%) were obese. Obesity leads to insulin resistance and hence complicates the control of type 2 diabetes. Therefore weight management is important in these patients and this includes physical activity and exercise.[6] The recommended exercise regime to lose weight is 60 to 75 minutes of moderate intensity activity daily.[6] It is very likely that many of these obese patients did not know this and hence need to be educated.

With reference to nutritional knowledge; domains on meal practice, food sources and proportion need reinforcement. For meal practice, many of them did not know that they should not share the same food with the others (62; 56.4%). The failure of our patients to recognize the importance of having their own meal reflects that they might not have been adequately informed on the individualized treatment and meal.[2,7] The medical nutrition therapy of diabetics has to be

tailored according to patients' circumstances: nutritional needs, severity of disease, cultural and ethnic preferences.[2,7] A balanced diet consisting of correct proportion of carbohydrate (50-60%), protein (15-20%) and fat (25-30%) has to be individualized based on patients' glucose and lipids profiles.[2] It is also recommended for normotensive or hypertensive diabetics to reduce their sodium intake to less than 6g of salt a day.[2] Understandably it would be rather difficult for diabetics to eat the correct proportion if they share with people especially those who do not practice similarly.

For food sources and proportion, more than half of them were wrong in the food proportion for potato, noodle, pharatta, sweet potato, red bean, watermelon and lemon juice. Although the knowledge on the source and type of food is important, the patients' knowledge on food proportion is equally essential.[7] The glycaemic responses of food depends on the amount of carbohydrate, type of sugar, nature of starch, cooking and food preparation, food form and other food components such as fat in the food.[7] The recommended proportion for carbohydrate is around 60-70% of total energy intake.[7] For some patients the carbohydrate intake need to be limited in order to improve the overall glycaemic level.[7] Fruits are known to be good for health especially for its natural vitamins and minerals. However, certain food such as watermelon and processed fruit such as lemon juice have high sugar and most likely would give high glycaemic response to many individuals. Therefore, these diabetics need to be taught on issues of food sources and proportion. Overeating should be avoided by them. Moreover majority of the respondents were obese and hence their recommended total daily calorie intake would be lower than normal weight diabetic patients. The recommended diet which will result in a slow but progressive weight loss for many of these patients should be around 1000 to 1200kcal/day for women and 1200 to 1600kcal/day for men.[6] A weight loss of 5% to 10% of body weight would improve the overall glycaemic control in them.[2] This highlights the importance of re-educating these patients on the food proportion which indirectly would control their total calorie intake.

The role of dietician in diabetic care is very important and recommended due to the complexity of nutritional issues.[2,7] Alas in this study, only half of the patients had the opportunity to consult dietician. This is consistent with earlier studies as not all diabetics received the necessary education.[5] Patients who had at least one consultation with dietician showed an overall better knowledge score (p=0.04). However the knowledge did not improve with increasing frequency of dietician consultation (p=0.10). Therefore it is very important for treating physicians to refer all diabetic patients to the dietician and ensure the patients have at least one dietician consultation. Unfortunately, this study did not look into the reasons why the patients did not receive a dietician consultation. These could be related to patient's, physician's as well as the health system factors. For patient's factors, among the reasons why diabetic patients did not attend their appointment were: a stable body weight as an indication of a good diet, doubts about the usefulness of the dietary advice and forgetting the appointment.[8] For physician's factors, the physicians may do the nutritional counselling themselves, felt patients themselves are not interested in nutritional therapy, would not follow the prescribed diet, patients' family are not supportive with the nutritional therapy and patient's educational status as barriers.[9] Health insurance and reimbursement was found as one of the limiting factor in the health system.[9] Although in this study setting there is no additional charge for a dietician visit, however, the issue of this insurance reimbursement by dietician or diabetic educators has to be looked into especially when the privatization of the Malaysian health care system takes place.

Despite the overall good knowledge on diabetes and diabetic diet, this was not associated with the glycaemic level (p=0.18). A similar result was found in studies on Chinese and American population with type 2 diabetes mellitus where the diabetes knowledge score was not associated with the glycaemic control.[4,10] A meta analysis which looked into previous educational and behavioural interventions on diabetics had shown only a modest improvement in the glycaemic level.[11] Similarly on reviews of 71 studies on self management education program of chronic disease had shown only a small to moderate effects on the disease status.[12] A good knowledge on diabetes and diet may not be translated into their actual practice of having the recommended diet and thus affecting their overall glycaemic level. Behaviour is affected by an interaction of complex bio-psychosocial factors which is called reciprocal determinism.[13] Social consequences that occur before or after behaviour have an immediate impact on behaviour and subsequent cognition.[13] This reciprocal process would actually shape appropriate behaviour over time and in this study, patients have to control their diet which may directly result in a drop in the glycaemic level.

Perhaps a better study needs to look into the barriers in patients on practicing their good knowledge particularly on diabetic diet. However this hypothesis need to be used with caution as diabetic diet is not the only factor that affects the glycaemic level. Factors such as the natural progression of the disease, patients' compliance on the medication prescribed and the physician hesitancy on prescribing the optimum medication may also have their role in the glycaemic level. A study over 1560 records had shown that appointments keeping and medication adherence were associated with substantial reduction in glycaemic level.[14]

Patients' literacy will predict their acquisition of knowledge and later predicts their clinical outcome. Interestingly in a small study of 92 patients; it was shown that diabetes education was effective in improving knowledge, self management and glycaemic control of patients with adequate and limited health

literacy.[15] This is in support with this study findings; the mean total knowledge score (68.9%) was good even in patients with primary school education level. In this study also it is shown that there is no difference between knowledge and education level. It is hopeful to see that with a proper diabetic education regardless of their education level, these patients should ultimately received an equal chance of diabetic knowledge acquisition and care.

It is thought that the longer a person has an illness, the more knowledgeable the patient will be. For long term improvements, the education programme have to be long-term as well.[16] Conversely, what this study had found is duration of illness was not associated with better knowledge score. Possible explanation to this could be related to how such knowledge being delivered. The delivery process is very much related to the personal characteristics, counselling and educating skills of the educator.[16] Diabetic education is no longer limited to diabetes context expertise but rather it also needs a good delivery process.[16] There is a call for the diabetic education in the centre to be reviewed and improved. A good diabetic education programme will ultimately make a patient realize they need to look into their health first in order for them to perform their other socio-cultural obligations such as working for their family.[14] Once this cognition process is corrected, this in turn will improve their overall glycaemic status and hence prevent the long term diabetic complications.

This study has several limitations. Firstly, the study sample is small and the patients were selected using convenient sampling from the pre-consultation pool. Hence the results may not necessarily reflect all diabetic patients in the centre. Language was a barrier to many patients in the centre. Many of them were not proficient in either English or Malay language. This explains the reason why majority of the patients selected were mainly from 1 ethnicity and this may not represent the actual demographic picture of patients in the centre. Thirdly, this study lacks it statistical power where almost half of the selected patients approached refused to participate due to time limitation or simply not interested. This may mean only motivated patients were involved and could explain the high percentage of patients with good glycaemic control and good total knowledge score. In addition, patients' knowledge may also be affected by other sources of information such as from mass media, doctors, other allied health professionals and not just from dietician. However these sources of bias were not being controlled in this study when the association of knowledge with the dietician consultation was being analysed. Finally, as this study is a part of medical students' elective project, time was a limiting factor in patients' recruitment. Nevertheless, the findings of this study should not be treated lightly. There are still inadequacies in our current diabetic education which needs revision and improvement.

CONCLUSIONS

In general, the diabetic patients had good knowledge on diabetes and diabetic diet in this study. However, few domains such as diabetes complications, exercise, meal practice, food sources and proportion need reinforcement. Good knowledge was not found to be associated with the duration of their illness and glycaemic control. Involvement of dietician in diabetic care definitely had its impact on the patients' knowledge, thus patients who have not seen a dietician must be encouraged to see one early in their care and periodically thereafter to reinforce areas where they are lacking during the long-term care. The education session for diabetic patients attending the centre needs to be reviewed and improved especially in areas of knowledge where the patients were lacking. The modes of delivery, as well as counselling and educating skills of the educators are equally important and have to be addressed as well.

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Four-fifth of oesophageal cancer patients had late presentation

Abdullah M, Karim AA, Goh KL. Late presentation of esophageal cancer: Observations in a multiracial South-East Asian population. *J Dig Dis*. 2010;11(1):28-33.
143 patients with oesophageal cancer was diagnosed between 1998 and 2003 in University of Malaya Medical Medical . The mean age of the patients was 63.1 years with male and Indian predominance (overall hospital-based prevalence rates per 100 000 admissions according to races were: Malay; 23.5, Chinese; 57.4 and Indian; 134.1). Only 24 (16.8%) patients underwent surgery and 13 (9.1%) were considered curative.

Acute respiratory illness is very common in Hajj pilgrims despite influenza vaccination and wearing of facemasks

Deris ZZ, Hasan H, Sulaiman SA, Wahab MS, Naing NN, Othman NH. The prevalence of acute respiratory symptoms and role of protective measures among Malaysian hajj pilgrims. *J Travel Med*. 2010;17(2):82-8.
This is a survey of a convenient sample if 387 hajj pilgrim at transit centre before returning to Malaysia. The common respiratory symptoms were: cough 91.5%, runny nose 79.3%, fever 59.2%, and sore throat 57.1%. The prevalence of hajj pilgrims with triad of cough, subjective fever, and sore throat were 40.1%. 72% of them received influenza vaccination before departure and 72.9% wore facemasks.