

ANALYSING THE GROWTH OF SITAGLIPTIN MARKET IN UAE

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by

RITIK TATIA

Under the Supervision and Guidance of

**DR RAHUL SHARMA , ASSISTANT PROFESSOR , SCHOOL OF
PHARMACEUTICAL MANAGEMENT , IIHMR UNIVERSITY,
JAIPUR**

2023

DECLARATION BY STUDENT

I hereby declare that this dissertation titled ‘Analysing the growth of sitagliptin market in UAE’ is the bonafide record of my original researchwork. I declare that it has not been submitted to any other university or institution for the award of any degree or diploma. Information derived from the published or unpublished work of others has been duly acknowledged in the text.

(Signature)

Ritik Tatia

Date

CERTIFICATE

This is to certify that Ritik tatia in partial fulfillment of the requirements for the award of the degree of MBA (Pharmaceutical Management) from the IIHMR University, Jaipur has successfully completed his internship at IIHMR university during February 20, 2023 - May 19, 2023.

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This is to certify that dissertation and internship titled ‘Analysing the growth of sitagliptin market in UAE’ is a record of the research work undertaken by Ritik tatia in partial fulfillment of the requirements for the award of the degree of MBA (Pharmaceutical Management) from the IIHMR University, Jaipur under my guidance and supervision and his/her approach to the research study has been sincere, scientific, and analytical.

Faculty Guide IIHMR University, Jaipur
Date

School Dean IIHMR University, Jaipur
Date

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ABSTRACT

The condition known as diabetes mellitus (DM) is a type of diabetes marked by persistently elevated blood glucose levels. levels of 70-110 mg/dL blood glucose empty stomach are considered optimal, levels between 100 and 125 mg/dL are called prediabetes, and values 126 mg/dL or more are deemed diabetes. Diabetes is divided into two types primarily type 1 and type 2.

Diabetes mellitus particularly talking about type 2 diabetes, is a worldwide health issue that must be attributed for cardiovascular diseases .

Diabetes, along with microvascular implications such as retinopathy or nephropathy, imposes a large burden of CVD morbidity and mortality through macrovascular issues, particularly during preliminary stages.

As type -2 diabetes begins and progresses asymptotically, it is crucial for screening the population for recognizing it early. Many modifiable risk variables, such as hyperglycemia, hypertension, or dyslipidemia, must be addressed in patients with diabetes mellitus for CVD prevention.

The study research was conducted to comprehend and evaluate the sitagliptin market, practice trends, and to identify the top sitagliptin brands. A systematic survey was used to collect data from 100 participants, all of whom were chemists or doctors. The study was conducted from February 20th february to May 19th, 2023, under the supervision of Rahul Sharma Sir (Assistant Professor at IIHMR University).

The assignment was completed in three stages: first, learning about sitagliptin and then developing a questionnaire. The second stage was to perform the survey by visiting doctors and pharmacies. The data was analyzed and evaluated once the survey was completed.

Key words : cardiovascular disease , morbidity , dylipidemia , hyperglycemia

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CHAPTER 1

INTRODUCTION

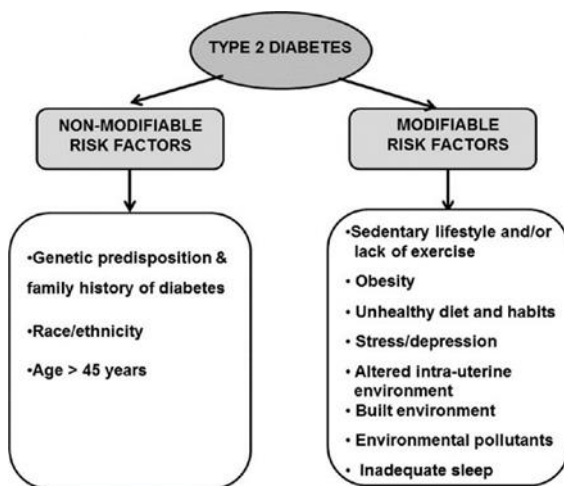
PREVELANCE OF DIABETES MELLITUS IN UAE

It is a well known fact that one of the largest global crisis in the 20th century is diabetes. The increase of diabetes and associated consequences in the UAE's multiethnic population has matched economic expansion. Previous research has found that the features of diabetes vary by ethnicity.(1)

The global diabetes burden is rising, particularly in developing countries that are industrializing and adopting sedentary lifestyles, poorer eating habits, and less physical activity. The population of UAE is made up of about 20% native locals while the rest are immigrants not from UAE from various Arab and foreign cultural backgrounds.(2)

Diabetes has a prevalence of 24% among nationals and 17.4% among expatriates in the gulf particularly in the UAE. The UAE had the world's second highest diabetes prevalence (19.5%) in 2007, with a predicted prevalence of 21.9% by 2025.To combat this condition, the emirates established a National Diabetes Care Continuum program. (3)

The Middle Eastern population, which has alarming rates of overweight due to increases rate of physical inactivity, is a particular source of concern. This region's economies have expanded dramatically over the last three decades. This has resulted in a shift in lifestyle, with decreased levels of exercise and increase in calorie consumption, which results in increases rates of obesity, diabetes, and cardiovascular disease (4).



1 :- Risk factors for type 2 diabetes (5)

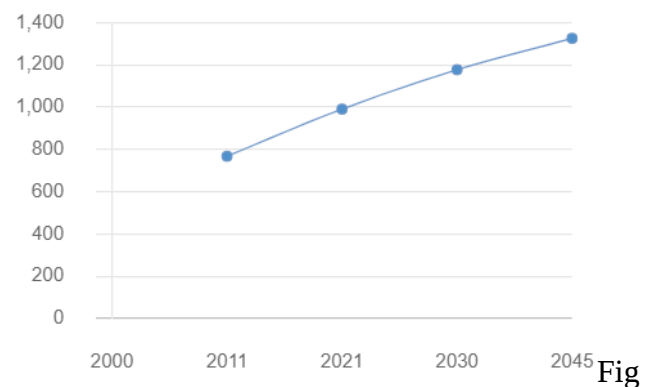


Fig 2 :- Growth of diabetes in UAE during the years (6)

ABOUT DIABETES MELLITUS

Diabetes is a chronic, progressive metabolic illness or health condition that affects blood sugar balance. The pancreas, which is in charge of insulin production, either fails to create insulin or our bodies are unable to utilise the insulin that is produced adequately.

Diabetes is likely to cause hyperglycemia, which can lead to significant macrovascular and microvascular problems.(12)

Classification:

Diabetes is classified into three types based on their mechanism(13):-

Type 1 or diabetes Insipidus:

It is commonly known as juvenile onset diabetes, occurs when our pancreas is unable to generate enough insulin. As a result, insulin must be supplied from outside the body.

Type 2 or Diabetes Mellitus:

It is often known as maturity-onset diabetes. It is a condition where the cells become resistive to taking in glucose and the body produces insulin in uneven amounts. This can be addressed with oral anti-diabetic medications and insulin therapy.

Type 3 or Gestational Diabetes:

Diabetes that occurs during pregnancy. In certain situations, physiologic stressors during pregnancy may cause diabetes to develop, but in others, pre-existing diabetes may be discovered during pregnancy-related medical tests. Some people can be managed with diet alone, while others require insulin treatment.

Type 4 or Other forms of diabetes:

Endocrinopathies, pharmacological or chemical-induced impairments in beta-cell activity and insulin action are examples of generic deficiencies.

PHARMACODYNAMICS AND PHARMACOKINETICS OF SITAGLIPTIN

Sitagliptin functions as a DPP-4 inhibitor. DPP-4 inhibitors lower levels of sugar in the blood through raising insulin production, secretion while decreasing glucagon secretion.(7) DPP-4 inhibitors act by stopping DPP-4 degradation and thus increasing the activity of serum glucagon-like peptide-1 (GLP-1) and glucose-dependent insulinotropic polypeptide (GIP)(8).

They are both orally active, quickly absorbed, and potent blockers of plasma Dipeptidyl activity – where the activity is reduced with nearly 100% 15-30 minutes following consumption, with no inhibition of >80% lasting more than 16 hours (9). As a result, sitagliptin can be taken once daily.

The Food and Drug Administration (FDA) approved sitagliptin in October 2006. The dose of the drug is 100 mg one time daily. While liver failure doesn't affect the pharmacokinetics of the compound, kidney failure increases circulating sitagliptin (10).

As a result, the amount of sitagliptin intake should be reduced to half in patients with a range of moderate to severe renal impairment. Before beginning the treatment, ensure that function is maintained.

Dipeptidyl inhibition blocks GLP-1 deactivation, resulting in increased GLP-1 levels. GLP-1 levels are elevated for 24 hours in both full and fasted states (11). DPP-4 inhibition fails to enhance the balance of glucose in rodents with genetic deletions of GLP-1 and GIP receptors, indicating importance of GLP-1 in the mechanism of DPP-4 inhibitors. In turn, GLP-1 improves insulin secretion, and DPP-4 inhibition is seen to improve acute -cell function.

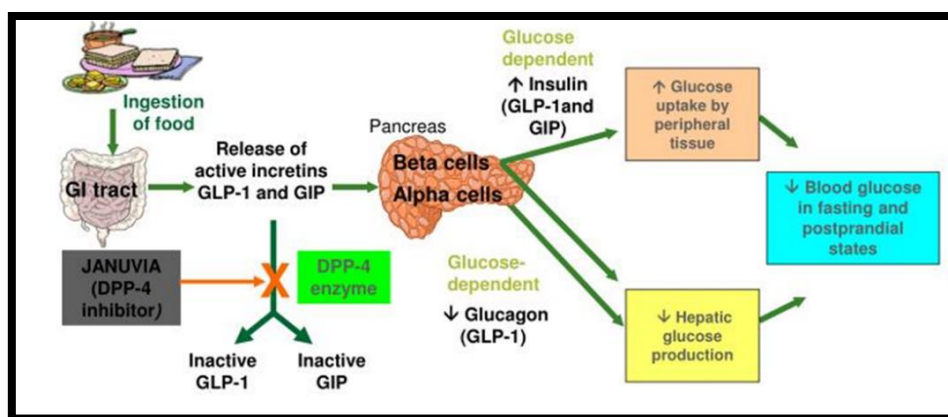


Figure 3 : A schematic Representation of showing pharmacodynamics of sitagliptin(14)

DIRECT COMPETITORS OF SITAGLIPTIN (JANUVIA) IN THE UAE

1) Pioglitazone(Actos)

Glycemic control is improved with pioglitazone in people suffering from diabetes by increasing sensitivity to insulin via its activity at PPAR gamma 1 and gamma 2. It also affects metabolism of lipids by acting on NR1C1. Changes in glucose transporters 1 and 4, free fatty acid levels, insulin signaling, and the levels of TNF alpha synthesis arise from the interaction.. They can reduce gluconeogenesis in cells of liver while increasing glucose absorption and use in peripheral organs, reducing resistance to insulin.

2) Amaryl (glimepiride)

Improve blood sugar levels in persons suffering from T2-DM with exercise and diet.

3) Glucophage (metformin)

Metformin belongs to the biguanide class of medicines. Metformin is a generic medication with the brand name Glucophage . Metformin reduces the quantity of sugar absorbed from diet. It also reduces the generation of glucose within the liver and boosts the body's reaction to insulin.

The drug is used to enhance blood sugar management in elderly and children with diabetes, combined with life style changes . A common daily dose of metformin for adults is 850 or 1000 mg twice daily with meals, after gradually increasing medication

4) Forxiga (dapagliflozin)

Dapagliflozin improves the blood glucose regulation in elderly patients with T2D and reduces the rate of heart attack hospitalization in adults with T2D and heart disease , It also reduces the probability of cardiac death/hospitalization in older individuals with heart disease.

5) Invokana (canagliflozin)

Reduce the chance of serious cardiac events in adults with T2D and heart disease, improve blood glucose regulation in adults with T2D decrease the the likelihood of kidney failure at end-stage as well as additional complications in adulthood with T2D and diabetes-related nephropathy who have albuminuria greater than 300 mg/day, and more.

CHAPTER – 2

REVIEW OF LITERATURE

This review of literature was performed to analyse sitagliptin as a molecule in treatment of diabetes mellitus.

- 1) Hansotia, T., Baggio, L. L., Delmeire, D., Hinke, S. A., Yamada, Y., Tsukiyama, K., Seino, Y., Holst, J. J., Schuit, F., & Drucker, D. J. (2004). Double Incretin Receptor Knockout (DIRKO) Mice Reveal an Essential Role for the Enteroinsular Axis in Transducing the Glucoregulatory Actions of DPP-IV Inhibitors. *Diabetes*, 53(5), 1326–1335. <https://doi.org/10.2337/diabetes.53.5.1326>. This study discovered that stimulating incretin receptor routes through increasing GLP-1 levels within the body and GIP results to the lowering the efficacy of glucose of DPP-IV inhibitors. DPP-IV is the main spark plug accountable for the deactivation of GLP-1 and GIP, and genetic disruption or pharmacological inhibition of DPP-IV decreases blood sugar levels in rats and humans.
- 2) Ahrén, B., Landin-Olsson, M., Jansson, P.-A., Svensson, M., Holmes, D., & Schweizer, A. (2004c). Inhibition of Dipeptidyl Peptidase-4 Reduces Glycemia, Sustains Insulin Levels, and Reduces Glucagon Levels in Type 2 Diabetes. *The Journal of Clinical Endocrinology & Metabolism*, 89(5), 2078–2084. The trial included a 4 week period that was followed by a 4-week double-blind study period in where participants are randomly assigned to either placebo or LAF237 at 100 mg once day, 30 minutes before breakfast. LAF237 was produced in Novartis Pharmaceuticals' (Basel, Switzerland) facilities in accordance with Good Manufacturing Practices. This 4-week trial in people with moderate type 2 diabetes found that inhibiting DPP-4 improves metabolic regulation, associated with lower glucagon levels and unchanged insulin levels.
- 3) Improved meal-related β -cell function and insulin sensitivity by the dipeptidyl peptidase-IV inhibitor vildagliptin in metformin-treated patients with type 2 diabetes over 1 year. *Diabetes Care*- 28:1936–1940, 2005 Ahrén B, Pacini G, Foley JE, Schweizer A : This study shows that vildagliptin improves β -cell function in type 2 diabetes individuals. The primary impact was noticed after only 12 weeks of therapy and lasted throughout the whole 52-week research period. The enhanced tolerance of glucose along with connection between change in adaption index and change in A1C after 52 weeks imply that better β -cell activity is a significant factor behind the improved glycemic control following 52 weeks of vildagliptin medication.
- 4) Ahren, B. (2007b). Dipeptidyl Peptidase-4 Inhibitors: Clinical data and clinical implications. *Diabetes Care*, 30(6), 1344–1350.

This journal talks about preventing GLP-1 inactivation in the treatment of diabetes by inhibiting DPP-4, thereby enhancing alongside prolonging the mechanism of the incretin hormone which is released within the body. GLP-1 levels in the blood are increased by blocking DPP-4 in experimental animals and that DPP-4 inhibition enhances the insulinotropic effects of externally given GLP-1. Later research found that preventing GLP-1 inactivation by inhibiting DPP-4 significantly increases the amount of active GLP-1 in the blood.

- 5) Delavari, A., Forouzanfar, M. H., Alikhani, S., Sharifian, A., & Kelishadi, R. (2009). First nationwide study of the prevalence of the metabolic syndrome and optimal cutoff points of waist circumference in the Middle East: the national survey of risk factors for noncommunicable diseases of Iran. *Diabetes Care*, 32(6), 1092–1097. <https://www.ncbi.nlm.nih.gov/pubmed/19279302>. The goal of the research was to provide the first national assessment of the incidence of metabolic disorder and its elements in the Eastern Mediterranean Region, as well as the first ethnically defined waist circumference threshold.

CHAPTER 3- RESEARCH QUESTION AND METHODOLOGY

RESEARCH QUESTION

1) To find out and analyse whether sitagliptin market will increase in the next 5 years or not

OBJECTIVE

1) To find out the preferred brand of sitagliptin used for diabetes mellitus-2.

2) To find out the most prescribed dose of sitagliptin.

3) Most combination therapies used of sitagliptin.

4) To find out the different brands of sitagliptin possessed by chemists.

METHODOLOGY

Study design:

A design was used to validate the data of patients and clinicians on insulin delivery which was cross sectional in nature. The information was gathered from pharmacies and doctors in Dubai and Sharjah.

Method:

A standardized questionnaire was administered to doctors and pharmacists in order to analyze their perceptions of sitagliptin and was performed in Sharjah and Dubai using Google Forms. The investigation was carried out using a pre-designed questionnaire. To facilitate this study and enhance the results, the form was translated into English during the doctor and chemist interviews.

Study tool:

For the purpose of the study, a pre-designed form with many questions on the usage of sitagliptin for doctors and pharmacists was produced.

Study Sample and setting:

The sample size for this study was 100 (50 chemists and 50 doctors). Data was gathered online using Google forms, and participants were given a permission form to ensure the confidentiality of their responses.

CHAPTER 4 – DATA ANALYSIS

RESULTS AND FINDINGS

DOCTORS PERPECTIVE TOWARDS THE USE OF SITAGLIPTIN

1)How many patients do you see in a day ?

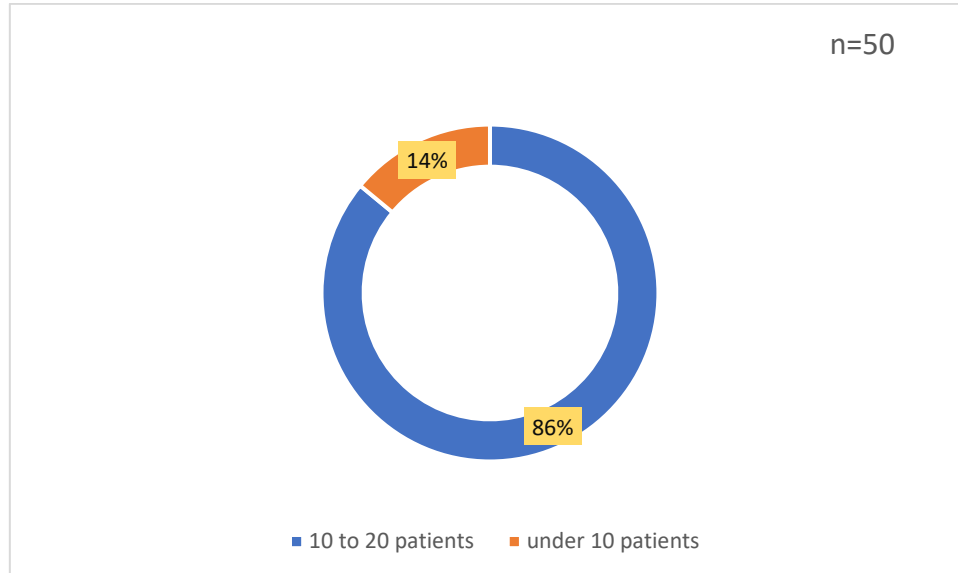


Figure showing number of patients met by physicians

Figure 4.1

It was shown that around 86% of physicians in the UAE saw fewer than ten diabetic patients per week, while just 14% saw ten to twenty patients per week.

2) How frequently do you prescribe Sitagliptin to your patients with diabetes?

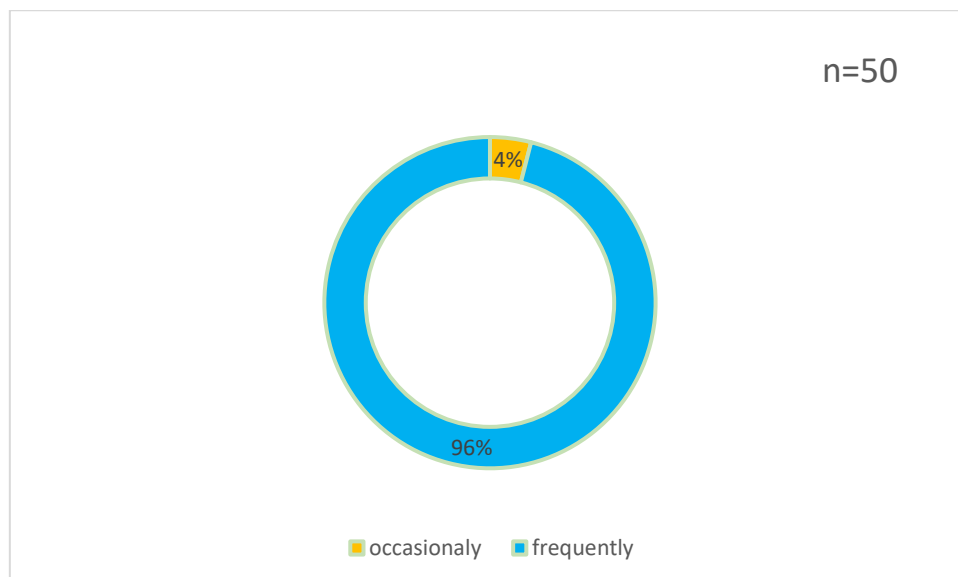


Figure showing the frequency of prescribing sitagliptin to patients with diabetes

Figure 4.2

It was seen that 96% of physicians often prescribed sitagliptin to their patients, whereas the other 4% only infrequently did so as shown in figure 4.2.

3) How do you typically monitor patients who are taking sitagliptin ?

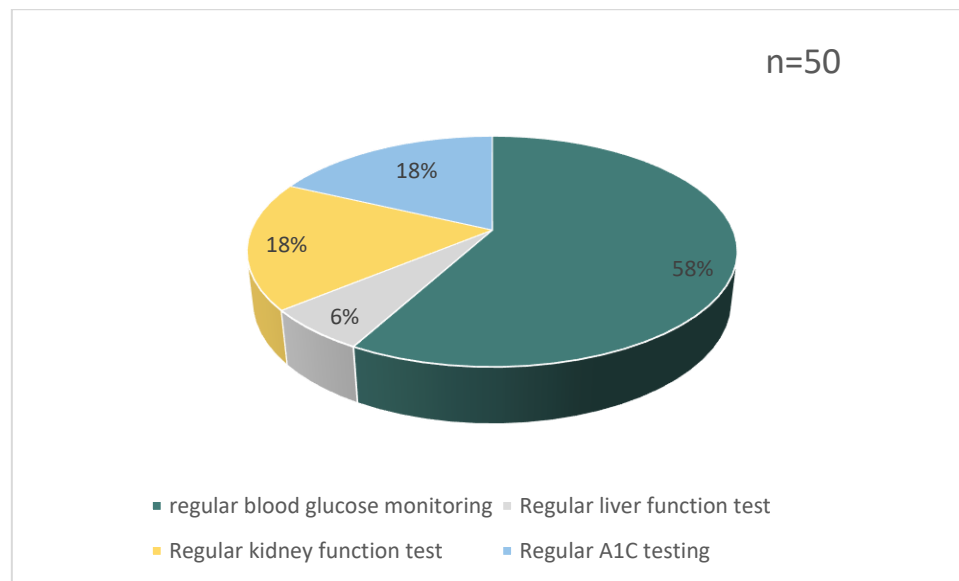


Figure showing the different methods of monitoring blood glucose level in patients

Figure 4.3

The majority of patients maintained their blood glucose levels using regular blood glucose monitoring, while 18% used regular A1C testing, the other 18% used regular renal function testing, and 6% used liver function tests as shown in figure 4.3.

4) Have you ever had to discontinue sitagliptin due to adverse events or lack of efficacy ?

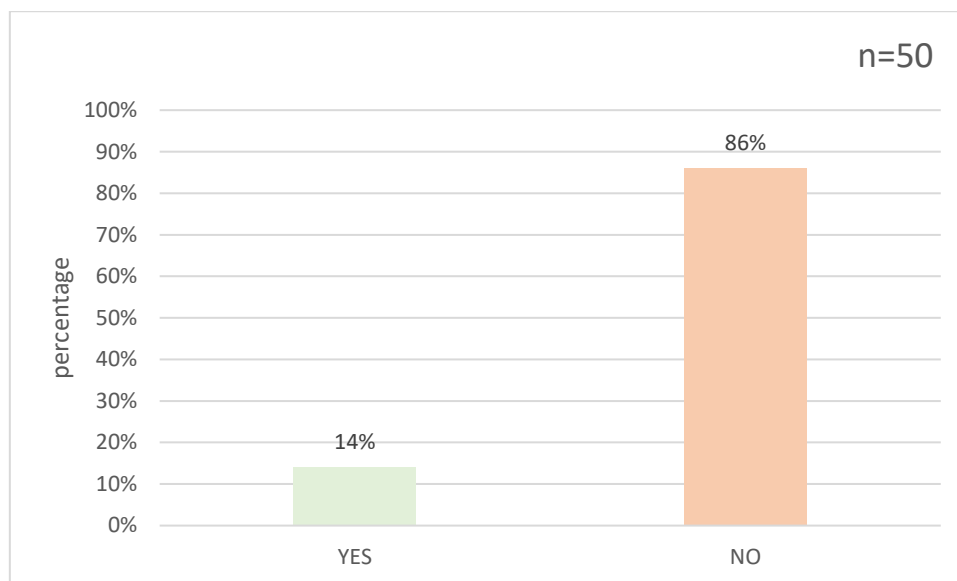


Figure showing wether sitagliptin had been discontinued or not

Figure 4.4

Around 86% of the physicians told that they never saw any adverse reactions by the use of sitagliptins while 14% suggested that they saw minor side effects as shown in figure 4.4.

5) How happy are you with sitagliptin as a therapy choice for your type 2 diabetes patients?

It can be noted that 84% of doctors were happy with sitagliptin for the treatment of T2DM, while just 8% were neutral. The above data is compiled in table No.

TREATMENT SATISFACTION	RESPONSES	% RESPONSES
VERY SATISFIED	30	84%
SOMEWHAT SATISFIED	12	36%
NEUTRAL	8	8%

Table representing the satisfactory level by the use of sitagliptin

Table 4.1

6)Would you recommend Sitagliptin to your colleagues who treat patients with type 2 diabetes ?

Only 5.8% of physicians said they would not recommend Sitagliptin to their patients, while 94.2% said they would.

Recommend sitagliptin	% response
YES	94.6%
NO	5.8%

Table showing % of how many physicians recommend sitagliptin to their colleagues

Table 4.2

7) Preferred brand for sitagliptin that you would use for the treatment of T2DM ?

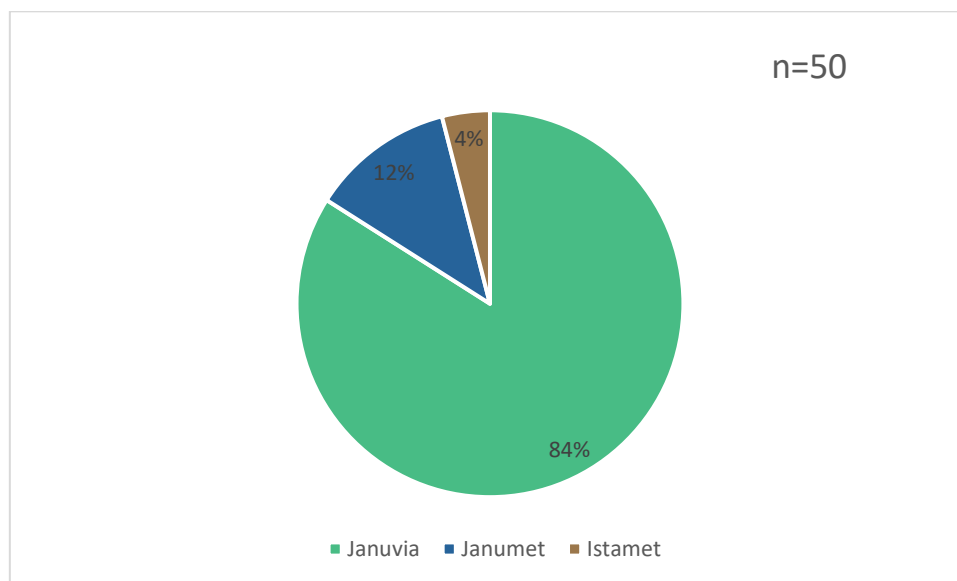


Figure showing the preferred brand of sitagliptin for the use of type-2 DM

Figure 4.5

In the treatment of T-2 DM, over 84% of doctors preferred Januvia, whereas 12% preferred Janumet and only 4% preferred Istamet. The data of preferred brands by the doctors is tabulated in figure no 4.5.

8) Whether combination therapy is preferred or not ?

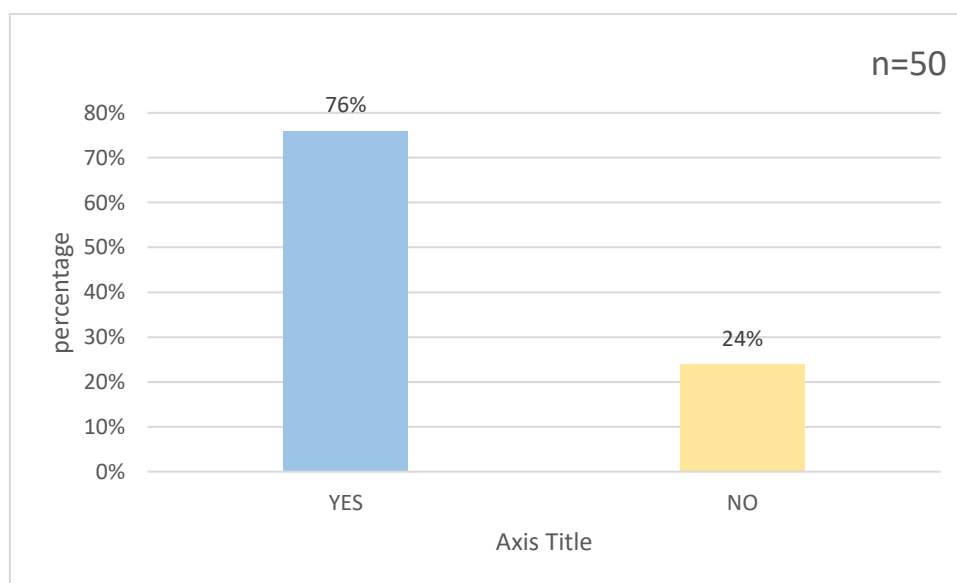


Figure showing whether combination therapy of sitagliptin is preferred or not

Figure 4.6

It was shown that 76% agreed that combination therapy is preferred while only 24% disagreed for the same.

Unmet need of sitagliptin :

- During the survey it was realized that most of the doctors preferred combination molecules in the UAE as compared to single molecule.
- It was also believed that more advertisements would be required to increase the market share of sitagliptin overall due to its high cost.

CHEMISTS PERPECTIVE TOWARDS THE USE AND SALE OF SITAGLIPTIN

1)Do you know about sitagliptin ?

It was observed that all the chemists knew about sitagliptin.

2)What brands of sitagliptin do you have ?

It was discovered that 76.5% of the chemists use Januvia, 13.7% use Janumet XRCP, 7.8% use Istamet, and 19.6% use all three brands of sitagliptin. The data is shown in Figure No 5.9.

SITAGLIPTIN BRANDS	% RESPONSE
Januvia	76.5%
Janumet XRCP	13.7%
Istamet	7.8%
All 3 types of brands	19.6%

Table showing the different brands of sitagliptin possessed by chemists

Table 4.3

3) Quantity of Januvia sold in a week ?

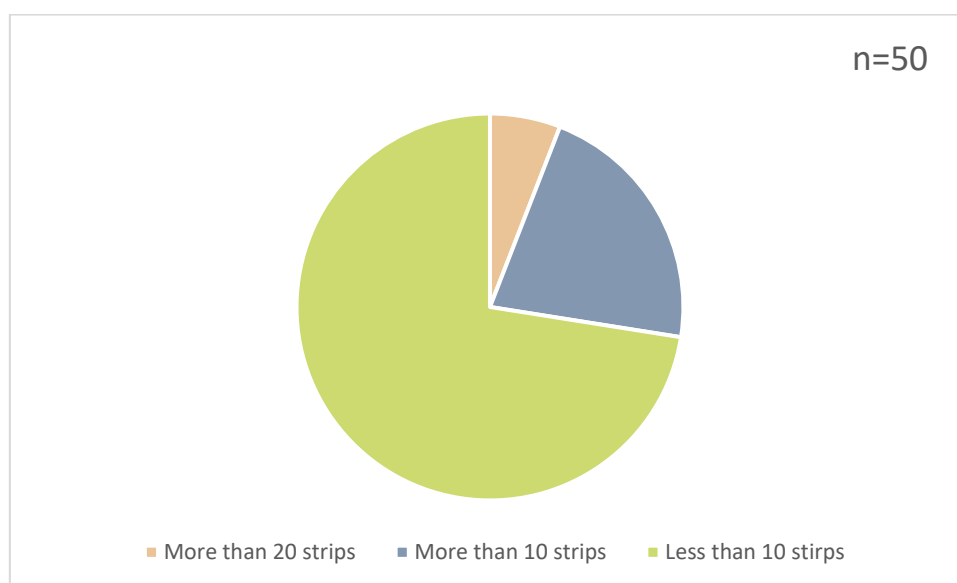


Figure representing the quantity of Januvia sold in a week

Figure 4.7

It was discovered that 72.5% of the researchers purchasing Januvia used fewer than 10 strips each week, The sales of Januvia in a week are shown in Figure No 4.7.

4) What combination of sitagliptin is majorly prescribed by your shop ?

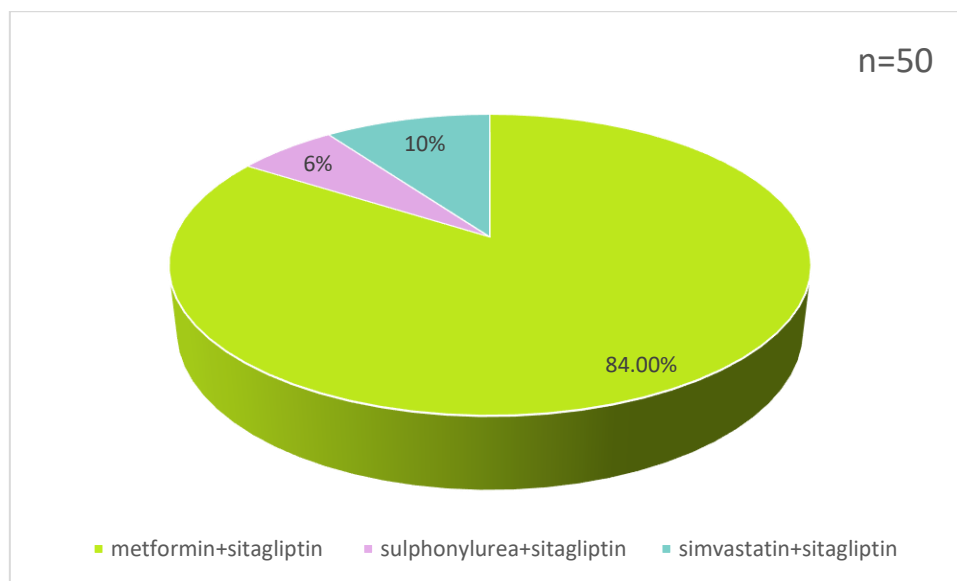


Figure showing the different combination therapies prescribed

Figure 4.8

It has been observed that 84% people in UAE trade metformin+ sitagliptin combination while only 6% trade sulphonylurea and 10% trade simvastatin as shown in figure No 4.8 .

5)What is the strength of sitagliptin(januvia) prescribed ?

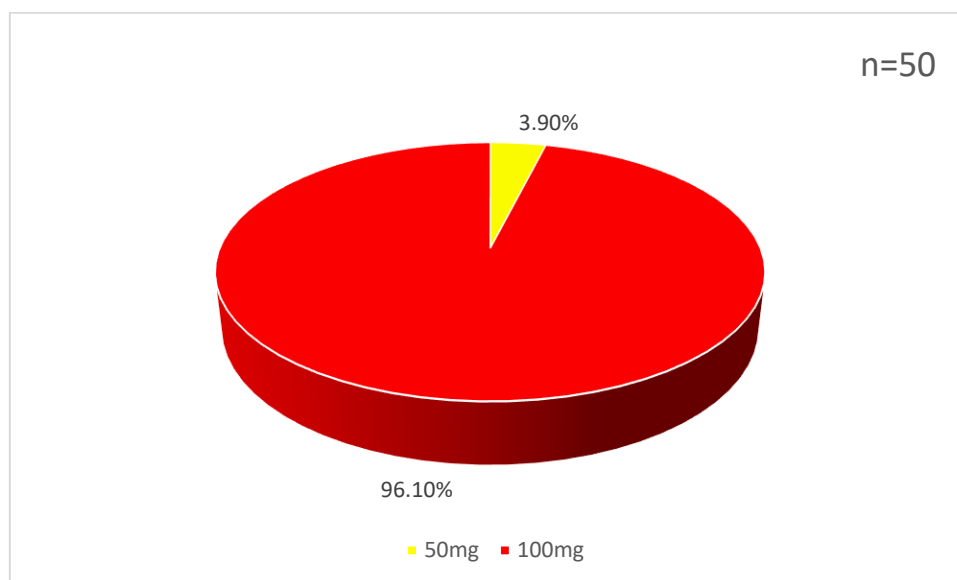


Figure showing dose of sitagliptin prescribed

Figure 4.9

It can be shown that 96% of the pharmacists indicated using 100mg sitagliptin, whereas just 3.9% suggested using 50mg sitagliptin . FigureNo 4.9 provides a comprehensive compilation of the same.

6)What is the price of sitagliptin in your shop ?

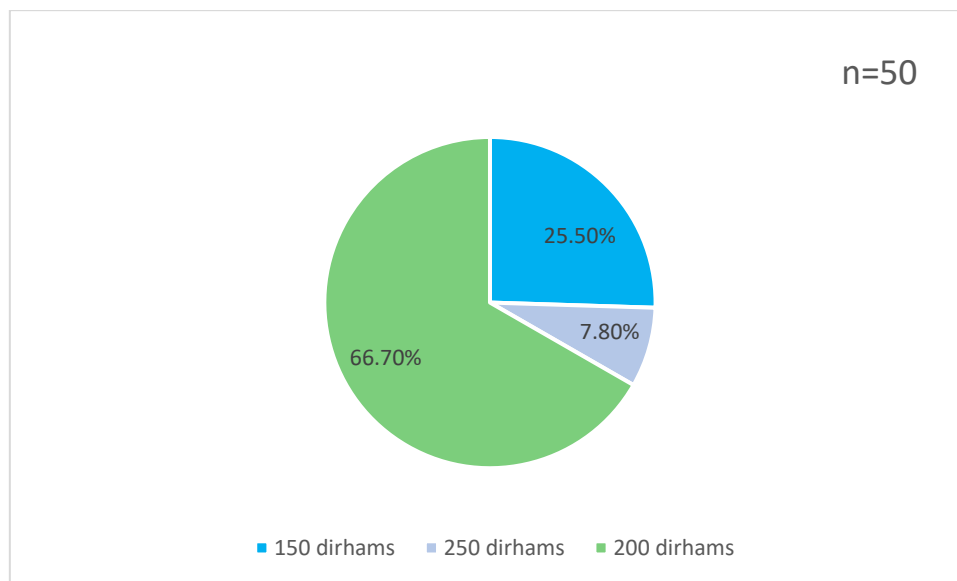


Figure showing the price of sitagliptin in shops

Figure 4.10

The average common cost of sitagliptin was 200 dirhams, although it was 150 dirhams in certain regions and 250 dirhams in others as shown in figure No 4.10.

CHAPTER -5

CONCLUSION

As we can see in today's world, diabetes is becoming more prevalent, and this is also true in the UAE. At the same time, altering a lifestyle with chronic conditions has exacerbated the situation, and those who already have inherited disorders are in greater danger than the general population. Many variables contribute to the problem, including financial situation, age, stress, severity of difficulties, and so on.

When it comes to diabetes, majority of public in the UAE suffers from the disease, and the numbers are growing exponentially day by day, causing the cost of prescriptions to rise tremendously.

According to the findings, physicians in the UAE suggest Januvia the most in management of the disease. The frequency of the disease has exponentially increases at an alarming rate over the years. The lifestyle of the inhabitants in the UAE was the most frequent element contributing to this.

According to the study, biguanides, such as metformin and sulphonylureas, are still a popular class of medications for treating diabetes, and their combination is widely given by doctors and used by patients. It can also be shown that the majority of doctors were pleased with the sitagliptin therapy.

Compared to other combination drugs, the utilization of metformin and sitagliptin is greatest at 84%. This then demonstrates how the drug is effective in the treatment of TYPE-2DM. We can also observe that Januvia was more popular at 76.5% than Janumet and Istamet.

Sitagliptin's cost in Dubai and Sharjah came out to be 200 dirhams which came out to be 66.7% which may be costly for some members of the sample group due to its high cost. As a result, cost utilisation approaches might be employed to cut costs while increasing benefits.

It can also be seen from the data that 96% of the times 100mg of sitagliptin was prescribed as a dose which shows that this was the most frequently used dosage for the treatment of type-2 DM.

Januvia is a promising medication according to data for the management of the disease. Furthermore, combination molecules are preferred over individual molecules due to improved pharmacodynamics within the body.

In terms of reliability, efficacy, and therapy, sitagliptin is the highest quality DPP-4 inhibitor.

As a result, we can conclude that the Sitagliptin market has grown over time and will continue to expand in near the future.

CHAPTER – 6

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CHAPTER -7

ANNEXURES

(Annexure -1) Questionnaire for doctors

Survey of sitagliptin market by the physicians in UAE

My name is Ritik Tatia, I am a student of IIHMR university Jaipur , I am conducting this survey as a part of my dissertation project needed for the completion of my post graduation degree . I am requesting you to provide your views on the SURVEY OF SITAGLITPIN MARKET BY PHYSICIANS IN UAE' . Please answer the questions by due responsibility. I hereby assure you that all information provided by you will be confidential and will be used for research purposes only. I am looking forward for your cooperation and thank you for your participation.

How many patients do you see in a day ?

|

☐ Under 10

☐ 10-20

☐ 20-30

☐ 30-40

How frequently do you prescribe Sitagliptin to your patients with type 2 diabetes?

- ☐ Frequently
- ☐ Occassionally
- ☐ rarely
- ☐ Never

How do you typically monitor patients who are taking Sitagliptin?

- ☐ Regular blood glucose monitoring
- ☐ Regular A1C testing
- ☐ Regular kidney function testing
- ☐ Regular liver function testing

Have you ever had to discontinue Sitagliptin due to adverse events or lack of efficacy?

☐ yes

☐ no

How satisfied are you with Sitagliptin as a treatment option for your patients with type 2 diabetes?

☐ Very satisfied

☐ Somewhat satisfied

☐ Neutral

☐ Somewhat Dissatisfied

☐ Very dissatisfied

Would you recommend Sitagliptin to your colleagues who treat patients with type 2 diabetes?

- ☐ Yes
- ☐ No

Preferred brand for Sitagliptin that you would use for the treatment of T2DM

- ☐ Januvia
- ☐ Istamet
- ☐ Janumet
- ☐ JanumetXRCP

combination therapy preferred or not ?

- ☐ yes
- ☐ no

(Annexure-2) Questionnaire for chemists

Survey of sitagliptin market by the chemists in UAE

My name is Ritik Tatia, I am a student of IIHMR university Jaipur , I am conducting this survey as a part of my dissertation project needed for the completion of my post graduation degree . I am requesting you to provide your views on the SURVEY ON KAP OF SITAGLITPIN MARKET BY CHEMISTS IN UAE' . Please answer the questions by due responsibility. I hereby assure you that all information provided by you will be confidential and will be used for research purposes only. I am looking forward for your cooperation and thank you for your participation.

Do you know about sitagliptin ? *

- ☐ YES
- ☐ No

What brands of sitagliptin do you have ? *

- ☐ Januvia
- ☐ Janumet XRCP
- ☐ Istamet
- ☐ All of the above

Quantity of Januvia sold in a month ? *

- ☐ Less than 10 strips
- ☐ More than 10 strips
- ☐ More than 20 strips

What combination of sitagliptin is majorly prescribed by your shop ?

- ☐ sulphonylurea + sitagliptin
- ☐ metformin + sitagliptin
- ☐ Simvastatin + sitagliptin
- ☐ ertuglifozin + sitagliptin

What is the strength of sitagliptin most prescribed ? *

- ☐ 25mg
- ☐ 50mg
- ☐ 100mg
- ☐ 150mg

what is the price of sitagliptin in your shop ? *

- ☐ 200 dirhams
- ☐ 150 dirhams
- ☐ 250 dirhams
- ☐ 300 dirhams

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