

# Perception and attitude of type 2 diabetic patients toward insulin therapy in the primary care of National Guard for Health Affairs (NGHA) in Jeddah, Saudi Arabia

Abdullah M. Alzahrani<sup>1,2,3</sup>, Reem J. Alshareef<sup>1</sup>, Marwan M. Balubaid<sup>2</sup>,  
Mohammed Alzahrani<sup>2</sup>, Mohammed Alsoubhi<sup>2</sup>, Mostafa Shaheen<sup>2</sup>

<sup>1</sup>Department of Family Medicine, King Abdulaziz Medical City, Ministry of National Guard Health Affairs, Jeddah, Saudi Arabia, <sup>2</sup>Department of Health Science, College of Medicine King Saud Bin Abdulaziz University for Health Sciences, Jeddah, Saudi Arabia, <sup>3</sup>King Abdullah International Medical Research Center, Jeddah, Saudi Arabia

## ABSTRACT

**Purpose/Background:** Our study explores and determines the perception toward insulin among patients with diabetes in the National Guard for Health Affairs (NGHA), Jeddah, the Kingdom of Saudi Arabia (KSA), and aims to gain insight into the causes of refusal. Patients with type 2 diabetes (T2D) are likely to need the use of insulin to keep blood glucose levels within normal range and delay the onset of diabetes-related problems. Individuals with diabetes may be hesitant to begin insulin therapy if they have a negative attitude toward it, which might add to the delay in beginning treatment. **Materials and Methods:** A cross-sectional study was conducted in the primary healthcare centers of the NGHA in Jeddah, Saudi Arabia. Data were collected through a validated self-administered questionnaire that was divided into three sections, with a total of 32 questions. The first section concerned demographic data, the second part was directed toward insulin users, and the last section was directed toward non-insulin patients. **Results and Conclusion:** Our study collected 314 responses. Males constituted 54.8% of participants and insulin users resembled 45.7%. According to our study, important deterrents to starting insulin therapy among non-insulin users included the following: the cost of insulin, the pain associated with injections, the difficulty in maintaining food control while on insulin treatment, scarring at the injection site, and the weight gain impact. Factors that were found to influence compliance to insulin therapy among insulin users included fear of weight gain and self-administration of insulin.

**Keywords:** Attitude, insulin therapy, perception, Saudi Arabia, T2DM

## Introduction

Diabetes mellitus (DM) is a chronic disease that is characterized by impairment of insulin secretion or resistance to the action of insulin.<sup>[1]</sup> It is a health issue that affects 425 million people worldwide and almost 4 million cases among Saudi

adults.<sup>[2]</sup> Its management can be challenging owing to its nature of deterioration. Therefore, patients with diabetes require insulin, in addition to oral hypoglycemic agents, to control glycemic levels and maintain HbA1C levels below 7%.<sup>[3]</sup>

Insulin therapy has a beneficial effect on glycemic control and prevention of further complications when it is implemented at an early stage of diabetes.<sup>[4]</sup> Patients with diabetes control their glycemic levels in less time with oral anti-diabetic drugs (OAD) and insulin in comparison with patients treated only with OAD.<sup>[5]</sup> However, insulin therapy is usually delayed for many reasons,

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow\_reprints@wolterskluwer.com

**How to cite this article:** Alzahrani AM, Alshareef RJ, Balubaid MM, Alzahrani M, Alsoubhi M, Shaheen M. Perception and attitude of type 2 diabetic patients toward insulin therapy in the primary care of National Guard for Health Affairs (NGHA) in Jeddah, Saudi Arabia. *J Family Med Prim Care* 2023;12:2768-73.

**Address for correspondence:** Dr. Reem J. Alshareef,  
Department of Family Medicine, King Abdulaziz Medical City,  
King Abdullah International Medical Research Center, Jeddah,  
Saudi Arabia.

E-mail: alshareef.reem@gmail.com

Received: 23-12-2022

Revised: 05-05-2023

Accepted: 18-07-2023

Published: 21-11-2023

### Access this article online

#### Quick Response Code:



**Website:**  
<http://journals.lww.com/JFMP>

**DOI:**  
10.4103/jfmpc.jfmpc\_2484\_22

whether related to patients or physician reluctance, such as fear of hypoglycemia, weight gain, injection phobia, or stigma owing to insulin injections. Therefore, some patients have poor glycemic control.<sup>[3]</sup>

The prevalence of patients' attitudes toward insulin therapy reflects misconceptions about it. For example, 74.2% of patients with diabetes in Malaysia refuse to take insulin, and 33% of patients with diabetes are unwilling to take insulin in the USA.<sup>[5,6]</sup> In the Kingdom of Saudi Arabia (KSA), unwillingness to initiate insulin was found in 34.6% of Saudi participants with type 2 diabetes. Many studies have been published regarding the barriers to insulin initiation and its prevalence;<sup>[7]</sup> however, to our knowledge, there are not much data regarding the perception and attitude toward insulin in Saudi Arabia. Therefore, this study explores and determines the perception of insulin among patients with diabetes in the National Guard for Health Affairs (NGHA), Jeddah, and KSA, to gain insight into the causes of refusal, which may assist in providing health education programs overcoming patients' fears and misconceptions. Primary care physicians have an important role in the guidance of DM patients, as they undertake the responsibility for directing and coordinating the care and management of a patient, being the first point of contact for the patient with the medical care system.

## Materials and Methods

### Study design and setting

This is a cross-sectional study conducted in the primary healthcare centers of the NGHA in Jeddah.

### Sampling technique

A convenient sampling technique was used, and data were collected through validated self-administered questionnaires.

### Sample size

The sample size was calculated to be 325 participants, as the average number of patients with diabetes in all clinics was 500 per month, with an estimated population of 2000 and a confidence level of 95%.

### Sampling criteria

Inclusion criterion was any patient who is above 18 years old with a confirmed diagnosis of type 2 diabetes.

### Data collection tool

The questionnaire was divided into three sections with a total of 32 questions. The first section concerned demographic data, the second part had 18 questions directed toward insulin users, and the last section had 14 questions directed toward non-insulin patients. Sociodemographic data comprised questions on sex, education, last HbA1c measurement, and whether or not the participant is on insulin therapy. The insulin and non-insulin users sections constituted questions regarding the attitude of

participants toward insulin use in T2DM management and its side effects.

### Statistical plan

Statistical analysis was performed using SPSS, with a *P* value of less than 0.05 considered statistically significance. Categorical data were presented in percentages, with quantitative data presented by mean and standard deviations. Chi-square was used to find the association between barriers and insulin initiation and compliance.

### Ethical considerations

We obtained the approval of the Institutional Research Ethics Board of the relevant medical research center. Informed consent was obtained from participants of the study prior to data collection. Confidentiality was maintained throughout the study. The ethical standards of our research are in accordance with the guidelines provided by the CPCSEA and World Medical Association Declaration of Helsinki on Ethical Principles for Medical Research Involving Humans.

## Results

Out of 350 questionnaires that were distributed to patients with diabetes attending family medicine clinics of the NGHA in Jeddah, 314 were received with a response rate of 89.71%. Table 1 shows the demographic data of the participants. The responses of non-insulin and insulin users are demonstrated in Table 2 and Table 3, respectively.

For non-insulin users, the majority of the participants showed a lack of information and background knowledge regarding insulin therapy; 34.4% had zero background knowledge. Insulin therapy was recommended to 8.6% of the non-insulin users; however, the majority of the non-insulin participants are willing to take insulin if recommended by a physician. Moreover, most of the participants perceived no embarrassment in insulin injection in public. Additionally, the responses revealed that the barrier concerning those patients greatly affected its hypoglycemic effect. Most of the responders had no idea whether insulin therapy could cause complications, such as coma, weight gain, and scarring effects. The majority of the participants reported the need for better communication by physicians regarding insulin therapy. An association between a variety of factors and the willingness to initiate insulin for non-insulin patients has been made, as shown in Table 4, and it was significant for painful injection, injection in public, insulin cost, and some insulin complications.

For insulin users, the pen was the most commonly used device for insulin administration. Responders were satisfied with insulin, and most of them experienced no irritation with daily multiple injections, easy administration, easy compliance, and self-administration of insulin. Regarding fears of insulin complications, weight gain was among the highest concerns.

**Table 1: Demographic data of the participants**

Variable	Percentage	
Gender (%)	Male	54.8
	Female	45.2
Age—Years, Median (Min-Max), SD		49 (21-85), 13.9
Insulin usage (%)	Yes	45.7
	No	54.3
Educational level (%)	Primary	18.6
	Intermediate	18.9
	Secondary	35.4
	University	27.
Duration of being diabetic (years), Median (Min-Max), SD		8 (0.16-45), 7.3
Remembering Last HbA1C Level (%)	Yes	46.8
	No	53.2
HbA1C Level, Median (Min-Max), SD		7 (4-16), 1.7

However, most insulin users had no knowledge of whether insulin can result in hypoglycemic effects and fainting or passing out. Fortunately, the DM of 41.1% of those patients was controlled since they started insulin, which represents most of the responders. Table 5 shows the relationship between different factors and compliance with the provided plan. The association was only significant for self-administration of insulin and fears of weight gain effect.

## Discussion

Our study investigates and determines the perception of insulin among patients with diabetes in the NGH, Jeddah, and KSA. The objective was to gain insight into the causes of refusal. We collected 314 responses from insulin users and non-insulin users.

Patients with T2D are first treated with diet and oral glucose-lowering medications. As insulinopenia worsens over time, many patients with T2D need insulin treatment.<sup>[8]</sup> However, persons with T2D and medical professionals both find it challenging to start insulin treatment.<sup>[9]</sup> This explains why our study found that the majority of individuals who were not insulin users exhibited a lack of knowledge and background regarding insulin treatment; 34.4% had none at all. However, a study conducted in Riyadh, KSA, found that the overall knowledge of participants was average, and very few participants scored above the average score.<sup>[10]</sup> The same findings were reported by a study conducted in Nepal that assessed DM knowledge in general.<sup>[11]</sup> The higher knowledge score in Riyadh may be explained by it being the capital city of Saudi Arabia, and therefore, more health education programs are conducted there.

Our study revealed that the majority of participants did not find administering insulin in public to be embarrassing. This is a positive indicator of the perception of insulin therapy, given that diabetes self-management necessitates several daily choices and actions, including performing self-monitoring of blood glucose (SMBG), recording and responding to it, modifying one's diet, engaging in physical activity for weight management and/or

**Table 2: Perception of non-insulin users toward insulin therapy**

Item	Response	Percentage
Background about insulin	Nothing	34.4%
	Little	31.9%
	Some	25.8%
	Great	8%
Insulin recommended by physician	Yes	8.6%
	No	90.7%
Willing to take insulin if recommended	Yes	39.3%
	No	34.4%
Insulin is expensive	Yes	26.4%
	No	36.8%
Perceived that insulin injection is painful	Yes	16.6%
	No	46.6%
	Don't know	29.7%
Diabetes has better control with insulin	Yes	31%
	No	39.2%
	Don't know	32.7%
	Don't know	17.6%
Diet control would be difficult with insulin therapy	Yes	49.7%
	No	24.5%
	Don't know	30.2%
	Don't know	45.3%
Would be embarrassed if taking insulin in public	Yes	36.1%
	No	48.7%
	Don't know	15.2%
	Don't know	49.7%
Insulin causes hypoglycemic attack	Yes	9.4%
	No	40.9%
	Don't know	20.4%
Insulin causes coma	Yes	27.4%
	No	52.2%
	Don't know	27.7%
Insulin has weight gain effect	Yes	20.1%
	No	52.2%
	Don't know	27.7%
Insulin has a scarring effect at the site of injection	Yes	36.5%
	No	20.1%
	Don't know	43.4%
Insulin would result in decreased life expectancy	Yes	5%
	No	25.8%
	Don't know	69.2%
Insulin would interfere with daily activities	Not at all	44.1%
	A little	47.4%
	A lot	8.6%
	Don't know	61.6%
Needed more information provided by physician regarding insulin	Yes	38.4%
	No	

glucose level control, and taking medications at regular intervals throughout the day. An individual's opinions or ideas about the behavior and its desired result are critical factors in determining whether they engage in healthy behavior, such as using insulin.<sup>[12]</sup>

Our results show that the pen was the most popular insulin delivery tool among insulin users. The majority of respondents did not suffer any annoyance from the many daily injections, simple administration, easy compliance, or self-administration of insulin, and they expressed satisfaction with it. This was in

**Table 3: Experience of insulin users toward insulin therapy**

Item	Response	
Insulin device used	Pen	97.2%
	Pump	1.4%
	Syringe	1.4%
Number of injections per day	Once	31.2%
	Twice	48.2%
	Three times	10.6%
	Four times	9.9%
Irritation with multiple injections per day	Yes	27.9%
	No	72.1%
Easy administration of insulin	Yes	93.6%
	No	6.4%
Self-administration of insulin	Yes	85%
	No	15%
Insulin administration is painful	Yes	29.2%
	No	70.7%
Conscious about insulin injection in public	Yes	71%
	No	29%
Easy to be compliant to the doses provided by the physician	Yes	77.1%
	No	22.9%
Compliant to the regimen provided by the physician	Yes	84.9%
	No	15.1%
Fearful of hypoglycemic effect	Yes	35%
	No	22.1%
	Don't know	42.9%
Fearful of coma	Yes	13.5%
	No	36.2%
	Don't know	49.6%
Fearful of weight gain effect	Yes	59.3%
	No	26.4%
	Don't know	14.3%
Fearful scarring effect at the site of injection	Yes	23.4%
	No	53.2%
	Don't know	23.4%
Fearful of decreased life expectancy	Yes	5.7%
	No	29.8%
	Don't know	64.5%
Insulin would interfere with daily activities	Not at all	39.9%
	A little	52.2%
	A lot	8%
Diabetes is controlled since starting insulin	Yes	41.1%
	No	24.8%
	Don't know	34%
Needed more information provided by physician regarding insulin	Yes	50%
	No	50%

accordance with the recent guidelines which recommended that short needles (4 mm pens) be utilized as the best methods for insulin administration, as they are the most effective, the least painful, and safe.<sup>[13]</sup>

Among our respondents, the majority of insulin users were unaware of insulin side effects. Fortunately, the majority of the responders have had their blood sugar under control ever since they began using insulin. This result was in contrast with a study conducted in India,<sup>[14]</sup> which showed that there was

**Table 4: Association between factors and the willingness to initiate insulin therapy in non-insulin users**

Factor	P
Insulin is expensive	0.000
Perceived that insulin injection is painful	0.017
Diet control would be difficult with insulin therapy	0.006
Would be embarrassed if taking insulin in public	0.090
Hypoglycemic attack	0.780
Coma	0.201
Weight gain effect	0.029
Scarring effect at the site of injection	0.003
Perceived shorter life expectancy from insulin	0.250

good knowledge regarding insulin usage and side effects among those study participants. This may be owing to the study being conducted in urban India, where there were a multitude of health education programs.

Our study found that among the significant barriers to initiating insulin therapy among non-insulin users were that insulin is expensive, injections are painful, dietary control is more difficult with insulin therapy, scarring often occurs at the injection site, and there is a weight gain effect. Additionally, factors that were found to influence compliance to insulin therapy among insulin users included fear of weight gain and self-administration of insulin.

According to literature, people with T2D often express apprehension regarding injections<sup>[15]</sup> and the potential lifestyle constraints this might entail,<sup>[15,16]</sup> as well as worries about the negative effects of insulin treatment, such as hypoglycemia<sup>[15-17]</sup> and weight gain.<sup>[15]</sup> The beginning of insulin therapy is seen by many patients with T2D as an indication that their condition has advanced and that they are more likely to develop diabetes complications.<sup>[15,16]</sup> Insulin introduction has often been linked to unfavorable feelings, anxieties, and concerns, as well as a sense of failure.<sup>[15,18]</sup> In the UK Prospective Diabetes Study, the proportion of insulin-only patients who did not take their prescribed medicine was twice as high as the proportion of oral medication non-users.<sup>[19]</sup>

Another reason for insulin non-compliance is that insulin is often thought to be unneeded for obtaining adequate blood glucose control by patients with T2D who are not currently taking it. They claim that they are able to lower their blood sugar levels without insulin<sup>[20-25]</sup> and show a preference for alternative treatments, such as herbs or dried fruit. They also question the effectiveness of insulin.<sup>[26-29]</sup>

Contrastingly, a study with individuals of non-Western ethnic ancestry showed that one barrier to starting insulin therapy is the belief that it is an artificial or chemical substance that upsets the body's natural equilibrium.<sup>[27,28]</sup> Patients' mistrust of Western physicians or pharmaceuticals is cited by healthcare practitioners (HCPs) as a deterrent to starting insulin therapy.<sup>[29-31]</sup> This factor was not mentioned by Saudi patients,

**Table 5: Association between factors and compliance to insulin therapy in insulin users**

Factor	P
Number of injections per day	0.670
Irritation with multiple injections per day	0.280
Self-administering of insulin	0.000
Insulin administration is painful	0.720
Conscious about insulin injection in public	0.650
Fearful of hypoglycemic effect	0.730
Fearful of coma	0.890
Fearful of weight gain effect	0.020
Fearful scarring effect at the site of injection	0.150
Fearful of decreased life expectancy	0.880
Insulin interferes with daily activities	0.160

which may be owing to the different backgrounds between the two populations.

Many persons with T2D now take insulin; however, data show that many more have suboptimal glycated hemoglobin, suggestive of a risk of complications, indicating that treatment may need to be intensified. Consequently, it is important to identify and comprehend the obstacles that patients with T2D and their doctors face while starting insulin treatment.

### Study limitations

The sample was limited to a single geographic area in Saudi Arabia.

### Conclusion

T2D is a progressive illness that often eventually requires insulin to maintain appropriate blood glucose levels and delay the development of complications associated with diabetes. However, having an unfavorable attitude toward insulin usage may lead to reluctance in starting and thereby delaying insulin treatment. According to our study findings, the cost of insulin, pain associated with injections, difficulty in maintaining food control while on insulin treatment, scarring at the injection site, and weight gain impact are all important deterrents to starting insulin therapy among non-insulin users. In addition, fear of weight gain and self-administration of insulin may affect insulin users' compliance with their medication.

### Recommendations

Additional surveys should be conducted across the KSA to assess the knowledge and attitude of patients with T2D toward insulin therapy. In addition, holding false beliefs may lead to reluctance to begin insulin treatment, which can ultimately result in unfavorable physical or psychological effects associated with T2D. Therefore, to increase awareness and improve patient outcomes, we recommend conducting more educational activities on insulin therapy for patients with T2D.

### Financial support and sponsorship

Nil.

### Conflicts of interest

There are no conflicts of interest.

### References

- UpToDate. Clinical presentation and diagnosis of diabetes mellitus in adult. City: Publisher; 2017. Available from: <http://www.uptodate.com/contents/clinical-presentation-and-diagnosis-of-diabetes-mellitus-in-adult>. [Last accessed on year month day].
- International Diabetes Federation. Total cases of diabetes in adults in Saudi Arabia. Brussels: IDF; 2018 Available from: <http://www.idf.org/our-network/regions-members/middle-east-and-north-africa/members/46-saudi-arabia.html>. [Last accessed on year month day].
- Batais MA, Schantter P. Prevalence of unwillingness to use insulin therapy and its associated attitudes amongst patients with type 2 diabetes in Saudi Arabia. *Prim Care Diabetes* 2016;10:415-24. doi: 10.1016/j.pcd.2016.05.007.
- Saleem A, Masood I, Khan TM. Insulin perception among insulin-naïve type-2 diabetes mellitus patients in Pakistan. *Cogent Medicine* 2016;3:1229374. doi: 10.1080/2331205X.2016.1229374.
- Eliaschewitz FG, de Paula MA, Pedrosa HC, Pires AC, Salles JEN, Tambascia MA, *et al.* Barriers to insulin initiation in elderly patients with type 2 diabetes mellitus in Brazil. *Diabetes Metab Syndr* 2018;12:39-44. doi: 10.1016/j.dsx.2017.08.011.
- Larkin ME, Capasso VA, Chen CL, Mahoney EK, Hazard B, Cagliero E, *et al.* Measuring psychological insulin resistance: Barriers to insulin use. *Diabetes Educ* 2008;34:511-7. doi: 10.1177/0145721708317869.
- Noakes H. Perceptions of black African and African-Caribbean people regarding insulin. *J Diabetes Nurs* 2010;14:148-56.
- Inzucchi SE, Bergenstal RM, Buse JB, Diamant M, Ferrannini E, Nauck M, *et al.* Management of hyperglycemia in type 2 diabetes: A patient-centered approach: Position statement of the American diabetes association (ADA) and the European association for the study of diabetes (EASD). *Diabetes Care* 2012;35:1364-79. doi: 10.2337/dc12-0413.
- Reach G, Consoli SM, Halimi S, Colas C, Duclos M, Fontaine P, *et al.* The multinational second diabetes, attitudes, wishes and needs study: Results of the French survey. *Patient Prefer Adherence* 2015;9:289-97. doi: 10.2147/PPA.S68941.
- Alarfaj RM, Alayed D. Knowledge and practice of use of insulin therapy among patients with type 2 diabetes attending primary health care centers, Riyadh, Saudi Arabia: A cross-sectional study. *Cureus* 2023;15:e35486. doi: 10.7759/cureus.35486.
- Ritz E, Rychlík I, Locatelli F, Halimi S. End-stage renal failure in type 2 diabetes: A medical catastrophe of worldwide dimensions. *Am J Kidney Dis* 1999;34:795-808. doi: 10.1016/S0272-6386(99)70035-1.
- Michie S, Johnston M, Francis J, Hardeman W, Eccles M. From theory to intervention: Mapping theoretically derived behavioural determinants to behaviour change techniques. *Appl Psychol* 2008;57:660-80. doi: 10.1111/j.1464-0597.2008.00341.x
- Frid AH, Kreugel G, Grassi G, Halimi S, Hicks D, Hirsch LJ, *et al.* New insulin delivery recommendations. *Mayo Clin Proc* 2016;91:1231-55. doi: 10.1016/j.mayocp.2016.06.010.

14. Nivethitha T, Manickavasagam S, Paramasivam M, Thaejasvi SG. Knowledge, attitude and practice of insulin use and its adverse effects in adult diabetic population. *Int J Basic Clin Pharmacol* 2017;6:2651-7. doi: 10.18203/2319-2003.ijbcp20174783.
15. Peragallo-Dittko V. Removing barriers to insulin therapy. *Diabetes Educ* 2007;33(Suppl 3):60S-5. doi: 10.1177/0145721707301S210.
16. Rubin RR, Peyrot M. Psychological issues and treatments for people with diabetes. *J Clin Psychol* 2001;57:457-78. doi: 10.1002/jclp. 1041.
17. Polonsky WH, Fisher L, Guzman S, Villa-Caballero L, Edelman SV. Psychological insulin resistance in patients with type 2 diabetes: The scope of the problem. *Diabetes Care* 2005;28:2543-5. doi: 10.2337/diacare. 28.10.2543.
18. Peyrot M, Rubin RR, Lauritzen T, Skovlund SE, Snoek FJ, Matthews DR, *et al.* Resistance to insulin therapy among patients and providers: Results of the cross-national diabetes attitudes, wishes, and needs (DAWN) study. *Diabetes Care* 2005;28:2673-9. doi: 10.2337/diacare. 28.11.2673.
19. United Kingdom Prospective Diabetes Study (UKPDS). 13: Relative efficacy of randomly allocated diet, sulphonylurea, insulin, or metformin in patients with newly diagnosed non-insulin dependent diabetes followed for three years. *BMJ* 1995;310:83-8.
20. Bogatean MP, Hâncu N. People with type 2 diabetes facing the reality of starting insulin therapy: Factors involved in psychological insulin resistance. *Practical Diabetes International* 2004;21:247-52.
21. Guimarães C, Marra CA, Gill S, Meneilly G, Simpson S, Godoy AL, *et al.* Exploring patients' perceptions for insulin therapy in type 2 diabetes: A Brazilian and Canadian qualitative study. *Patient Prefer Adherence* 2010;4:171-9. doi: 10.2147/ppa.s10178.
22. Hunt LM, Valenzuela MA, Pugh JA. NIDDM patients' fears and hopes about insulin therapy. The basis of patient reluctance. *Diabetes Care* 1997;20:292-8. doi: 10.2337/diacare.20.3.292.
23. Khan H, Lasker SS, Chowdhury TA. Prevalence and reasons for insulin refusal in Bangladeshi patients with poorly controlled Type 2 diabetes in East London. *Diabet Med* 2008;25:1108-11. doi: 10.1111/j. 1464-5491.2008.02538.x.
24. Noakes H. Perceptions of black African and African-Caribbean people regarding insulin. *J Diabetes Nurs* 2010;14:148-56.
25. Tan AM, Muthusamy L, Ng CC, Phoon KY, Ow JH, Tan NC. Initiation of insulin for type 2 diabetes mellitus patients: What are the issues? A qualitative study. *Singapore Med J* 2011;52:801-9.
26. Chen KW, Tseng HM, Huang YY, Chuang YJ. The barriers to initiating insulin therapy among people with type 2 diabetes in Taiwan—a qualitative study. *J Diabetes Metab Disord* 2012;3:194. doi: 10.4172/2155-6156.1000194.
27. Brown K, Avis M, Hubbard M. Health beliefs of African-Caribbean people with type 2 diabetes: A qualitative study. *Br J Gen Pract* 2007;57:461-9.
28. Mull DS, Nguyen N, Mull JD. Vietnamese diabetic patients and their physicians: What ethnography can teach us. *West J Med* 2001;175:307-11. doi: 10.1136/ewjm.175.5.307.
29. Haque M, Emerson SH, Dennison CR, Navsa M, Levitt NS. Barriers to initiating insulin therapy in patients with type 2 diabetes mellitus in public-sector primary health care centres in Cape Town. *S Afr Med J* 2005;95:798-802.
30. Lee YK, Lee PY, Ng CJ. A qualitative study on healthcare professionals' perceived barriers to insulin initiation in a multi-ethnic population. *BMC Fam Pract* 2012;13:28. doi: 10.1186/1471-2296-13-28.
31. Patel N, Stone MA, McDonough C, Davies MJ, Khunti K, Eborall H. Concerns and perceptions about necessity in relation to insulin therapy in an ethnically diverse UK population with type 2 diabetes: A qualitative study focusing mainly on people of South Asian origin. *Diabet Med* 2015;32:635-44. doi: 10.1111/dme.12648.