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Research Article

**KNOWLEDGE ASSESMENT OF DIABETES AND INCIDENCE
OF HYPERTENSION IN TYPE 2 DIABETIC PATIENTS****Dr. Rao Muhammad Adnan, Dr. Muhammad Shahbaz Hassan, Dr. Muhammad Arif, Dr.
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Abstract

Diabetes is a major and growing global health problem which affects more than 171 million people and the number is expected to rise up to 366 million by 2030. T2DM is a self-manageable disease. Diabetes is not a single disease. Rather, it is a heterogeneous set of syndromes represented by high blood glucose associate to a relative or absolute deficiency of insulin. Patients of type 2 diabetes mellitus (T2DM) are at higher risk of cardiovascular and other secondary complications if the disease is not controlled. Detecting and managing hypertension in patients with diabetes is one of the most effective things that can be done to prevent adverse events. The use of anti-diabetic agents is reserved for the treatment of patients with type 2 diabetes whose symptoms cannot be controlled with diet and exercise alone. In patients with type 2 diabetes, the prevalence of hypertension is higher than in non-diabetic subjects. The main aim of the study is to evaluate the awareness of knowledge, management and treatment of diabetes and incidence of hypertension in type 2 diabetic patients. A descriptive, cross-sectional study was performed in the diabetic patients of Bahawalpur. A structured closed ended questionnaire was designed to assess the knowledge about management, treatment and prevention of diabetes. Descriptive statistics (Frequency, Percentage, Mean and SD) and inferential statistics (Chi-square, Mann-Whitney U, Kruskal Wallis) were applied using Statistical Package for Social Sciences (SPSS) version 20.0. There are thousands of diabetic patients all over Pakistan but in the project our sample size is very less i.e. 112 patients_ + 20% hence a total of 135 patient's data was collected on the prevalence basis of the disease. Respondents from urban area were 94 (69.6%) while those of rural area respondents were 40 (29.6%). Respondents were divided on the basis of their family history and 100 (74.1) had family history of disease while 35 (25.9%) respondents had no family history of diabetes. 47 (34.8%) respondents suffered from diabetes less than 5 years while 86 (63.7%) volunteers had disease greater than five years. male had more knowledge than the women with the mean rank of 69.60. the respondents with education of graduation or above have the highest mean rank of 77.55 while illiterates had the lowest mean rank of 51.78. These findings demonstrate that immediate need for diabetes awareness programmers in rural areas of Bahawalpur region and the attention of healthcare professionals, researchers and policy makers to take essential steps in reducing the prevalence of diabetes.

Key words: Diabetes, Hypertension, knowledge, incidence.**Corresponding author:****Dr. Rao Muhammad Adnan,**
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INTRODUCTION:

Diabetes is a chronic, non-communicable disease, characterizes by high levels of glucose in the blood. It occurs either when the pancreas stops producing the hormone insulin (Type 1 diabetes), or through a combination of the pancreas having decrease ability to produce insulin side by side the body being resistant to its action (Type 2 diabetes) [1]. Type 2 diabetes mellitus, formerly called non-insulin-dependent diabetes mellitus, incidence is increasing worldwide. Type 2 diabetes results from the communication between a genetic predisposition and behavioral and environmental risk factors [2, 3]. Insulin is a hormone that regulates blood glucose level in body. Diabetes is a major and growing global health problem which affects more than 171 million people and the number is expected to rise up to 366 million by 2030 [4].

Diabetes prevalence is high in both developed and developing countries. Diabetes affects nearly 300 million worldwide and contributes to over 10% of adult deaths. According to the International Diabetes Federation (IDF) around 387 million people in the world are suffering from diabetes, of which 77% belong to lower and middle income countries and the number of the diabetic population is questionably increased to reach 592 million by 2035 [5]. The prevalence of diabetes has been reported as 9.4% in the United States of America, 3.9 % in the United Kingdom, 8.6% China, 9.1% in India, 17.6% in Malaysia, 23.9% in Saudi Arabia, 19% in the United Arab Emirates, 14.8% in Turkey and 7.9% in Pakistan. The most frightening aspect is the calculated Pakistani diabetic population that is expected to reach 13.9 million by 2030. In Pakistan 9.5% of the urban and 9.4% of the rural population suffers from type 2 diabetes. According to the WHO estimates, Pakistan ranked seventh in prevalence of Diabetes. Pakistan is a developing country. Due to the lack of resources and huge economic crisis, it spends only 2% of the GDP on healthcare services. Diabetes is not a single disease [6].

METHODOLOGY:**3.1 Study Objective****3.1.1 General Objective**

Take step towards better management of chronic diseases.

3.1.2 Specific Objective

- To assess the knowledge of management, treatment, prevention of diabetes that a patient is suffering from.
- To assess the correlation of Type 2 diabetes with Hypertension.

3.2 Study Design

A descriptive, cross-sectional study was performed in the diabetic patients of Bahawalpur. A structured closed ended questionnaire was designed to assess the knowledge about management and treatment of diabetes. The study was conducted in February 2018. The reason for adopting this study design is to prove and/or disprove assumptions. Not costly to perform and does not require a lot of time. Capture the specific point in time. It contains the multiple variables. Data can be used for various types of research. Many findings and outcomes can be analyzed to create new theories.

3.2.1 Study Setting

Study was conducted in major public sector hospitals of Bahawalpur, BVH and Civil Hospital Bahawalpur in order to get complete required information about the patient. The targeted population was diabetic patients from hospitals and some acquainted patients from various parts of the city.

3.2.2 Justification of selection of Bahawalpur City

There are thousands of diabetic patients all over Pakistan but in the project our sample size is very less i.e. 112 patients + 20% hence a total of 135 patient's data was collected on the prevalence basis of the disease. So we don't need to circulate the country due to inadequate resources and less time. That's why we targeted the Bahawalpur City.

3.3 Study Population

The study was conducted on diabetic patients of Pakistan and our targeted population is diabetic patient of Bahawalpur.

DATA COLLECTION:

A structured questionnaire was prepared both in English and Urdu languages. The tool consisted of total of 30 questions divided into five main sections i.e. A, B, C, and D. Section A was about the demographic characters and comprised of 7 questions. Section B was about the knowledge of management of diabetes and consisted of 7 questions also. Section C was about the knowledge of treatment of diabetes and included 9 questions out which question number 20 was a string type question. Section D was about the knowledge about the risk factors of hypertension in diabetic patients and comprised of 7 questions. Each correct answer was awarded with a score of 1 while wrong answer was marked as 0; the maximum marks obtained could be 13 while minimum score attained could be 0.

RESULT**Table 4.1****Demographic characteristics of the study respondents**

There were a total of 135 respondents calculated for our sample size through prevalence based formula. Male respondents included were 68 (50.4%) while female count was 67 (49.6%). There were five age groups in which respondents were divided as follows, 25-35, 35-45, 45-55 and 56 and above. It was found that respondents with secondary education had the greatest number while higher secondary respondents were just 17.8%. Area of residence was divided into two groups of rural and urban. Respondents from urban area were 94 (69.6%) while those of rural area respondents were 40 (29.6%). Respondents were also divided into monthly income, four sections were made and percentage was calculated. Respondents were divided on the basis of their family history and 100 (74.1) had family history of disease while 35 (25.9%) respondents had no family history of diabetes. 47 (34.8%) respondents suffered from diabetes less than 5 years while 86 (63.7%) volunteers had disease greeter than five years.

Table 4.1**Demographic characteristics of the study respondents****Table 4.2 :Descriptive statistics of respondent's knowledge towards management of diabetes**

How can you manage your diabetes	By relaxing N (%)	by walking N (%)	by medicines N (%)	By insulin N (%)	All N (%)
	4(3.0)	14(10.4)	32(23.7)	25(18.5)	60(44.4)
Which type of exercise helps you more	Running		Walking		
	5(3.7)		129(95.6)		
	Yes		No		
Can life style modification help you in managing diabetes	114(84.4)		21(15.6)		
People with diabetes should use cold drinks?	87(64.4)		48(35.6)		
Do you follow diet chart designed for diabetic patients?	81(60.0)		54(40.0)		
Diabetic patient should check glucose level daily	88(65.2)		47(34.8)		
Does media help you in managing your condition	53(39.3)		81(60)		

Note: All the values are based upon observed values and missing values were excluded from analysis.

Table 4.3: Descriptive statistics of respondent's knowledge towards treatment of diabetes**SECTION-B: KNOWLEDGE TOWARDS MANAGEMENT OF DIABETES****Table 4.2****Descriptive statistics of respondent's knowledge towards management of diabetes**

Our section B was of management of diabetes consisting of 7 questions. 32 (23.7%) of the respondents said that diabetes could be managed by just taking medicine while least percentage was obtained for the option of managing diabetes by relaxing which was 4 (3.0%). 60 (44.4%) people responded that it can be managed by all the options which is actually the right option. Type of exercise adopted by the patient affects the patient condition in a great manner. 5 (3.7%) people said they run while 129 (95.6%) respondents said they did walk. Life style modification was very well understood but the respondents as only 21 (15.6%) respondents said no. Use of cold drinks in diabetic patients should be limited. But 87 (64.4%) respondents said yes one should limit the use of cold drinks while 48 (35.6%) said no. Diet charts are usually designed for the patients and 81 (60.0%) people said they follow the diet chart while 54 (40.0%) showed they didn't. Diabetic patients should monitor their glucose level on daily basis and 88 (65.2%) said yes while 47 (34.8%) said no. Media has a great impact on people but it was shown from data that only 53 (39.9%) said that it was useful while others said no.

Our section C is about treatment of diabetes, and consists of 9 questions. 74 (54.5%) respondents responded correctly that diabetes could be treated by all the means. 77 (57.7%) of the respondents said that they consult their physicians before changing the dose of insulin. While 43 (39.1%) didn't used insulin and managed their disease by using medicines. 58 (43.0%) of the respondents do change the site of administration of insulin while respondent. 111 (82.7%) respondents said they don't miss their doses while 22 (16.3%). They usually miss their doses out which tow gave the reason due to hectic routine, 2

said carelessness, 3 said forgetfulness, 1 said due to allergy, 1 said due to stomach problems, 1 said he missed dose because he doesn't like taking medicines. 66% people thought that it was better for the elder patients to use tablets while 69 (51.1%) thought injections were preferable. 68 (50.4%) respondents said they reused their insulin syringes while 27 said they don't reuse their insulin syringe. 107 (79.3%) respondents said they were well satisfied with their treatment while 27 (20.0%) patients said they were unsatisfied.

Table 4.3 Descriptive statistics of respondent's knowledge towards treatment of diabetes

How do you get rid of your elevated blood glucose level?	By proper management	By medication	Insulin	All
	N (%)	N (%)	N (%)	N (%)
	6(4.4)	28(20.7)	27(20.0)	74(54.8)
How often do you visit your doctor for a follow-up checkup?	Every week		Every week	
	14(10.4)		121(89.6)	
	Yes		No	I don't use insulin
	N (%)		N (%)	N (%)
Before changing insulin dose do you consult your physician	77(57.0)		15(11)	43(31.9)
Do you change site of administration of insulin daily	58(43.0)		34(25.20)	43(31.9)
Have you ever missed your dose	22(16.3)		111(82.2)	
Which type of treatment of diabetes you think can be easily practiced by elderly patients	Injection		Tablets	
	69(51.1)		66(48.9)	
	Yes		No	I don't use insulin
Have you ever reused your syringe for insulin injection	68(50.4)		27(20.0)	40(29.6)
Are you satisfied with treatment and management of your disease	107(79.3)		27(20.0)	

Note: All the values are based upon observed values and missing values were excluded from analysis. Missed dose due to busy routine, carelessness, didn't like medicine, due to allergy, due to carelessness, due to depression, due to forgetfulness, due to stomach problem, due to laziness, due to hectic routine.

Table 4.4: Risk factors of hypertension in diabetic patients

Section D consisted of 7 questions; it was about relationship between diabetes and hypertension. These sections showed that majority of the individual were well known about the risk factors of diabetes and relation between diabetes and hypertension. 119 (88.8%) agreed that progressive age was associated factor of the disease. 115 (85.2%) said that obesity was linked with the aggregation of the patient condition. Alcohol intake is a cause factor of hypertension and it was evident from the results as 93

(68.9%) people said yes. 93 (68.9%) of the respondents said smoking was risk factor of hypertension. 101 (74.8%) patients said that they thought diabetes itself is a risk factor of hypertension. 85 (63%) respondents had family history of hypertension while others had no history. 96 (71.1%) diabetic patients had associated hypertension along with diabetes, which shows that incidence of comorbidity of hypertension and diabetes.

Table 4.4 : Risk factors of hypertension in diabetic patients

	Yes (%)	N	No (%)	N
Do you think progressive age is a risk factor of hypertension?	119(88.8)		15(11.1)	
Does obesity aggravates the risk of hypertension	115(85.2)		20(14.8)	
Do you think alcohol intake is one of the cause of hypertension	93(68.9)		42(31.1)	
Do you think smoking increases blood pressure	93(68.9)		42(31.1)	
Do you think diabetes itself is a risk factor of hypertension	101(74.8)		34(25.2)	
Does your family has history of hypertension	85(63.0)		50(37.0)	
Are you suffering from hypertension?	96(71.1)		39(28.9)	

Note: All the values are based upon observed values and missing values were excluded from analysis.

DISCUSSION:

A cross sectional study about the assessment of knowledge of diabetes and the incidence of hypertension in type 2 Diabetic patients has performed in which most of respondents were male. Most of the study participants were illiterate. Some were secondary and few respondents were higher secondary and about three quarter were graduated or above. Most of the study participants were belonging to urban area and other belong to rural area. Furthermore, we observed that participants with higher socioeconomic status scored higher than participants belonging to low income socioeconomic status. Hence we endorse the findings of a research study that reported the rural and low income population are less aware of diabetes related knowledge. In current study most of the respondents have the family history of diabetes and the probable reason behind their adequate awareness was the presence of diabetes among family members of our study participants. Similar findings were observed in a study performed in Thailand. In present study most of the respondents suffering from diabetes having duration more than five years while other

respondents suffering from diabetes having duration of less than five years. In our study most of the respondents said that they were manage their diabetes by all these aspects by walking, relaxing, by medicines and by insulin. This results consistent with findings from a study in BWP Pakistan that out of 378 general populations 273 were managed their diabetes by all these parameters.

The role of physical activity for the treatment of hypertension and reduction of insulin resistance in diabetes is well established. In our study more than three quarter respondents said that walking helps them more in managing their diabetes and a few respondents preferred running. This result is compared with the 2017 Guidelines on the Prevention and Treatment of Hypertension recommends the accumulation of 30 to 60 minutes of moderate intensity dynamic exercise (e.g. Walking). In current study most of the respondents respond that life style modification help them in managing their diabetes and the similar findings were observed in a study performed in BWP Pakistan in which 79.1% respondents were agreed that life style modification

helps them in managing diabetes [7]. Sweetened sugary drinks can cause sharp rises in blood sugar levels for people with diabetes or glucose intolerance and so it's usually best to avoid drinking sugary drinks and we have found same results in discussed study in which most of the respondents agreed that the people with diabetes should not use cold drinks.

We all are well aware that diabetes can be managed by following the diet charts as prescribed by the physician and the same results have found in study under discussion in which most of the respondents follow their recommended diet charts. In present study more than half of the respondents respond that diabetic patients should check their glucose level daily as it helps them in management and the similar findings were observed in a study conducted in Shifa medical college of medicines Islamabad Pakistan in which 61% of the patients regularly checked their blood sugar level. Although most of the patients were aware of the risk factors but according to our study most of the patients do not get any information through media but few of them agreed that media help them in managing diabetes and the study conducted in Appalachian population had the same results in which only few participants sought information from social network [8].

In present study about more than half of the respondents were get rid of their elevated blood glucose level by using all these parameters insulin, medication and proper management some respondents said that they get rid of this by medication and insulin and few of them, by proper management .this study is compared with the study of (SofieHædersdal, MD; Auger Lund, MD, PhD; Filip K. Knop, MD, PhD;and Tina Vilsbøll, MD, DMSc) in which clinical discussion often focuses on the role of insulin, and medicines were equally important in understanding type 2 diabetes [9, 10]. In current study most of the patients about 89.6 % were visit their doctor for a follow up checkup monthly and few of respondents 10.4% were used to visit their doctor weekly and the major reason behind this is that most of our respondents about 69.6% are from urban area. In present study 57.0 % of the respondents said that they consult their physician before changing insulin and only 11% of the respondents do not consult and the rest of 31.9% were not used insulin and in the same way most of the patients change their site of administration insulin daily few of them do not change and rest of the respondents do not use insulin. This study is compared with the study of Joy A. Dugan in this less frequent office visits should only occur once target measures are achieved [11].

In current study most of the people do not missed

their dose as they knew that medication is very important for diabetic patients but few of the respondents missed their dose because of carelessness, busy routine, due to forget fullness, laziness, stomach problems, hectic routine and allergy. In study under discussion half of the respondents thought that injection can be preferred treatment option practice by elderly patients and rest of the respondents thought that tablets can be preferred treatment practice by elderly patients due to more illiteracy rate in our respondents more than half of them reuse their syringe for insulin injection, few of them do not used and rest of them do not use insulin [12]. In present study most of the respondents said that they are satisfied with the treatment of and management of their disease a few respondents said that they are not satisfied with the treatment and management of their disease. In current study more than half of the respondents agreed that progressive age and obesity is the risk factor for hypertension and these similar findings were found in a study of US that increase in obesity and diabetes among US adults continue in both sexes ,all ages ,all races, all educational levels, and all smoking levels .Obesity is strongly associated with several major health risk factors [13].

In present study most of the participants thought that alcohol intake and smoking should increase the blood pressure but others said that alcohol intake and smoking should not increase the blood pressure but according to the similar study which was performed in healthy japans that was approved by institutional review board of Dokkyo University school of medicine. and also in employees of steel company which show the similar results and according to them the increase in BP among the quitters and current non-smokers ,especially the quitters ,were generally larger than those of the current smokers. In current study most of the respondents said that diabetes itself is a risk factor of hypertension but few respondents said that diabetes is not the risk factor of hypertension. In our study more than half of the respondents have the history of hypertension and other respondents do not have the history of hypertension [14]. Incurrent study most of the respondents suffering from hypertension. The 30 respondents of the age group 34-45 give the correct answer of the question that life style modification help you in managing diabetes the 43 respondents of age group 46-56 gave the correct answer and the 26 respondents of age group 57-67 gave the correct answer and 8 respondents of the age group 68-78 gave the correct answer and only 6 respondents of age group 79-89 gave the correct answer .these findings highlight that people were aware of

prevention and treatment, also they have sufficient knowledge regarding the basics of diabetes, however they did not have sufficient knowledge about its severity and other difficult questions. All of the misconceptions were due to the lack of appropriate diabetes treatment and due to illiteracy.

Apparently there were no significant differences among the scores of participants belonging to different age groups however the highest scores were achieved by respondents in age group 46-56 but respondents of age group 79-89 scored less. The illiterate respondents know less about the diabetes treatment and management and scored less according to the knowledge the graduated respondents scored more because of more education and knowledge. The people of urban area scored more because of more resources and more knowledge about the disease and the people of rural area scored less due to lack of knowledge. In our study male respondents scored more than that of female according to the knowledge and know more about the diabetes treatment, management and prevention. It was found that male had more knowledge than that of the female with the mean rank of 69.60 and the results are significant and matched with the results of the study of BWP on general population. The reason behind the lack of knowledge in these in the older population is due to the lack of knowledge and weak memory and poor understanding [15]. Pakistan is a developing country and faces many problems like rapid population growth, fewer resources, and a high disease burden. In this instance, the promotion of health related among diabetic patients appear to be helpful in reducing the risk of disease and improving the health-related quality of life. Not only this, diabetes treatment, management and prevention will help diabetic patients in taking care of themselves in a better way and enabling themselves to modify lifestyle to reduce the severity of disease. The barrier that we observed was the lack of education of the most of the respondents due to this the illiterate respondents do not know true about the management and treatment of the disease. However participants were knew the impact of high blood pressure on the diabetes. Lack of knowledge, lack of interest, incorrect personal beliefs of the participants, lack of income and gaps between healthcare providers and the community were identified as major barriers toward diabetes treatment and prevention. These study findings indicate the need of further and more extensive research throughout the country for the precise quantification of the diabetes awareness of the Pakistani diabetic patients. The present study and various other future studies will play a positive role as a back bone in the process of developing effective

diabetes treatment, prevention and management programs and will also help in implementing various effective policies that will improve this and solve the problems of the patients and also the other Pakistani people.

CONCLUSION:

The study has shown that the most of the respondents in our study had good knowledge regarding diabetes and incidence of hypertension in type 2 diabetic patients. Correct knowledge about diabetes was associated with the residential area, gender and socioeconomic status of the participants. Lack of awareness was observed mainly among illiterate participants and the participants of urban area and our study also proved that hypertension was well associated with type 2 diabetes and literate participants have good knowledge regarding this. These findings demonstrate that immediate need for diabetes awareness programmes in rural areas of Bahawalpur region and the attention of healthcare professionals, researchers and policy makers to take essential steps in reducing the prevalence of diabetes.

Recommendations for Future:

Health care professionals must collaborate with each other in order to provide benefits regarding their disease and to control the prevalence. It is necessary to broaden the spectrum of study at various levels.

REFERENCES:

1. Ahmad, S. & Ahmad, M. T. 2015. Assessment of knowledge, attitude and practice among diabetic patients attending a health care facility in North India. *Indian J Basic Appl Med Res*, 4, 501-9.
2. Al Bimani, Z. S., Khan, S. A. & David, P. 2015. Evaluation of T2DM related knowledge and practices of Omani patients. *Saudi Pharmaceutical Journal*, 23, 22-27.
3. Alam, M. K., Islam, M. A., Das, A., Karmakar, P., Debnath, P. C. & Saha, M. R. 2016. Evaluation of individual awareness of diabetes, related risk factors and complications in urban and rural people of Noakhali region, Bangladesh: A population-based study. *Bangladesh Journal of Medicine*, 27, 8-15.
4. Alghshanen, M. A., Almuhanha, M. F., Almuhanha, A. M., Alghobaish, F. F., Alajji, N. A., Alabdullah, H. J., Aldosari, S. H., Alomran, S. I., Abualjadayel, M. & Almeshari, A. A. 2017. Diabetic Foot Awareness among Diabetic Patients in Saudi Arabia. *Egyptian Journal of Hospital Medicine*, 68.
5. Baldisserotto, J., Kopittke, L., Nedel, F. B., Takeda, S. P., Mendonça, C. S., Sirena, S. A., Diercks, M. S., de Lima, L. A. & Nicolau, B.

2016. Socio-demographic characteristics and prevalence of risk factors in a hypertensive and diabetics population: a cross-sectional study in primary health care in Brazil. *BMC public health*, 16, 573.
6. Campbell, N. R., Gilbert, R. E., Leiter, L. A., Laroche, P., Tobe, S., Chockalingam, A., Ward, R., Morris, D., Tsuyuki, R. T. & Harris, S. B. 2011. Hypertension in people with type 2 diabetes: Update on pharmacologic management. *Canadian Family Physician*, 57, 997-1002.
 7. Chiasson, J.-L., Josse, R. G., Gomis, R., Hanefeld, M., Karasik, A. & Laakso, M. Acarbose Treatment and the Risk of Cardiovascular Disease and Hypertension in Patients With Impaired Glucose Tolerance.
 8. De Boer, I. H., Bangalore, S., Benetos, A., Davis, A. M., Michos, E. D., Muntner, P., Rossing, P., Zoungas, S. & Bakris, G. 2017. Diabetes and hypertension: a position statement by the American Diabetes Association. *Diabetes Care*, 40, 1273-1284.
 9. de Burgos-Lunar, C., Jiménez-García, R., Salinero-Fort, M. A., Gómez-Campelo, P., Gil, Á., Abánades-Herranz, J. C., Cárdenas-Valladolid, J. & del Cura-González, I. 2014. Trends in hypertension prevalence, awareness, treatment and control in an adult type 2 diabetes Spanish population between 2003 and 2009. *PloS one*, 9, e86713.
 10. Dugan, J. A. 2017a. Standards of Care and Treatment in Diabetes. *Physician Assist Clin* 2, 13-22.
 11. Dugan, J. A. 2017b. Standards of Care and Treatment in Diabetes. *Physician Assistant Clinics*, 2, 13-23.
 12. Grossman, A. & Grossman, E. 2017. Blood pressure control in type 2 diabetic patients. *Cardiovascular Diabetology*, 16, 3.
 13. Group, D. P. P. R. 2002. Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *New England journal of medicine*, 346, 393-403.
 14. Gul, N. 2010. Knowledge, attitudes and practices of type 2 diabetic patients. *Journal of Ayub Medical College Abbottabad*, 22, 128-131.
 15. Hædersdal, S., Lund, A., Knop, F. K. & Vilsbøll, T. The Role of Glucagon in the Pathophysiology and Treatment of Type 2 Diabetes. *Mayo Clinic Proceedings*, 2018. Elsevier.