

Knowledge and Practice of Physicians About Vitamin B12 Deficiency among Type 2 Diabetes Mellitus Patients in Buraidah, Saudi Arabia

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Abstract

Objectives: To assess knowledge and practice of physicians regarding Vitamin B12 Screening among Type 2 diabetes mellitus (T2DM) and assess knowledge of physicians about recent American diabetic association (ADA) guidelines updates.

Methods: A cross sectional study was conducted at Primary Health Care (PHC) centers in Buraidah, Qassim from January to April 2022. Data was collected using a structured questionnaire which was based on ADA guidelines among all physicians of PHCs. Statistical package for social sciences (SPSS) version 23.0 was used for analysis. Frequencies and percentages were calculated for categorical variables and means with standard deviations were calculated for continuous variables.

Results: About 135 (72.2%) physicians would test T2DM patients who are on metformin for Vitamin B12, and only 65 (34.8) would test them annually. Early signs of Diabetic peripheral neuropathy (DPN) are pain, burning sensation, tangling sensation, numbness and loss of protective sensation (LOPS). Only 23 (12.3%) of them knew the all five symptoms. Forty-five (45.5%) of participants would not treat DPN with B12 supplementation. Only (57.2%) order Vit B12 testing for DM2 who are on metformin, and (49.2%), (29.4%) would order them if the patient has neuropathy and on annual basis respectively. Majority of physicians (70.6%) give Vit B12 supplements as treatment of DPN.

Conclusion: There is poor knowledge and practices related to B12 deficiency among primary care physicians. This calls for training and educating primary care physicians regarding B12 deficiency screening, neuropathy and their management. There is also need for providing sufficient resources in order to ensure B12 screening in high risk diabetic patients.

Keywords: Primary care, B12 screening, B12 supplementation, diabetics, Saudi Arabia

Background

Type 2 Diabetes Mellitus (T2DM) is a major problem worldwide. Its prevalence increasing globally, including Saudi Arabia.¹ The World Health Organization (WHO) has reported that Saudi Arabia ranks the second highest in the Middle East, and is seventh in the world for the rate of diabetes. It is estimated that around 7 million of the population are diabetic and almost around 3 million have pre-diabetes.²

One of the corner stone medications used for T2DM is Metformin; which is reported to be associated with Vitamin B12 deficiency up to 30% among patients who are in long term Metformin treatment.³⁻⁶ A recent report from the Diabetes Prevention Program Outcomes Study (DPPOS) suggesting periodic testing of vitamin B12.⁷

Long-term metformin therapy is significantly associated with lower serum vitamin B12 concentration, yet those at risk are often not monitored for B12 deficiency. Prescription of Vitamin B12 supplementation is common practice in physicians for diabetics who are on metformin without solid evidence of Vitamin B12 levels.

A research about the association of metformin use with vitamin B12 deficiency and peripheral neuropathy in Saudi individuals with type 2 diabetes mellitus, found that the prevalence of B12 deficiency was 7.8% overall, but the B12 deficiency was 9.4% and 2.2% in metformin users and non-metformin users, respectively.⁸ A meta-analysis done 2014, six randomized controlled trials concluded that B12 concentration was significantly lower in metformin users compared to those on placebo (mean difference [MD], -53.93 pmol/L; 95% confidence interval [CI], -81.44 to -26.42 pmol/L, $P = 0.0001$).⁹

Testing for levels of and prescription of B12 supplementation have been found to be varying and discordant. A study published in 2017 in Atlanta, Georgia reported that, only 37% of older adults with diabetes receiving metformin were tested for vitamin B12 status after long-term metformin prescription.¹⁰ Another study conducted in Riyadh 2019 found that among 57.9% of diabetics who were on vitamin B12 supplementation, and only 4.4% had available serum vitamin B12 levels. Among physicians 39% do not know about the current ADA recommendation, whereas 17% have no idea about the recommendations.¹¹

There is limited evidence on prescription of B12 screening and supplementation for diabetic patients by physicians in Saudi Arabia. This study therefore aimed to assess knowledge and practice of physicians regarding Vitamin B12 Screening among T2DM and assess Knowledge of physicians about recent ADA guidelines updates.

Methodology

This cross-sectional study was conducted among physicians working in Primary Health Care (PHC) centers in Buraidah city January to April 2022. Targeted participants were all physicians in PHCs.

There are about 40 functional PHC centers in Buraidah and there are 204 physicians working in those PHC centers including family medicine trainees and trainers. Given the limited population of physicians, we included all the primary care physicians who were working in PHC centers of Buraidah for at least one year in our study. We excluded those physicians working in polyclinics in PHC centers and having other specialty. All the eligible physicians were

approached in their respective PHC centers and invited to participate in the study.

Data was collected using structured questionnaire. The questionnaire was developed based on American Diabetics Association (ADA) guidelines. Questionnaire had three sections. First section included variables related to social and professional information. Second section assessed the knowledge about vitamin B12 and diabetic Peripheral Neuropathy. Third section was about practice of physician regarding Vitamin B12 screening.

After taking permission from the regional director of PHCs, the questionnaire were distributed directly to the physicians by trained data collectors, who were undergraduates medical students.

The data was analyzed using Statistical package for social sciences (SPSS) version 23.0. Descriptive analysis was done and calculated frequencies and proportions of categorical variables while mean with standard deviations was calculated for continuous variables.

Ethical Approval was taken from Qassim Regional Bioethics Committee. Informed consent was taken from all participants and confidentiality was maintained as name and ID of participants was not taken. Approval was also taken from Administration of PHC centers.

Results

A total of 250 physicians were invited to participate in the study period out of which 187 patients completed the questionnaire (response rate 74.8%). More than half (57.2%) were males. The mean (SD) age was 36.9 (8.55) years. More than half (58.3) of them were Saudis. The professional ranks of the participants were as follows; general practitioners (GPs) 63 (33.7%), residents 61 (32.6%), specialists 44 (23.5%) and consultant 19 (10.2%). With mean (SD) experience 9.18 (7.15) years (Table 1).

A total of 112 (59.9%) knew that Vitamin B12 Supplementation essential to patients who are taking metformin and have B12 deficiency. In terms of routine test for Vit B12, about 135 (72.2%) physicians would test DM2 who are on metformin, and 65 (34.8) would test them annually. According to ADA 2021 there are five special groups (pregnant or lactating ladies, older adults, vegetarians and people who are on low

carb diets) for which multivitamins are recommended. In our sample, 21 (11.2%) were aware of the five groups. Majority of participants (80.2%) knew that Vitamin C and E are not advised for diabetic patients. Early signs of Diabetic peripheral neuropathy (DPN) are pain, burning sensation, tangling sensation, numbness and loss of protective sensation (LOPS). Only 23 (12.3%) of them knew the all five symptoms. Forty-five (45.5%) of participants would not treat DPN with B12 supplementation. More than half of the physicians (50.3%) knew that DMT2 patients on metformin taking larger dosage for long duration, are at higher risk of DPN (Table 2).

Regarding the practices of prescription of Vitamin B12 supplement, almost half of participants (48.1%) prescribed B12 supplements for Diabetics who are on metformin, (36.4%) give only to symptomatic patients and (11.8%) would give every DMT2. Of the physicians, only (57.2%) order Vit B12 testing for DMT2 who are on metformin, and (49.2%), (29.4%) would order them if the patient has neuropathy and on annual basis respectively. Seventeen participants (9.1%) prescribe

Table 2. Knowledge about B12 deficiency

B12 Supplement is required for	
Every diabetic pt	8 (4.3)
Pts on Metformin	112 (59.9)
Pts with Neuropathy Sx	63 (33.7)
None of the above	4 (2.1)
Routine Test for B12	
DMT1	3 (1.6)
DMT2	135 (72.2)
Both Types	38 (20.3)
IDK	11 (5.9)
Routine Test for B12	
Every 1 year	65 (34.8)
Every 5 years	11 (5.9)
Every 6 months	4 (2.1)
For symptomatic pts	97 (51.9)
IDK	10 (5.3)
Indications of MV Supplement	
One indication	28 (15.0)
Two indications	57 (30.5)
Three indications	58 (31.0)
Four indications	23 (13.3)
Five indications	21 (11.2)
Vit C and E Supplement are required for	
DMT1	1 (0.5)
DMT2	18 (9.6)
IDK	18 (9.6)
Not advised	150 (80.2)
Early signs of DPN	
One Sign	32 (17.1)
Two Signs	44 (23.5)
Three Signs	66 (35.3)
Four Signs	22 (11.8)
Five Signs	23 (12.3)
B12 is Treatment of DPN	
Yes	96 (51.3)
No	85 (45.5)
IDK	6 (3.2)
Metformin related DPN is associated with	
Longer duration	60 (32.1)
Higher dose	7 (3.7)
Both dose and duration	94 (50.3)
Irrelevant to dose and duration	18 (9.6)
IDK	8 (4.3)

Table 1. Socio-demographic characteristics

Variables	N (%)
Age	
Mean (SD)	36.9 (8.55)
Gender	
Male	107 (57.2)
Female	80 (42.8)
Nationality	
Saudi	109 (58.3)
Non-Saudi	78 (41.7)
Qualification	
GP	63 (33.7)
Resident	61 (32.6)
Specialist	44 (23.5)
Consultant	19 (10.2)
Experience	
Mean (SD)	9.18 (7.15)

Table 3. Practice about B12 deficiency

I give B12 supplements for	
Every T2 diabetic pt	22 (11.8)
Pts on Metformin	90 (48.1)
Pts with Neuropathy Sx	68 (36.4)
None of the above	7 (3.7)
I Order B12 test for	
DMT1	1 (0.5)
DMT2	107 (57.2)
Both types	26 (13.9)
I don't order	53 (28.3)
I order B12 test	
Every 1 year	55 (29.4)
Every 5 years	10 (5.3)
Every 6 months	6 (3.2)
For symptomatic pts	92 (49.2)
I don't order	24 (12.89)
I give MV for	
One indication	35 (18.7)
Two indications	62 (33.2)
Three indications	57 (30.5)
Four indications	16 (8.6)
Five indications	17 (9.1)
I give B12 as treatment for DPN	
Yes	132 (70.6)
No	55 (29.4)

Multivitamins to the five recommended groups. Majority of physicians (70.6%) give Vit B12 supplements as treatment of DPN (Table 3).

Discussion

Type 2 diabetics particularly those on metformin are at risk for metabolically lower levels of vitamin B12. The mechanisms of vitamin B12 deficiency in metformin treatment has not been clear, but the most likely hypothesis is that metformin interferes with calcium-dependent membrane action responsible for vitamin B12 intrinsic factor absorption in the terminal ileum.⁶

In this study we found 59.9% knew that Vit B12 supplementation is essential for DMT2 patients who are on metformin, but only 34.8% knew that it's recommended to test for it annually. We found only 12.3% knew the 5 signs of DPN. Regarding practice, we found 48.1% of physicians prescribe Vit B12 supplementation for every patient on metformin, but only 29.4% order Vit B12 test on Annual basis. We also found that majority (70.6%) of physicians Give Vit B12 as treatment of DPN.

In Previous study¹¹ 44.0% of the respondents know the current recommendation of ADA on vitamin B12 screening and supplementation among diabetic patients. Seventy-two percent of our participants knew that routine testing of Vit B12 for DMT2 patients on metformin and 34.8% knew that it's recommended to test them annually. A possible explanation of lower knowledge in Buraidah compared to Riyadh is most of our participants were general practitioner (GPs) compared to specialists in Diabetic clinics in Riyadh study. None the less this is an important finding and call for updating the knowledge of practitioners on this matter.

We found that, in practice 57.2% of the practitioners do routine testing on patients who are on metformin and 49.2%, 29.4% test their patients if they have neuropathy and annually respectively. Compared to the study in Riyadh,¹¹ 51.0% order vitamin B12 testing only if they have symptoms of neuropathy and 19.0% routinely order vitamin B12 testing. One explanation to the difference in knowledge and practice is lack of resources in PHC settings which may hinder testing of B12 levels.

In our study only 12.3% knew the five signs of DPN. This an important finding as this low knowledge of signs of DPN might lead to delay in identification and treatment of DPN. Metformin use has been associated with DPN in prospective study where the prevalence of neuropathy was significantly higher among the patients with low levels of B12.⁷ This calls for educating primary care physicians regarding the DPN risk factors and sign and symptoms.

The study has provided useful information regarding the knowledge and practices of primary care physicians about B12 among diabetic patients. However, there are two limitations should be kept under consideration. First, the knowledge and practices were self-reported and therefore are prone to response bias, as physicians may report better practice than their actual practices. However, we assume this to be of less importance as we ensured complete privacy and anonymity during data collection which would have encouraged respondents to give accurate responses. Secondly, this study was conducted in one city only, therefore results may not be generalizable to whole region. None the less, this study has provided a base for further research on practices of B12 deficiency among diabetic patients.

Conclusion

This study highlights the fact that there is lack of knowledge about the ADA recommendation by PHC physicians. Routine testing for serum vitamin B12 level is not practiced in our centers. Thus, there is need for doctors involved in the management of diabetes to keep abreast with guidelines and current recommendations and routinely monitor vitamin B12 levels particularly those who were on long-term use of metformin and the elderly patients to optimize management of diabetes and its complications. The difference between knowledge and practice due to lack of resources in PHC, so we recommend that physicians and managers reach a solution to provide the needed resources.

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Conflict of Interest

There are no conflicts of interest.

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