Knowledge, Attitude and practices about diabetes among Diabetic Libyan population.

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Abstract

Back ground: KAP studies are highly focused evaluations that measure changes in human knowledge, attitudes and practices in response to a specific intervention usually for, demonstration or education. **Aim of study:** to investigate and evaluate the knowledge, attitude and practices of diabetic patients regarding diabetes, and it's management. **Patients and Methods:** Across sectional involving 385 diabetic participants in National Diabetic & Endocrine center (Tripoli), from Jan 2010 until April 2010 selected by systemic random. The data was collected by using the KAP questionnaire developed by the researcher's face to face interview after obtaining a verbal consent. Which included details, about sociodemographic, questions regarding knowledge , beliefs , and practices in different topic of diabetes. **Results:** the study reported 385 participants, 58.7% females, and their age ranged from 20 - 7oyears and above, with mean age 49 ± 14.5 years, The duration of diabetes was ranged from one year to 35 years with a mean 10.7 ± 5.5 years.. the overall mean (±SD)scores of the participants was 37.5±6 knowledge score, 6±2.1 attitude score, 10.3±2.8 practices score, with maximum scores for knowledge, attitude, practice scorepractants being   50 , 8 ,16.Respectively.There is a significantly weak positive correlation between knowledge and attitude (r=0.137) and between knowledge, and practices (r=0.136). Similarly, there is a weak positive correlation between attitude and practices (r=0.121). *Conclusion:* the knowledge, attitude, and practices scores of the participants were good in general, and had sufficient knowledge about diabetes, but less in attitude and practices. But although of that, we still need for further educational intervention for all

Keywords: Knowledge, attitude, practices, diabetes mellitus

Introduction

Diabetes mellitus (DM) is a metabolic disorder of multiple etiologies [1]. It's percentage in Libya in year 2009 is estimated to reach 16.4%, 3.6% impaired glucose test, and 7.3% impaired fasting glucose [2] . Over the past three decades, the social and economic changes have occurred in the majority of Arab countries that include progressive urbanization, increased life expectancy, increasingly sedentary life styles, and obesity that lead to a dramatic rise in type 2 diabetes in many countries of the region[3]. Diabetes can lead to increased morbidity and mortality[4]however the poor control of diabetes results in markedly increased risk for heart disease, stroke, blindness, kidney failure, leg amputation and premature death[5,6] On the other hand, scientific evidence has clearly demonstrate that most diabetes-related pathologies are potentially avoidable if optimum metabolic control is achieved [7,8]. Furthermore the management of diabetes is depending to a great extent on the affected persons, and their own abilities to carry out self-care in their daily lives, such educated patient, which is considered an essential component of achieving this objective [9]. There is further evidence that People affected with the disease often have inadequate knowledge about the nature of diabetes, its risk factors and associated complications [10], and that lack of awareness may be the underlying factor affecting attitudes and practices towards its care[11]. Therefore, it needs to investigate the knowledge, attitude, and practice (KAP) among diabetic patients to aid in future development of programs and techniques for effective health education [12]. This study attempted to assess disease related knowledge, attitude, and practices (KAP) among people with diabetes.

and providing diabetes care for most of the western area of Libya for adult and adolescent diabetic patients. Involving in-patients care, and specialized diabetes out patients clinic including diabetes foot care, ophthalmology, dental, neurology clinic, and antenatal diabetes care .

Patients and Methods

Settings and design

A Cross sectional descriptive study, was carried out in the period from Jan t0 April 2010, in the outpatient clinic in National diabetic & Endocerine center, an educational hospital located in the capital

Sample size and sampling

The sample size was calculated by using equation of esmating proportion [18], The required sample size was calculated as 384, they had been selected by systematic

Questionnaire

A KAP questionnaire developed by thein ventilators after reviewing different published studies (Pakistan [13],Malaysia [14], Nepal [30], Indian [16]), and some questions added which considered to be value based on local beliefs and personal clinical observations. A Likert scale [17] was used for their responses to questions. The KAP questionnaire had nine questions on know ledgeregarding what's diabetes, symptom and signs of diabetes, symptom , and, DKA symptom, risk factor, and complication of diabetes, foot care and prevention of diabetes, , diabetic diet. And

Reliability of questionnaire

The questionnaire was piloted on 10 patients from the same clinics to assess the suitability of content, clarity, and flow of question, and time taken for every patient. Reliability of questionnaire was determined by Kuder -Richardson (KR$_{20}$)[17]for questions in the practice, A

Data collection

Data were collected in special questionnaire, by face to face interview after taken verbal consent which included

sampling,(1:5).Patient selected according to the following criteria; Duration of diabetes more than one year, and History of treatment with insulin (type1 and type 2).

four questions on Attitude regarding, taken insulin lead to eating without restriction, when use insulin treatment means the patients indicate reacheing last stage of the disease , regular insulin use leads to addiction, diabetic patients can take self-care of diabetes . And Eight questions on practice regarding doing regular exercise how it done, and regular blood sugar follow up, regular doing of HbA$_{1c}$, eye examination, and Routine urine, insulin storage in correct way, and if can Adjustment of insulin dose, and change site of insulin injection.

reliability *Coefficien t*of r = 0.935(high reliable was obtained). And for knowledge and attitude questions was determined by Cronbach's alpha Coefficient (α) [17]. A reliability *Coefficient*of r= 0.831 for knowledge questions, and r=0.95 for attitude questions were obtained . Both of them were highly reliable.

information about; sociodemographiccharacters of participants .type , duration , and treatment of diabetes

and sources of information about diabetes.

Scoring system

The answers were recorded by using a coded system, and after that the data transformed into quantitive data for summing of score..Each correct answer in the knowledge was given a score of 1, and zero for wrong and don't know answers. In the attitude score each agree (correct) answerer was given a score of 2, and zero for disagree and one score for undecided. In the practices score, in question one which was about the regular exercise was given, a score 2 for doing regular exercise twice per week, and day after day, other answers given a zero. And about regular follow up of blood sugar was given a score 2 for follow up in O.P.D, and self-monitoring and both (O.P.D and self monitoring), and score zero for others. And about doing HbA_{1c} level was given a score 2 for the less than five month, and

Statistical analysis

Data were analyzed by using SPSS, version 10, into descriptive statican dinferential statistics, used Independent samples *t*- test, and One way ANOVA test

Results

The demographics of the participants are shown in table 1. A total of 385 people (226women, 159 men) participated in the study . The age ranged from 20-70 years and above, with mean age 49.5±14.56

And KAP question about diabetes zero for the other answers. While the eye examination and urine routine examination was given a score 2 for less than five month, and six month one years, and other answers given zero. The change site of insulin ejection, and the storage of insulin, adjustment of the insulin dose was give a score 2 for yes and zero for No..

Three categories were defined on the basis of the score obtained by each participant:

- Poor score (< 40% of the total score)
- Acceptable score (40% -60 % of the total score)
- Good score (> 60% of the total score)[13].

The total score for knowledge was 50, for attitude was 8, and for practice 16. A composite score in percentage was derived by dividing each individual's score by maximum score

(analysis of variances) were used to compare the groups, p≤0.05 has been used as the cut off value, and Correlation coefficient are used to study the association between the three KAP scores. years, The greatest number of participants were in the age group of50-59 years 28.3%.30.1% never attended school. The majority of the participant 61.6% suffering from type 2 diabetes, 44.7% had disease from 6-15 years ago, 70.5% were on

insulin treatment two dose only,33.8% was the source of information about diabetes from medical staff (doctors and nurse). The response of the patients regarding the knowledge related questions are listed in Table 2.

Table 1 Distribution charactersof the participants(n=385).

Parameter	Frequency (%)
Age(years)	
20- 29	42(10.9%)
30-39	53(13.8%)
40-49	82(21.3%)
50-59	109(28.4%)
60-69	68(17.7%)
≥70	31(8.1%)
Sex	
Male	159(41.3%)
Female	226(58.7%)
Occupation	
House wife or unemployed	230(59.7%)
Employed	101(26.2%)
Self employed	40(10.4%)
Student	14(3.6%)
Education level	
Illiterate	116(30.1%)
Primary	66(17.1%)
Secondary	52(13.5%)
Intermediate	104(27%)
University and above	47(12.2%)
Type of diabetes	
Type1	148(38.4%)
Type 2	237(61.6%)
Duration of diabetes(years)	
1-5	106(27.5%)
6-15	172(44.7%)
>15	107(27.8%)
Treatment of diabetes	295(76.6%)
insulin mix or NPH	90(23.4%)
insulin mix and metformin	
Source of information	
Medical staff	130(33.8%)
No clear source	78(20.3%)
Television and radio	53(13.8%)
Family	44(11.4%)
Friends	26(6%)
Books and newspaper and magazine	20(5.2%)
from network	3(0.8%)
All above source	31(8.1%)

Table 2.Responseto knowledge question(correct answer n=385).

Knowledge parameters	Frequency(%)
What 'diabetes	
High blood sugar	330(85.7%)
High urine sugar	251(65.2%)
Low blood sugar does not mean DM	184(47.8%)
Symptoms of diabetes	
Weight loss	241(62.6%)
Polyurea	367(95.3%)
Polydypsia	359(93.2%)
No symptom	120(31.2%)
Symptoms of hypoglycemia	
Feeling hunger	294(76.4%)
Sweating	368(95.8%)
Palpitation	340(88.3%)
Symptom of diabetic ketoacidosis	
Blurring of vision	248(64.4%)
Heart burn	240(62%)
Vomiting	192(49.9%)
Epigasteric pain	192(49.9%)
Risk factor of diabetes	
Obesity	328(85.2%)
Decreased physical activity	332(86.2%)
Consuming excessive sweats	315(81.8%)
family History of diabetes	214(55.6%)
Complication of diabetes	
Heart attack	304(79.9%)
Renal failure	360(93.5%)
Blindness	372(96.9%)
Loss of limbs	369(95%)
Cerebo vascular accident	275(71.4%)
Foot care	
Risk of walking bare foot	346(86.9%)
Treat any fungal lesion between toes	375(97.4%)
Avoid any trauma	374(97.1%)
Use flexible shoes	320(83.1%)
Prevention of diabetes	
Regular exercise	364(94.5%)
Weight gain not prevent Diabetes	320(83.1%)
Smoking not prevent Diabetes	250(64.9%)
Healthy diet	360(93.5%)
Diabetic diet	
Diet less carbohydrate	345(89.6%)
More vegetable	309(80.3%)

Less fruit	273(70.9%)
Low sugar	331(86%)

The response of the participants regarding the attitude related questions are listed in Table 3

Table 3.Response to attitude question (correct answering n=385).

Attitude parameter	Frequency(%)
Taken insulin does not mean eating food without restriction	307(79.7%)
Taken insulin regular dose not indicate reaching last stage of disease	244(63.4%)
Taken insulin regular will not lead to addiction	230(59.7%)
Diabetic patients can take self-care of diabetes	235(61%)

The response of the participants regarding the practice related questions are listed in Table 4.

Table 4.Response to practice questions(correct answer. n=385).

Practice parameter	Frequency(%)
Exercise activity	
Not walking at all	131(34.4%)
Walking twice / weak	115(29.9%)
Walking once / weak	71(18.4%)
Walking day after day	61(15.8%)
Walking irregular	7(1.8%)
Follow up for control blood sugar	
Regular follow up in the OPD	218(56.6%)
Follow up in the O.P.D and self-monitoring	71(18.4%)
Self-monitoring	41(10.6%)
Irregular follow up	31(8.1%)
No follow up	24(6.2%)
Last time of doing HbA$_{1c}$ level	
Not done before	190(49.4%)
Before five month	132(34.3%)
6-12 month	42(10.9%)
2-3 Years	11(2.9%)
> 4 years	10(2.6%)
Last time examination of the eye	
Before five month	140(36.4%)
Not done before	122(31.7%)
6-12 month	83(21.6%)
2-3 Years	29(7.5%)
>4 years	11(2.9%)
Last time examination of urine	

Before five month	177(46.%)
Not done before	144(37.4%)
6-12 month	35(9.1%)
>4 Years	19(4.9%)
2-3 years	10(2.6%)
Change site of insulin injection	
Yes	371(96.4%)
No	14(3.6%)
Storage of insulin	
Yes	376(97.7%)
No	9(3.2%)
Adjustment of insulin dose	
No	216(56.1%)
Yes	169(43.9%)

Knowledge , attitude , and practice score results and correlation.

The participants got good 90.4% knowledge score, 66.8% attitude.   66.1% practices score.

Figure 1.
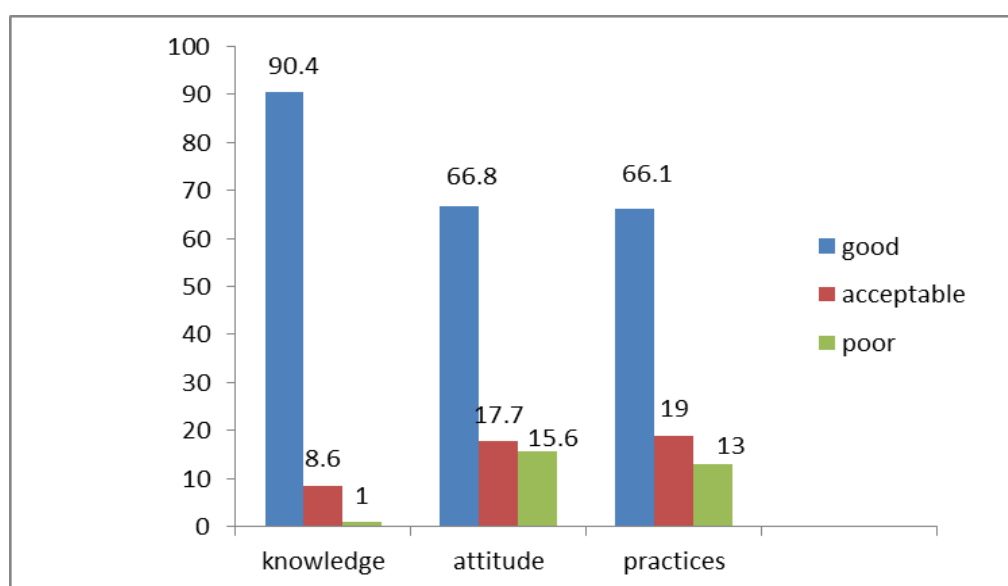
Figuer 1.knowledge, Attitude, and practices scores

Participants Characteristics associated with KAP score are summarized in table 5. The mean knowledge score decreased with increasing age (p=0.000), no difference between gender (p=0.369), and increased with increasing educational level (p=0.000), better in type 1 diabetes (p=0.000). no significant change   with duration of diabetes (p=0.225), but it changed significantly   with different source of information. about The mean of belief score is   nearly equal in all age

group, and gender (p= 0.889, p=0.835) respectively.   While different with educational levels , it increased from illiterate to graduate and above p=0.013, and those with type 1 diabetes have good attitude about their diabetes than type II (p=0.000). The attitude affected by different source of information about diabetes(p=0.01). The mean practice score were decreased with increasing age (p=0.000), and higher in male (p=0.016), and increasing with increasing education level p=0.000), and also the practice was better in type 1 diabetes p=0.000, The practice score was higher away patients who get their knowledge about diabetes from the family p= 0.008. There is weak positive correlation between scores of knowledge and attitude score r= 0.137, and   knowledge and practices score (r= 0.236),this mean that   attitude, and practices score increased   when the knowledge score increased.   The relation between attitude and practice scores (r=0. 121),explore that   the score of practice increases   when the scores of attitude become   better   toward   diabetes.

Table 5.participants characteristic associated with their diabetes knowledge, Attitude, and practices scores(n=385)

Participants parameter	Knowledge scores mean (SD)	Attitude scores mean (SD)	Practices scores mean (SD)
Age (Years)			
20- 29 years	39.3±4.1	5.7 ±1.9	11.5 ± 3.1
30- 39 years	39.3 ±5.5	5.6 ±1.9	11.4 ±2.6
40-49 years	39.7±6.5	5.5 ±2.2	10.3 ±2.6
50-59 years	37.2 ±4.8	5.5±1.9	9.9 ±2.7
60-69 years	36.1 ±4.6	5.5 ±1.9	10±2.7
> 70 years	33.5 ±6.9	5.5 2.2	8.9±2.8
One way ANOVA test	P =0.000 *	P=0 .889	P= 0.000 *
Gender			
Male	37.84±5.40	5.5 ±1.7	10.7 ±2.7
Female	37.32 ±5.74	5.5 ±2.3	10 ±2.9
Independent T test	P= 0.369	P= 0.835	P= 0.016
Education level			
Illerate	34.9 ±5.1	5±2.4	9.3 ±2.8
Primary	36.7 ±5.9	6 ±2.2	10 ±2.4
Secondary	39.1 ±6.6	6 ±1.7	10.7 ±3
Inter mediate	39.6 ±4.1	5.6 ±1.8	11 ±2.6
University and above	38.1 ±5.1	6 ±1.9	11.5 ±2.6
One way ANOVA test	P= 0.000 *	P= 0.013 *	P= 0.000 *
Occupation			

Student	37.1 ±4.1	5.1 ±2.4	11.9 ±2.4
House wife	36.7 ±6.1	5.4±2.3	9.8 ±2.8
Free job	39.2 ±3.8	5.9 ±1.5	11 ±2.3
Employee	38.9 ±4.7	5.8 ±1.7	11 ±2.8
One way ANOVA test	P=0.003 *	P= 0.280	P=0.000 *
Duration of diabetes			
1-5 years	36.8 ±6	5.5 ±2	9.9 ±2.7
6-15 years	38 ±5.8	5.6 ±2.1	10.5±2.9
6-15 years	37.6 ±4.9	5.4 ±2.1	10.5 ±2.8
One way ANOVA test	P = 0.225	P=0.616	P = 0.135
Type of diabetes			
Type 1	39.02 ±5	5.8 ±1.8	11.1±2.8
Type 2	36.6 ±5.8	5. 3 ±2.2	9.9 ±2.7
Independent T test	P=0.000 *	P = 0.021 *	P =0.000 *
Treatment of diabetes			
Insulin (mix + NPH)	37.7±5.1	5.±2	10.3 ±2.8
Insulin + metformine	37.5±6.7	5.3 ±2.4	10.6±2.8
One way ANOVA test	P =0.103	P = 0.269	P = 0.711
Source of information			
Medicals staff	38.1 ±4.5	5.6 ±1.9	10.7 ±2.8
Tiv and Radio	37.7 ±7.4	6±1.7	9.7 ±2.9
Books +news paper	36.8 ±5.7	4.8 ±2.6	11 ±3.6
Family	37.8 ±5	5.8 ±1.9	11.2 ±2.3
Friend	36.9 ±5.4	5.3 ±2	10 ±2.3
All the above	39.2±4.4	6.3 ±1.7	11 ±2.5
Net work	24.7 ±13.0	3±1	9.3±2.3
No clear source	36.6 ±5.7	4.9±2.4	9.5 ±2.3
One way ANOVA test	P= 0.001 *	P= 0. 013 *	P = 0.008 *

*p value statically significant

Discussion

The total KAP score of the participants was found to be good, because most of participants have recurrent follow up in the out patients clinic, Additionally to that the diabetic clinic in the hospital is well equipped with education charts and leaflets about diabetes, and the common sources of Information about diabetes was obtained from their physicians and medical assistances during check up, as revealed by this study , Even those with low level of education were informed regarding their diabetes. The three different Malaysian studies[14,19,20], identified a good knowledge , attitude , and practice score, But in other studies from different countries[13,21,16,15,22,23], revealed low scores of the patients. The difference in the findings among these studies may be due to the difference in the literacy of the study patients, the training received by

them , availability of information on diabetes, lack of time in their clinic due to huge patients load, and lack of diabetic educators[24]. In This study we found that majority of the participants were aware about the symptoms, complications, risk factors, prevention of diabetes, Which was on line with the Malaysian studies[14,19]. Theprevious studies like the diabetes prevention programme[25], the Finnish diabetes prevention study[26] and Da Qing study[27] have clearly demonstrated that diabetes is preventable. The health beliefs are often affected by hearsay[28,29], the study had also highlighted certain of these beliefs and misconception among people with diabetes. The most common misconception among them, is the concept of insulin use indicating last stage of disease, and becoming addict on it , same concept has been documented by the Vietnamese study [28] ,and by Pakistan study [13]. More than half of the participant in this study didn't consider that and their believes based on the fact that's insulin needs to be taken as daily treatment, and the person cannot do without it. Another concept was diabetic patients can eat without restriction, the majority of participant disagreed that, that's true, as their believes of fear from hyperglycemia when eating without restriction, and to avoid the complications. Same opinion

found the in Malaysia study [14]. The practices of exercise, most of the participants were walking for one and half hours twice per weak or day after day, as recommended in the diabetic care 2008[30] and the reminders gave excuse for not doing exercise because of their ill health. Most of them self monitoring of controlling blood sugar, through serial checks of the blood sugar (in the house or the clinic).because they are educated about diabetes, especially those with typ1 diabetes. As presented (Ruggieo L) people with diabetes on insulin are more supported to self monitoring of blood sugar[32]. In diabetic care questions, it was found lack in the examination of the Hb_{A1C} every three months because was not available at laboratory of the center some times and few of them don't know what is the HB_{A1C}because they have irregular follow up. And more of the participants went for the examination of the eyes, during last five months, in the National Diabetic center had ophthalmology clinic in the period of study. But In Nepal study [15]revealed low level contributed due to lack of education about diabetic care regarding eyes. The result of this study showed an increase in percentage of doing urine examination; this investigation is available in the hospital, same result in Nepal study [15]Also in present study more

than half participant can change site of insulin injection,change dose of insulin therapy according to blood sugar level ,

Conclusion

The knowledge, attitude, and practice scores were good. But the mean knowledge scores were better than other score. The participants have sufficient knowledge about diabetes, but less in attitude and practices, and have self monitoring of blood sugar, healthy life style for controlling blood sugar, and responsibility of self care in diabetes.

Recommendations

Health care professionals should actively provide education to diabetic patients to improve people perception and practice, and storage insulin in the correct way, because in our center the education room is available.

and not only providing them with information and skills, but also the ability to make decisions and take ownership of controlling their diabetes especially those living in the rural areas and has less access to information .

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References

1. World health organization,(2006) Guide lines for prevention ,management and cares of diabetes mellitus, WHO; 35-75.

2. Ministry of health and environment(2009), results of surveillances of risk factor for non-communicable disease, Tripoli Libya.

3. William.H.Herman W et al.(1995) Diabetes mellitus in Egypt: risk factors and prevalence. Diabetic Medicine, 12:1126-1131.

4. Adibah H, Idris MN osmanali(1998).perception and behaviour of diabetic patients on blood glucose maintenance. Int. J Diab. Dev. Countries; 18:71-74.

5. World Health Organization (1985)study group on diabetes mellitus. Geneva, World Health Organization, (WHO Technical Report Series No.727).

6. Stratton M.(2000) Association of glycaemia with macrovascular and microvascular complications of type 2 diabetes (UKPDS 35): prospective observational study. British medical journal, , 321(7258): 405–12.

7. The Diabetes Control and Complication Trial Research Group(1993). The effect of intensive treatment of diabetes on the development of progression of long-term complications in insulin-dependent diabetes. New England journal of medicine, , 329(14):977–86.

8. UK Prospective Diabetes Study (UKPDS) Group(1998). Intensive blood glucose control with sulphonylureas or insulin compared with conventional treatment and risk of complications in patients with type 2 diabetes (UKPDS 33). Lancet, , 352(9131):837–53.

9. Tan AS, Young LS, Wan S, Wong ML, et al(1997). Patient education in the management of diabetes mellitus. Singapore medical journal, , 38(4):156–60.

10. Sivaganam G, Namasivayam K, Rajasekaran M, et al(2002). A comparative study of the knowledge, beliefs, and practices of diabetic patients cared for at a teaching hospital (free service) and those cared for by private practitioners (paid service). Annals of the New York Academy of Sciences, , 958:416–9.

11. Hawthorne K, Tomlinson S(1997). One-to-one teaching with pictures-flashcard health education for British Asians with diabetes. British journal of general practice, , 47(418):301–4. 13(5):276–83.

12. Ruzita T, Osman A, Fatimah A et al.(1997) The Effectiveness of group dietary counelling among non-insulin dependent diabetes mellitus (NIDDM) patients in resettiement scheme areas in Malaysia. Asia pacific Jclin. Nutr; 2: 84-87.

13. Rafique G, Azam S.I, F, White. (2002) Diabetes knowledge, beliefs And practices among people with diabetes attending aunverisity hospital in Karachi, Pakistan (Pakistan study).

14. Ambigapathy R, Ambigapathy S, ling HM.(2003)Aknowledge, attitude. And practice (KAP) study of diabetes mellitus among patients attending klinikkesihatanserimanjung. NCD Malaysia;2:6-16. (Malaysia study).

15. Upadhay. DK. Palaians, P.Ravisuhankar,(2007).knowledge, Attitude practice about diabetes a among diabetes patients in western Nepal November 26.

16. Mohand, Raj D etal,(2005).awareness and knowledge of diabetes in Chennai (the Chennai urban Rural Epidemiology study) CURES.a JAPI. Vol; April; 286-50.

17. Kenneth D, Julian C, B.R Hopkins,(1990) Educational and Psychological Measurement and Evaluation, seventh edition; ch 5 test reliability 132-133, ch 11, assessment of objectives from instruments,293.

18. .W. Danil, Biostatistics: Afoundation for Analysis in the health sciences, sixth Edition, Estimation ch6, 180.

19. Lee LF. A KAP(2000-2001) (Knowledge, Attitude, and Practice) study among women with history of gestational diabetes in the prevention of type 2 diabetes in University Malaya Medical Centre, Kuala Lumpur. (unpublished).

20. C H Ding , C L Teng, CN Koh.(2006).Knowledge of Diabetes Mellitus Among Diabetic and Non-Diabetic Patients in KlinikKesihatanSeremban 2004. Med J Malaysia Vol, 61, No, 4, October.

21. N. Nisar, I. Ahmad Khan, M. HafeezQadri, S. AzamSher,(2008).Knowledge and Risk assessment of diabetes mellitus at primary care level; Pakistan Journal of medical science October- December (part 1) vol, 24,no,5, 667-672

22. Z. Saadia, S. Rushdi, M. Alsheha, H. Saeed& M. Rajab: (2010)A Study Of Knowledge Attitude And Practices Of Saudi Women Towards Diabetes Mellitus. A (KAP) Study In Al-Qassim Region. The Internet Journal of Health. Volume 11 Number 2.

23. H.Al-geed, R.Al-okka, B. Greer, A.yousif, N.Kheir.(2010).knowledge, Attitude, and practices of diabrticQateri patients, Qateriunveristysidra medical &Research centre, Hamad General hospital, Doha, Qater.18-4-.

24. kapur A,(2001) . Influence of socio-economic factors on diabetes care. Int J Diab Dew Countries;21:77-85.

25. Knowler WC et al.(2002). The Diabetes Prevention Programme Research Group. Reduction in the incidence of type2 diabetes with lifestyle intervention or metformin. New England Journal of Medicine, 346:393-403.

26. Tuomilehto J, Lindstrom J, Eriksson JG, *et al*. (2001).Finnish diabetes Prevention study Group. Prevention of Type 2 diabets mellitus by changes in lifestyle among subjects with impaired glucose tolerance. *N Engl J Med*;344:1343–50.

27. Li G, Hu Y, Yang W, *et al*.(2002). Effects of insulin resistance and insulin secretion on the efficacy of interventions to retard development of type 2 diabetes mellitus: the DA Qing IGT and diabetes study .diabetes*ResClin Pract*;58:193-200.

28. Mull DS, Nguyen N, Mull JD.(2001). Vietnamese diabetic patients and their physicians: what ethnography can teach us. West-ern journal of medicine, 175(5): 307-11.

29. Anderson RM et al .(1991). Barriers to improving diabetes care for blacks. Diabetes care, 14(7):605-9.

30. DiabetesCare,(2008).volume31, supplement1,January; S22.

31. Ruggiero L et al.(1997). Diabetes self management. Self reported recommendations and patterns in a large population. Diabetes care.