

## Awareness of Vitamin B12 Deficiency and Its Effects on the Body among Diabetic Type II Patients Taking Metformin in Al Qassim Region, Saudi Arabia.

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### Abstract

• **Background:** Vitamin B12 is one of the essential Vitamins for protein biosynthesis, cell division and optimal systemic function, particularly for nervous system and blood. Diagnosis and treatment are delayed because of symptoms not specific to Vitamin B12 deficiency, normal blood count and lack of awareness. Metformin (Glucophage) is a popular and highly effective oral anti-diabetic drug used for type II diabetes. However, long-term use of Metformin may interfere with Vitamin B12 absorption which may lead to Vitamin B12 deficiency.

• **Objectives:** To assess the awareness of Vitamin B12 deficiency and its effects on the body among diabetic type II patients taking Metformin in Al Qassim region, Saudi Arabia.

• **Methods:** We conducted a cross-sectional study of 163 diabetic type II patients using convenient sampling. The Online-survey was distributed and filled by diabetic type II patients using Metformin and live in Al Qassim region.

• **Results:** There were 83 male (64.8%) and 45 female (35.2%). Mean age was  $45.5 \pm 0.47$ , standard deviation was 11.95 and median age was 47 years. People live in Qassim region who answer the questionnaire were 17 from ElRass, 86 from Buraidah, and 25 from Unaizah.

• **Conclusion:** We conclude that most of the participants using metformin in Qassim region, particularly in Buraidah, Unaizah, and Elrass were not aware about vitamin B12 deficiency and its effects on the body. Most of them believe that the lack of knowledge is due to absence of educational campaigns and careless doctors.

**Keywords:** Metformin, Vitamin B12 deficiency, Diabetes type II and T2DM.

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### I. Introduction

Metformin (Glucophage) is a popular and highly effective oral anti-diabetic drug used for type II diabetes. This drug works by lowering the glucose level in the blood by making the insulin receptors more sensitive to insulin, reduction of hepatic glucose output by inhibiting the hepatic gluconeogenesis, reduce hyperlipidemia and patients lose weight due to loss of appetite. However, long-term use of Metformin may interfere with Vitamin B12 absorption<sup>(5)</sup>. Vitamin B12 (Cobalamin) serves as cofactor for several essential biochemical reactions in humans. It is involved in two important reactions in the body: the transfer of methyl group from N5-methyl-FH4 to homocysteine to form methionine by the enzyme methionine synthase and rearrangement of L-methylmalonyl-CoA (which is produced during degradation of some amino acids and fatty acids with odd number of carbon atoms) to form Succinyl-CoA<sup>(6)</sup>. Vitamin B12 deficiency may cause clinical situations include megaloblastic anemia, gastrointestinal symptoms like: sore tongue that has a red, beefy appearance, nausea, poor appetite and diarrhea. It also leads to neurological manifestations like: Isolated neuropathy, Myelopathy, memory loss with reduced attention span<sup>(4)</sup> by accumulation of unusual fatty acid which become incorporated into cell membrane, including those of nerves system<sup>(6)</sup>.

Our aim is to assess awareness of Vitamin B12 deficiency and its effect on the body among diabetic type II patient taking Metformin in Al Qassim region, Saudi Arabia.

### II. Method

A descriptive, cross-sectional study of diabetic type II (T2DM) patients was conducted using an Online-survey. The study was done to assess the awareness about Vitamin B12 deficiency and its effects on the body among T2DM patients taking Metformin (Glucophage). The questionnaire was distributed online to

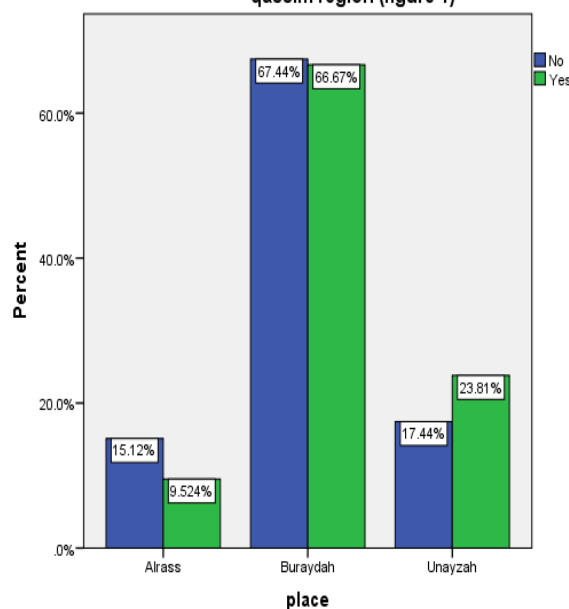
several groups of T2DM patients taking Metformin in Al Qassim region, Saudi Arabia during December, 2017. The sample size of the study was estimated using Raosoft.com (sample size calculator) and it was: 300. We target the patients between the age of 25 to 70 years. There was a limitation in the collection of samples which was 137. A convenience sample of 163 patients on Metformin was recruited. Participants who below 25 or above 70 years were excluded from the study. Patients who're not on Metformin are excluded, too. The questionnaire consisted of questions on (1) Demographic characteristics, (2) Duration of Diabetes and the usage of Metformin, (3) Yes / No and Why as regard to the awareness about the effect of Metformin on Vitamin B12, (4) Yes: Example / Don't know as knowledge quiz about the Vitamin B12 source, function and effect of its deficiency. Ethical approval isn't needed for such a study according to The National Committee of Bioethics at King Abdulaziz City for Science and Technology (KACST). Data was analysed using SPSS statistical package (version 23).

### III. Data Results

The total sample was 163. The participants who are included in the study were 128 out of 163. Participants who are younger than 25 years old were 12 patients and are excluded. Participants who are older than 70 were 3 patients and are excluded. Patients with T2DM not using Metformin were 24 patients and are excluded, too. There were 83 male (64.8%) and 45 female (35.2%).

Mean age was  $45.5 \pm 0.47$ , standard deviation was 11.95 and median age was 47 years. People live in Qassim region who answer the questionnaire was 17 from ElRass, 86 from Buraidah, and 25 from Unaizah (figure 1). Participants who know about Vitamin B12 and its effect on the body were listed in table 1. Participants who know about the effect of Metformin on Vitamin B12 are 16 out of 86 from Buraidah, 6 out of 25 from Unaizah, and none out of 17 from ElRass.

Participants who know about vitamin B12 and its effect on the body among qassim region (figure 1)



Knowledge about Vitamin B12 among Qassim Regions (Table 1)

		No	Yes	Total
place	Elrass	13	4	17
	Buraydah	58	28	86
	Unayzah	15	10	25
Total		86	42	128

Participants using Metformin less than one year was 22.7%, from one to 3 years was 17.2%, from 3 to 5 years was 19.5%, and those who are more than 5 years were 40.6%.The knowledge about Vitamin B12 in relation to the duration of Metformin usage is listed in table 2.Participants who know about the effect of Metformin on Vitamin B12in relation to metformin usage are listed in table 3.

Furthermore, participants using Metformin and know what is Vitamin B12 were 42 out of 128 (32.8%).Participants who know what organ in the body benefits from Vitamin B12 were 23 out of 42.Participant who know what type of food contains Vitamin B12 were 20 out of 42. In addition, participants who know that Vitamin B12 deficiency can lead to anaemia were 11 out of 42.Participants who know that Vitamin B12 can lead to ataxia were 19 out of 42.Participants who know that Vitamin B12 can lead to numbness were 20 out of 42.

**The knowledge about Vitamin B12 in relation to the duration of Metformin usage (Table2)**

Metformin duration	The knowledge about Vitamin B12		Total
	No	Yes	
<1 Years	25	4	29
1-3 Years	13	9	22
>5 Years	27	25	52
3-5 Years	21	4	25
Total	86	42	128

**The knowledge about the effect of the Metformin on Vitamin B12 in relation to the duration of Metformin usage (Table 3)**

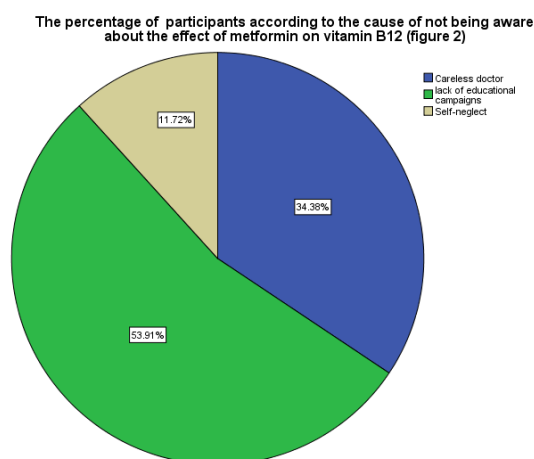
The duration of Metformin usage	The knowledge about the effect of the Metformin on Vitamin B12		Total
	No	Yes	
<1 Years	28	1	29
1-3 Years	17	5	22
3-5 Years	23	2	25
>5 Years	38	14	52
Total	106	22	128

#### IV. Discussion

The present study is the first to illustrate the awareness of Vitamin B12 deficiency and its effects on the body among diabetic type II patients taking Metformin in Al Qassim region, Saudi Arabia. This study was done using a cross-sectional study design. Our aim is to assess the awareness of Vitamin B12 deficiency and its effects on the body among T2DM patients taking Metformin in Al Qassim region, Saudi Arabia. A Convenient sample of 163 diabetic type II patients was recruited. There was a limitation in the collection of samples which was 137. The limitation was due to poor compliance in the response to the online-survey.

The present study shows that a great percentage of participants are not aware about the effect of vitamin B12 in the body (table 2).In addition, most of them which were 100% from Elrass, 81% from Buraidah, and 76% from Unaizah are not aware about the effect of metformin on vitamin B12, which indicate the need of increase the awareness in Qassim region by medical field personnel. The present study shows that 49% of those using metformin more than 5 years have knowledge about vitamin B12, in contrast only 13.7% of those using metformin less than 5 years. In addition, the awareness about the effects of metformin on vitamin B12 are 3.4% of those using metformin less than 1 year, 22.7% of those using metformin from 1-3 years, and 26.9% of those using metformin more than 5 years. Accordingly, this study suggests that the awareness about vitamin B12 as well as the effect of metformin on it are directly proportional to the duration of metformin usage (table 2,3). The cause of lack of knowledge according to the participants response were 11.72% due to self-neglect, 34.38% due

to a careless doctor and 53.91% due to lack of educational campaigns (figure 2). Therefore, the educational campaigns by medical personnel should be performed among these cities in order to raise the awareness among T2DM patients. In addition, doctors are advised to give complete information about the prescribed drugs.



## V. Conclusion

We conclude that most of the participants using metformin in Qassim region, particularly in Buraidah, Unaizah, and Elrass were not aware about vitamin B12 deficiency and its effects on the body. Most of them believe that the lack of knowledge is due to absence of educational campaigns and careless doctors. There is a need for conducting, establishing, and improving awareness programs about vitamin B12 deficiency among T2DM patients. As well as encouraging physicians to provide vitamin B12 supplementation and to be aware about vitamin B12 deficiency in their T2DM patients using metformin.

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