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Knowledge and Attitude of Medical Students about Insulin Resistance Symptoms, Effect, and Treatment

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ABSTRACT

The inability of the target organs to react appropriately to the action of insulin is known as insulin resistance. Insulin resistance impairs insulin-mediated glucose absorption in the peripheral (skeletal muscle and adipose tissue), which results in increased blood sugar levels and increase insulin demand.

Aim: This study aims to assess medical students' knowledge and attitudes on the signs, consequences, and treatments of insulin resistance.

Patients and methods: There were 160 medical students at Tikrit University in all, male and female. The average age of students in the primary stages was 20 years, while that of students in the clinical stages was 23 years old. The current study, which was conducted in 2023 at Tikrit University College of Medicine (TUCOM), is cross-sectional in nature. All data presented statically as percentage.

Results: There are three forms of diabetes mellitus, according to 43.75 percent of medical students. One of the complications of DM, according to (90.63 %) of them, is vision problems. Diet modification and exercise were preferable than oral hypoglycemic drugs and insulin therapy.

Conclusions: The study found that (75%) of medical students recognized the link between type 2 DM and insulin resistance, with clinical students showed a higher level of awareness in comparison with preclinical students.

Keywords- Insulin resistance, type 2 diabetes mellitus, Metabolic syndrome.

I. INTRODUCTION

Insulin resistance is characterized as an organ's inability to respond to insulin properly (1). Insulin resistance impairs insulin-mediated glucose absorption in the peripheral (skeletal muscle and adipose tissue), which results in increased blood sugar levels and requirement insulin (2). Hyperglycemia occurs when increased insulin needs are not accompanied by higher insulin levels (3). Other disorders including central obesity, hypertension, and dyslipidemia, all of which are risk factors for cardiovascular disease, are known to be connected to insulin resistance (4). The phrase "metabolic syndrome" refers to the collection of certain metabolic disorders (5). It is generally known that obesity increases the likelihood of developing insulin resistance and the metabolic syndrome (6). The distribution of adipose tissue is just as crucial as the overall quantity of fat, with visceral depots having a greater impact on insulin resistance (7). Intense research is being done to determine the processes by which the anatomical distribution and accumulation of adipose tissue may be connected to the emergence of insulin resistance (8). Adipose tissue had previously been thought of as an organ that stores energy, but within the

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past ten years, a new function as an endocrine organ has developed. Currently, it is understood that adipose tissue secretes a variety of diversely categorized factors (9).

Free fatty acids (FFA) with well-known physiological and pathological effects on glucose homeostasis and proteins known as adipocytokines that function in an autocrine, paracrine, or endocrine manner are among these variables. a way to regulate different metabolic processes (10).

These adipocytokines may play a role in the development of insulin resistance. They may change the sensitivity of insulin-targeted organs such muscle and the liver locally or distantly, or they may function through immune, autonomic, or neuroendocrine mechanisms. The primary pathophysiological mechanisms of type 2 diabetes mellitus and diabetic consequences are insulin resistance and hyperglycemia (11).

II. AIM OF STUDY

This study aims to assess medical students' knowledge and attitudes on the signs, consequences, and treatments of insulin resistance.

III. PATIENTS AND METHODS

A total of 160 medical students from both sexes at Tikrit University participated in the survey. The clinical stage students' ages (1st, 2nd, and 3rd stages) varied from 18 to 22 years on average (20), while the clinical stage students' ages (4th, 5th, and 6th stages) ranged from 21 to 25 years on average (23) years.

A cross-sectional research was conducted at Tikrit University/College of Medicine (TUCOM) from the first of December 2022 to the first of March 2023 to evaluate medical students' knowledge and attitudes on the signs, symptoms, causes, and treatments of insulin resistance.

Medical students from TUCOM made up the research sample, which was a straightforward random sampling.

The demographic information on medical students was part of the questionnaire used to gather data, and then there were questions regarding their attitudes and understanding of the signs, effects, and treatments of insulin resistance.

Percentages are used to display all the data.

Students gave their consent to fill out the necessary information after receiving assurances that their answers would be kept private.

Only individuals who consented to participate in the study and were informed of its purpose were considered for inclusion.

IV. RESULTS

Figure (1) Type of DM that related to insulin resistance:

According to data, 60% of students in the preclinical level and 90% of students in the clinical stage accurately diagnosed type 2 DM linked to insulin resistance, which represent 75%of the total students.

Table (1): Respondents Knowledge About Types of Diabetes Mellitus:

60% of students in the preclinical level reported having two forms of diabetes mellitus, compared to 52% of clinical students who reported having three types.

Table (2): Risk Factors of Insulin Resistance According to Medical Student's Knowledge:

Table (2) clarifies risk factors of DM responded by preclinical students reported family history (91.25%), obesity (93.75%), lifestyle (90%) and age and diet (76.25%) more frequently than other students. They reacted by (100%) obesity, (96.25%) diet, (95%) lifestyle, and age (92.5%) in clinical stages students. The correct answer rang between (49.38%) to (96.86%)

Table (3): Clinical Symptoms of Insulin Resistance According to Medical Student's Respondent:

Table (3) illustrates the clinical symptoms of insulin resistance according to medical students responded of clinical stage included (91.2%) dry mouth, (90%) fatigue, (88.75%) blurring of vision, and (86.25%) recurrent infection. While preclinical students the symptoms of insulin resistance were (85%) dry mouth, (76.5%) fatigue, (75%) polydipsia, and (75%) blurred vision. The most common correct answer was dry mouth (88.16%), and weight gain was the least one (26.88%).

Table (4): Complications of Insulin Resistance According to Medical Student's Knowledge:

Table (4) show the complications of insulin resistance were reported by the clinical stage students: (93.75%) kidney disease, (91.25%) vision problems, (82.5%) cerebrovascular disease, (80%) coronary artery disease, and (70%) hypoglycemia in clinical stages; on the other side the preclinical stages :(90%) vision disease; (85%) kidney disease; (78.75%) diabetic ketoacidosis; (63.75%) hypoglycemia; and (62.5%) coronary artery disease. With different percentage of correct answer (16.25% to 90.63%).

Table (5): Treatment lines of Insulin Resistance According to Students Respondent:

Table (5) show compares between clinical and preclinical students' knowledge according to type of treatment of insulin resistance (oral hypoglycemic agents, Insulin, diet and exercise revealed (81.25,55,100,100 versus 55,72.5,87.5,88.75) respectively.

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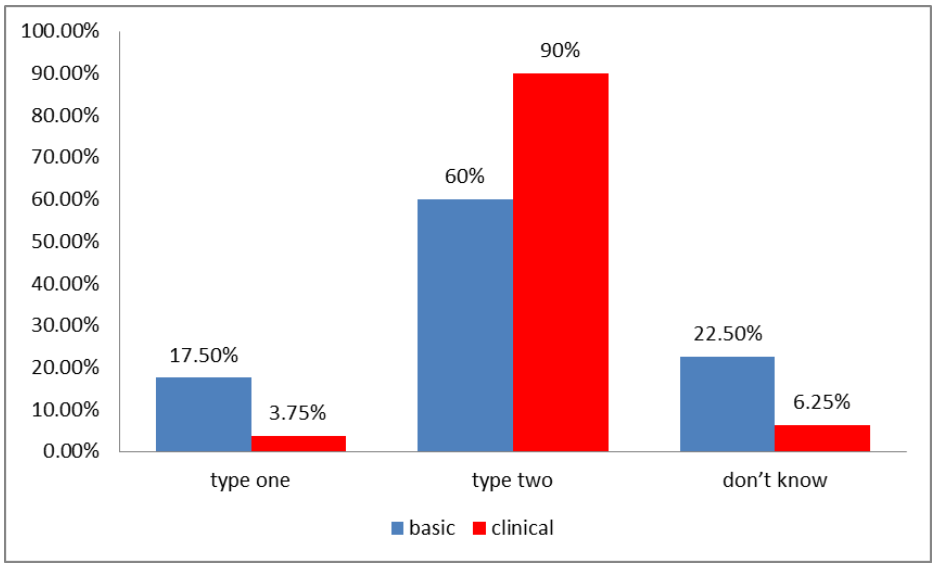

Figure (1): Type of DM that Related to Insulin Resistance

Table (1): Respondents Knowledge about Types of Diabetes Mellitus:

Type of DM	Preclinical		Clinical		Total percentage
One type	4	5%	0	0%	2.5%
Two types	48	60%	38	47.5%	53.75%
Three types	28	35%	42	52.5%	43.75%
Total	80	100%	80	100%	100%

Table (2): Risk Factors of Insulin Resistance According to Medical Students Knowledge:

Risk factor	Preclinical **Students**						**Clinical Students**						**Over all**
	Yes		**No**		**Don't**		**Yes**		**No**		**Don't**		**correct answer**
	no	**%**	**no**	**%**	**no**	**%**	**no**	**%**	**no**	**%**	**no**	**%**	
Family history	73	91.25	5	6.25	2	2.5	72	90	5	6.25	3	3.75	145 (90.63%)
Age	61	76.25	15	18.25	4	5	74	92.5	2	2.5	4	5	135(84.375)
Obesity	75	93.75	1	1.25	4	5	80	100	0	0	0	0	155(96.86%)
Diet	61	76.25	13	16.25	6	7.5	77	96.25	1	1.25	2	2.5	138(86.25%)
Sedentary Life style	72	90	5	6.25	3	3.75	76	95	3	3.75	1	1.25	148(92.5%)
Smoking	35	43.75	31	38.75	14	17.5	44	55	23	28.75	13	16.25	79(49.38%)
Hypertension	35	43.75	27	33.75	18	22.5	44	55	21	26.25	15	18.75	79(49.38%)
Alcohol intake	48	60	17	21.25	15	18.75	37	46.25	14	17.5	29	36.25	85(53.13%)

Table (3): Clinical Symptoms of Insulin Resistance According to Medical Student's Respondent

Symptoms	Preclinical Students						Clinical Students						Over all correct answer
	Yes		**No**		**Don't**		**Yes**		**No**		**Don't**		
	No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	
Polydipsia	60	75	5	6.25	15	18.75	67	83.75	2	2.5	11	13.75	127(79.38%)
Weight gain	56	70	17	21.25	7	8.75	48	60	26	32.5	6	7.5	43(26.88%)
Polyphagia	52	65	12	15	16	20	65	81.25	5	6.25	10	12.5	117(73.13%)

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Delay wound healing	51	63.75	18	22.5	11	13.75	66	82.5	9	11.25	5	6.25	117(73.13%)
Polyuria	24	30	39	48.75	17	21.25	25	31.25	46	57.5	9	11.25	85(53.13%)
Blurring of vision	60	75	9	11.25	11	13.75	71	88.75	3	3.75	6	7.5	131(81.88%)
Dry mouth	68	85	5	6.25	7	8.75	73	91.25	3	3.75	4	5	141(88.16%)
Headache	29	36.25	31	38.75	20	25	46	57.5	14	17.5	20	25	75(46.88%)
Recurrent infection	47	58.75	6	7.5	27	33.75	69	86.25	8	10	3	3.75	116(72.5%)
Fatigue	61	76.25	6	7.5	13	16.25	72	90	2	2.5	6	7.5	133(83.13%)
Dry skin	48	60	14	17.5	18	22.5	30	37.5	21	26.25	29	36.25	78(48.75%)

Table (4): Complications of Insulin Resistance According to Medical Student's Knowledge

Complication	**Preclinical Students**						**Clinical Students**						**Over all Correct answer**
	Yes		**No**		**Don't**		**Yes**		**No**		**Don't**		
	No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	
Vision problems	72	90	2	2.5	6	7.5	73	91.25	3	3.75	4	5	145 (90.63%)
Hypertension	37	46.25	22	27.5	21	56.25	45	18.75	15	26.25	20	25	82 (51.25%)
Kidney disease	68	85	6	7.5	6	7.5	75	93.75	0	0	5	6.25	143 (89.38%)
Cerebrovascular disease	47	58.75	14	17.5	19	23.75	66	82.5	3	3.75	11	13.75	113 (70.63%)
Coronary artery disease	50	62.5	9	11.25	21	26.25	64	80	2	2.5	14	17.5	114 (71.25%)
Hyperosmolar non ketosis syndrome	21	26.25	4	5	55	68.75	46	57.5	9	11.25	25	31.25	67 (41.88%)
Diabetic ketoacidosis	63	78.75	6	7.5	11	13.75	54	67.5	20	25	6	7.5	26 (16.25%)
Hypercholesterolemia	52	65	14	17.5	14	17.5	44	55	13	16.25	23	28.75	96 (60%)
Hypoglycemia	51	63.75	21	26.25	8	10	56	70	12	15	12	15	107 (66.88%)
Peripheral neuropathy	48	60	14	17.5	18	22.5	53	66.25	11	13.75	16	20	101 (81.13%)

Table (5): Treatment lines of Insulin Resistance According Students Respondent

Treatment	**Preclinical Students**						**Clinical Students**						**Over all Correct answer**
	Yes		No		Don't		Yes		No		Don't		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Diet	70	87.5	5	6.25	5	6.25	80	100	0	0	0	0	150 (93.75%)
Insulin	58	72.5	16	20	6	7.5	44	55	35	43.75	1	1.25	51 (31.88%)
Oral hypoglycemic agents	44	55	16	20	20	25	65	81.25	4	5	11	13.75	109 (68.13%)
Exercise	71	88.75	2	2.5	7	8.75	80	100	0	0	0	0	151 (94.38%)

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V. DISCUSSION

Due to the rising incidence and prevalence of DM, it is essential to teach aspiring physicians how to recognize and successfully treat insulin resistance. This research at Tikrit University College of Medicine in Iraq is to assess the knowledge and attitude (awareness) of medical students about international relations.

One kind (2.5%), two types (53.75%), and three types (43.75%) of DM were reported by students when asked about them, but at Port Harcourt University in South Zone Nigeria, one type (10%), two types (6.4%), and three types was (3.2%) (12). Students from Tikrit University have more knowledge than those who studied in South Zone Nigeria.

In this study, more medical students (75%) accurately recognized insulin resistance as a factor in type 2 diabetes than in a study conducted at Al-Balqa Applied University in Jordan, which had a response rate of 41.6% (13).

According to medical student understanding, the study's findings for family history (90.63%), age (84.38%), obesity (96.86%), and Sedentary lifestyle (92.5%) as risk factors for insulin resistance.

While family history (94.4%), obesity (96.7%), lifestyle (99.3%), and age (100%) were shown to be the risk factors for insulin resistance in the study from Albaha University, respectively (14). Despite the fact that sedentary lifestyle and obesity are the most prominent risk factors in this study, which are the most important modifiable contributors to the prevalence of diabetes, hypertension, and coronary artery disease (15), (16).

In addition, results of this study revealed high levels of awareness regarding lifestyle and physical activity as a preventative measure against type T2DM, which was similar in comparison with a study in Pakistan (17) and a higher than a study done in Southern Sri Lanka (18).

The majority of clinical and preclinical students correctly identified the risk factors, include old age, obesity, and a family history of diabetes. The results of current study were higher in comparison with studies done in Karbala, Iraq (19).

Early recognition of clinical features plays a role in preventing serious complications of the disease (20).

Depending on the clinical symptoms of DM can have a variety of clinical presentations, ranging from asymptomatic to significant consequences. The correct answer have modest variances, from Syrian study (21). Polydipsia, mouth dryness, fatigue, delayed wound healing, recurrent infections, and polyphagia (79.38% 88.16%, 83.13%, 73.13%, 72.5%, 73.13% verses 94.9%, 89.8%, 78.9%, 88.4%, 66.9%, 55.3%) respectively.

Polyuria, polydipsia, and fatigue are the main classical symptoms of insulin resistance (22). Our study showed higher levels of awareness in comparison with studies conducted in Jordan (23). Saudi Arabia (24), and United Arab Emirates (UAE) (25).

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Concerning insulin resistance consequences, can cause a number of major issues that raise mortality and morbidity rates.

The knowledge among medical students regarding complications of insulin resistance in comparison with other study done in Ajman University research in the United Arab Emirates (25). These complications included visual problems, Kidney disease, cardiovascular disease, hypercholesterolemia and peripheral neuropathy (90.63%, 89.38%, 71.25%, 60%, 81.13%) verses (54%, 57%, 40%,, 56%, 48%) respectively.

However, it is difficult to compare our findings to those of other studies because most of them used different instruments and or were conducted among different age groups or ethnicities. We obtained the information from our knowledge, attitude, and practice study on diabetic mellitus in medical students, unlike non-medical students of other studies which provided us with an insight into the gaps in their knowledge, which will help us in the future to enrich them with more knowledge by inoculating more study materials and conducting workshops for them. In the future, the participant could play a key role in the primary prevention of diabetes in the community. As a result, as most prevention programs do, their core knowledge, positive attitude, and correct practice toward the prevention and treatment of diabetes will significantly reduce the prevalence of complications in the community (26).

In terms of the study's treatment lines, the findings for diet (93.75%), insulin therapy (31.875%), oral hypoglycemic drugs (68.125%), and exercise (94.375%) were all positive. While in the Syrian study, will agree with recommended diet and contras insulin treatment (21).

Clinical students of the current study showed a higher level of awareness in comparison with preclinical students; this is attributed to the clinical experience in hospitals, and that the endocrinology curriculum is taught in the medical university.

VI. CONCLUSIONS

1- The study found that (75%) of medical students recognized the link between type 2 DM and insulin resistance.

2- Three different kinds of diabetes mellitus are reported to exist by around 43.75% of (TUCOM) students, with (88.125%) of medical students stated that dry mouth is insulin resistance symptom.

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3- Medical students' respondent that oral hypoglycemic drugs are the first line of therapy for insulin resistance.
4- The overall scores (TUCOM) students were good and acceptable regarding knowledge, attitude, and practice about insulin resistance.
5- Clinical students showed a higher level of awareness in comparison with preclinical students

RECOMMENDATION

1- A better insulin resistance education program should be implemented in all ministries to increase awareness, attitude, and practice through mass media and health education.
2- Managing and treating insulin resistance should be prioritized in order to improve life quality and prevent the development of its complications.

REFERENCES

[1] Kim T J, Kim H J, Kim Y B, Lee J Y, Lee H S, Hong J H, Lee J W. Comparison of surrogate markers as measures of uncomplicated insulin resistance in Korean adults. *Korean Journal of Family Medicine. 2016May; 37(3): 188.*
[2] Bothou C, Beuschlein F, Spyroglou A. Links between aldosterone excess and metabolic complications: A comprehensive review. Diabetes and metabolism. 2020 feb; 46(1): 4.
[3] Seong J, Kang J Y, Sun J S, Kim K W. Hypothalamic inflammation and obesity: a mechanistic review. Archives of pharmacal research. 2019 May; 42: 390.
[4] Ying W, Wollam J, Ofrecio J M, Bandyopadhyay G, El Ouarrat D, Lee YS, Olefsky J M . Adipose tissue B2 cells promote insulin resistance through leukotriene LTB4/LTB4R1 signaling. The Journal of clinical investigation.2017 Mar; 127(3): 1025.
[5] Hall C, Yu H, Choi E. Insulin receptor endocytosis in the pathophysiology of insulin resistance. *Experimental & molecular medicine.2020 Jun; 52(6):919.*
[6] Freeman A M, & Pennings N. Insulin resistance. In StatPearls [Internet]. StatPearls Publishing.2022 Jun 4: 5
[7] Brown J C, Harhay M O, Harhay, M N . The value of anthropometric measures in nutrition and metabolism: comment on anthropometrically predicted visceral adipose tissue and blood-based biomarkers: a cross-sectional analysis. Nutrition and metabolic insights.2019 Feb ; 12: 2.
[8] Schmidt A F, Swerdlow D I, Holmes M V, Patel RS, Fairhurst-Hunter Z., Lyall D M, Sattar N . PCSK9 genetic variants and risk of type 2 diabetes: a mendelian randomisation study. The lancet Diabetes & endocrinology.2017 Feb; 5(2): 100.
[9] Dearborn JL, Viscoli CM, Inzucchi S E, Young L H, Kernan W N . Metabolic syndrome identifies normal weight insulin-resistant stroke patients at risk for recurrent vascular disease. International Journal of Stroke.2019 Aug; 14(6): 641.
[10] Nolan, Christopher J., Peter Damm, and Marc Prentki. "Type 2 diabetes across generations: from pathophysiology to prevention and management." The Lancet 378.9786 (2011): 169-181. doi:10.1016/S0140-6736(11)60614-4
[11] Khalid M, Alkaabi J, Khan M A, Adem A. Insulin signal transduction perturbations in insulin resistance. International journal of molecular sciences.2021Aug; 22(16): 8590.
[12] Mgbahurike A A, Amadi DO, Onwusah DO. Knowledge Attitude and Perception of Diabetes Mellitus among Students of University of Port Harcourt, Rivers State, South–South Zone Nigeria 2017Oct [Cited 2020 Oct 25].
[13] Al-Sarayra L, Khalidi R S . Awareness and knowledge about diabetes mellitus among students at Al-Balqa'Applied University. *Pakistan Journal of Nutrition. 2012 Jun; 11(11): 1023.*
[14] Abukhelaif AEE, Alghamdi H, Alzahrani M, Alghamdi T, Alamri A, Almalki F. Diabetes mellitus knowledge and awareness among Albaha University students: An observational study. *International Journal of Recent Scientific Research. 2017Sep; 8(1):15285.*
[15] Tiffany M. Powell-Wiley, Vice Chair Lora E. Burke Chair Paul Poirier,*et al* .Obesity and Cardiovascular Disease. Circulation. 2021 May 25; 143(21): e984–e1010.) Korean J Fam Med. 2020 Nov; 41(6): 365–37.
[16] Jung Ha Park, Ji Hyun Moon, Hyeon Ju Kim, *et al*. Sedentary Lifestyle: Overview of Updated Evidence of Potential Health Risks. Korean J Fam Med. 2020 Nov; 41(6): 365–373.
[17] Mumtaz S., Ashfaq T., Siddiqui H. Knowledge of medical students regarding diabetes mellitus at Ziauddin University, Karachi. *J. Pakistan Med. Assoc.* 2009;59(3):163–166.
[18] Herath HMM, Weerasinghe NP, Dias H, Weerarathna TP. Knowledge attitude and practice related to diabetes mellitus among the general public in Galle district in Southern Sri Lanka: A pilot study. BMC Public Health 2017;17:535.
[19] Ali Abd Al-Latif G. Mohammed, Ali Neamah Hasan Al-Aaragi, Mohammed Abdulridha Merzah, Karbala, Knowledge, attitude, and practice regarding diabetic mellitus among a sample of students at technical institute of Karbala. Karbala, Iraq Medical Journal of Babylon ¦ Volume 15 ¦ Issue 2 ¦ April-June 2018.
[20] Ramachandran A. Know the signs and symptoms of diabetes. *Indian J. Med. Res.* 2014;140(5):579–581.
[21] Mohsen F, Safieh H, Shibani M, Ismail H, Alzabibi M A, Armashi H, Sawaf B. Assessing diabetes mellitus knowledge among Syrian medical students: A cross-sectional study. Heliyon. 2021 Sep ; 7(9): e08079.
[22] Ramachandran A. Know the signs and symptoms of diabetes. *Indian J. Med. Res.* 2014;140(5):579–581.

ISSN: 2583-4053

Volume-2 Issue-5 || October 2023 || PP. 44-50

https://doi.org/10.55544/jrasb.2.5.8

[23] Balagopal P, Kamalamma N, Patel TG, Misra R. A community-based participatory diabetes prevention and management intervention in rural India using community health workers. Diabetes Educ 2012;38:822-34.

[24] Khamaiseh A., Alshloul M. Diabetes knowledge among health Sciences students in Saudi Arabia and Jordan. *Jordan Med. J.* 2019;53:37–48.

[25] Khan N, Gomathi K G, Shehnaz S I, Muttappallymyalil J. Diabetes mellitus-related knowledge among university students in Ajman, United Arab Emirates. *Sultan Qaboos University Medical Journal. 2012 Aug;12(3):306* .

[26] Balagopal P, Kamalamma N, Patel TG, Misra R. A community-based participatory diabetes prevention and management intervention in rural India using community health workers. Diabetes Educ 2012;38:822-34.