

Awareness on Vitamin B12 Supplementation in Patients with type II Diabetes Mellitus

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ABSTRACT

Vitamin B12, also known as cobalamin is essential for DNA synthesis and energy production. Vitamin B12 deficiency is common, especially in vegetarians. Because Vitamin B12 is found only in animal source foods like dairy products, meat, fish and eggs. Type 2 diabetes mellitus is a metabolic disorder characterised by hyperglycemia, insulin resistance and insulin deficiency. It is mainly due to cigarette smoking, alcohol consumption, obesity, physical inactivity etc. The aim of the present study is to analyse the awareness on Vitamin B12 supplementation in Type 2 Diabetic patients. The present study is a survey based study. A set of questions were prepared and distributed among 50 patients with type 2 diabetes mellitus. The questions are about awareness on Vitamin B12, its supplements and its effects. The responses are made into a pie chart. In the present study most of the participants were not aware of Vitamin B12 and its supplements. Most of the participants were aware of diabetes and are checking their sugar levels routinely. Most of the participants experienced side effects after consumption of B12 tablets. Vitamin B12 levels should be routinely diagnosed and Vitamin B12 supplements should be administered routinely at a proper dosage to prevent Vitamin B12 deficiency.

Keywords: Diabetes, Vitamin B12, Supplements, Metformin.

INTRODUCTION

Diabetes mellitus is a group of metabolic diseases resulting from defects in insulin secretion, characterized by chronic hyperglycemia. Classification of diabetes includes type 1, type 2, and gestational diabetes mellitus (Kharroubi, 2015). Type 1 diabetes is common in children and adolescents whereas type 2 diabetes is common in middle aged and older adults (Dabelea *et al.*, 2014). Insulin resistance in type 2 diabetes patients increases the demand for insulin in tissues (Dabelea *et al.*, 2014; Halban *et al.*, 2014). In type 2 diabetes, genetic predisposition is stronger (Saadi *et al.*, 2008). Some of the diabetes patients are asymptomatic, especially those with type 2 diabetes (Craig, Hattersley and Donaghue, 2009) which causes delay in diagnosis. Uncontrolled diabetes causes stupor, coma and death, if left untreated (Craig, Hattersley and Donaghue, 2009; Galtier, 2010). Manifestations of type 2 diabetes are obesity, nephropathy, hypertension, dyslipidemia, fatty liver disease and systemic inflammation (Saadi *et al.*, 2008; Kraemer and Ginsberg, 2014).

Metformin is the most prescribed anti-diabetic drug in patients with type 2 diabetes mellitus (Kirpichnikov, McFarlane and Sowers, 2002) and it is characterized by excellent improvement in the cardiovascular morbidity and mortality associated with type 2 diabetes mellitus (Kooyet *et al.*, 2009). But it causes some side effects. One such side effect is Vitamin B12 deficiency (Liu, Dai and Jean, 2006). This is the reason why diabetes is associated with vitamin B12 deficiency (Akinlade *et al.*, 2015).

Vitamin B12 is a water-soluble vitamin involved in the functioning of the hematopoietic, neuro-cognitive and vascular systems. It is also called cobalamin. Sources of Vitamin B12 are animal products like fish, meat, milk and eggs. Vitamin B12 is essential in DNA synthesis, fatty acid metabolism and energy production (Akinlade *et al.*, 2015). Some of the physiological effects are that it facilitates the methylation of homocysteine to methionine (Bottiglieri, 2000); converts methyl malonyl coenzyme A (coA) to succinylcoA in fatty acid metabolism (Malouf and Sastre,

2003). Vitamin B12 deficiency is mainly due to less intake of animal foods and its deficiency is common in vegetarians (O'Leary and Samman, 2010).

Vitamin B12 deficiency occurs in type 2 diabetes patients due to the side effect caused by metformin (Akinladeet *al.*, 2015). Hence Vitamin B12 supplements are given to overcome this. In the present study we analysed the awareness levels on Vitamin B12 supplementation in Type II Diabetic patients.

MATERIALS AND METHODS

The present study is a survey based study where a set of questions were prepared and distributed among 50 patients with type II diabetes. The questions are about awareness levels on Vitamin B12, its supplements and its side effects. The responses are made into a pie chart.

RESULTS AND DISCUSSION

From the overall participants we found that only 8% participants were not aware of the term diabetes [Figure 1]. 42% participants said that they check their sugar levels once in 6 months and 8% participants were not checking their sugar levels regularly [Figure 2]. 56% participants were not aware of Vitamin B12 supplements [Figure 3]. 64% participants were consuming Vitamin B12 tablets whereas 36% participants were not consuming vitamin B12 tablets [Figure 4]. Among those 64% participants, 42% participants experienced side effects [Figure 5] like headache (22%), nausea (12%), diarrhea (8%) [Figure 6].

In the present study, we found that nearly half of the people are not aware of Vitamin B12 and its supplements. Most of the people are aware of diabetes and are checking their sugar levels routinely and most of the participants are under B12 tablet medication.

Previously many researchers conducted studies to check the Vitamin B12 levels in type 2 diabetes patients. Most of the studies reported that vitamin b12 deficiency is common in diabetic patients due to metformin drug's side effect (Nasser and Islam, 2018), (Akinladeet *al.*, 2015). Nasser F et al conducted a study to check the vitamin B12 levels in type 2 diabetes patients and found that the vitamin B12 levels are lower in patients with type 2 diabetes mellitus on metformin (Nasser and Islam, 2018). Another similar study was conducted by Pflipsen MC where they obtained the similar results (Pflipsenet *al.*, 2009). Several case reports were also conducted and they found an increased frequency of vitamin B12 deficiency among type 2 diabetes patients (Bell, 2010), (Kumthekar, Gidwani and Kumthekar, 2012).

The main sources of Vitamin B12 are animal foods like meat, fish etc. these foods are usually not consumed by vegetarians. Priti Agarwal et al conducted a study to check the Vitamin B12 levels. They took 4 groups- metformin and non metformin groups, vegetarian and non vegetarian groups. They reported that Vitamin B12 levels are lower in non-metformin groups and vegetarian groups. Thus Vitamin B12 deficiency is common in vegetarians and diabetes patients under metformin (Agarwalet *al.*, 2016).

In the present study most of the participants check their sugar levels once in six months. Diabetic patients should check their glucose level more frequently until the blood glucose level becomes stable (Pickering and Marsden, 2014). Vitamin B12 tablets are taken in order to reduce the side effects caused by metformin during treatment of diabetes but over consumption of B12 tablets can cause side effects like headache, nausea, vomiting, diarrhea (Wolffenbuttelet *al.*, 2019). Even in the present study most of the participants were consuming vitamin B12 tablets and most of them got the side effects of headache, nausea, diarrhea after consumption. This is due to overdose. Hence it has to be taken in a limited dose (Wolffenbuttelet *al.*, 2019).

The present study is a single centered study conducted with a small sample size. The future scope of the present study includes a multi centered study with a large population and creating more awareness on diabetes.

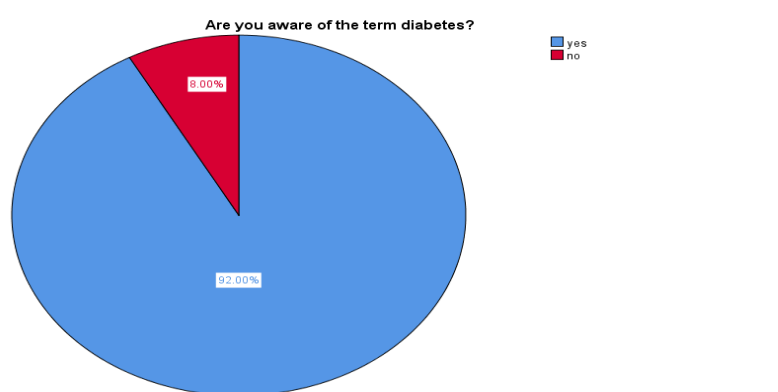


Figure 1: Pie chart representing participants who are aware and not aware of the term diabetes. Blue denotes participants who are aware and red denotes participants who are not aware. 92% participants were aware of the term diabetes whereas 8% participants were not aware of the term diabetes.

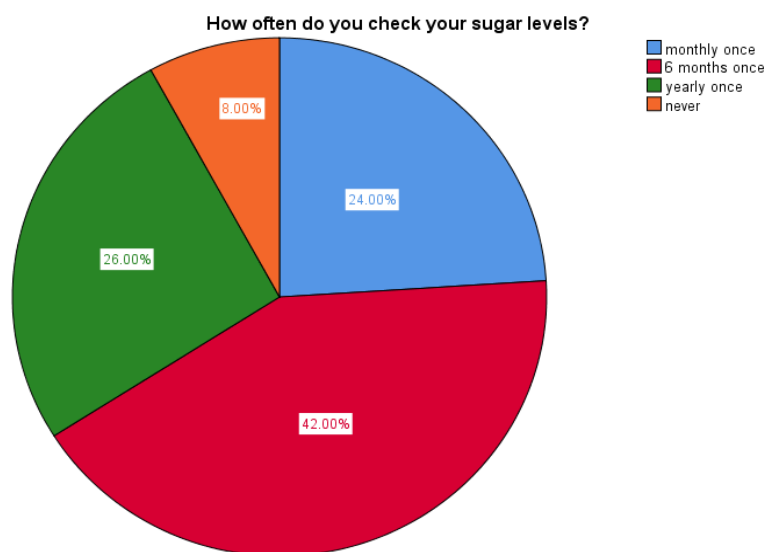


Figure 2: Pie chart representing how often the participants check their sugar levels. Blue denotes participants who check their sugar levels monthly once, red denotes participants who check their

sugar levels 6 months once, green denotes participants who check their sugar levels yearly once and orange denotes participants who do not check their sugar levels. 42% participants check their sugar levels 6 months once, 26% participants check their sugar levels yearly once, 24% participants check their sugar levels monthly once and 8% participants do not check their sugar levels.

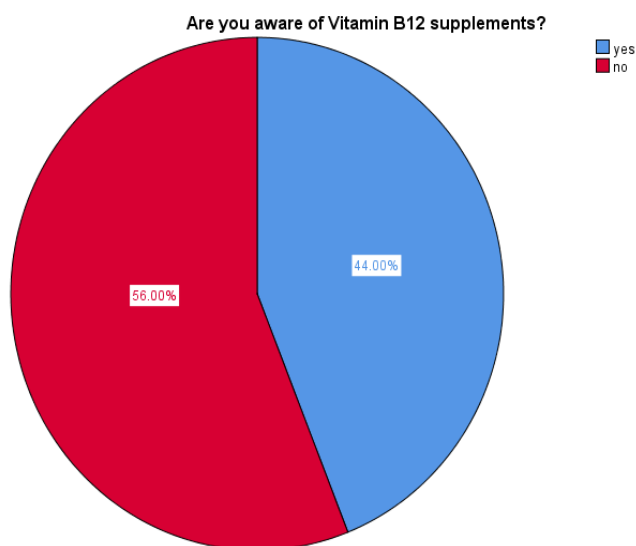


Figure 3: Pie chart representing participants who are aware and not aware of the Vitamin B12 supplements. Blue denotes participants who are aware and red denotes participants who are not aware. 56% participants were not aware of vitamin B12 supplements whereas 44% participants were aware of vitamin B12 supplements.

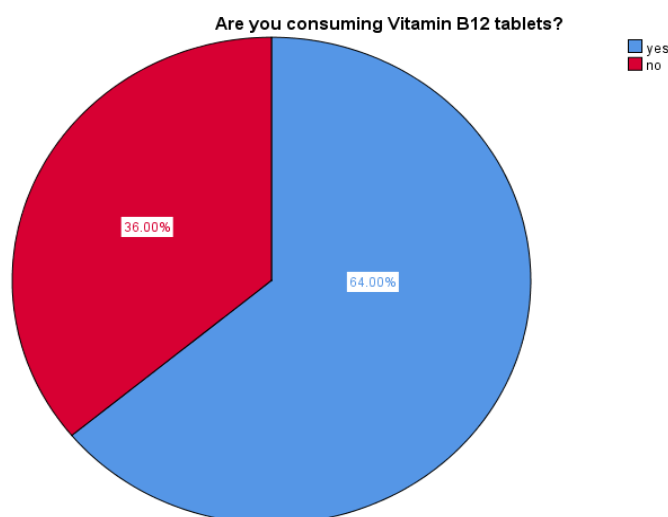


Figure 4: Pie chart representing participants who are taking and not taking vitamin B12 tablets. Blue denotes participants who are taking vitamin B12 tablets and red denotes participants who

are not taking vitamin B12 tablets. 64% participants were taking vitamin B12 tablets whereas 36% participants were not taking vitamin B12 tablets.

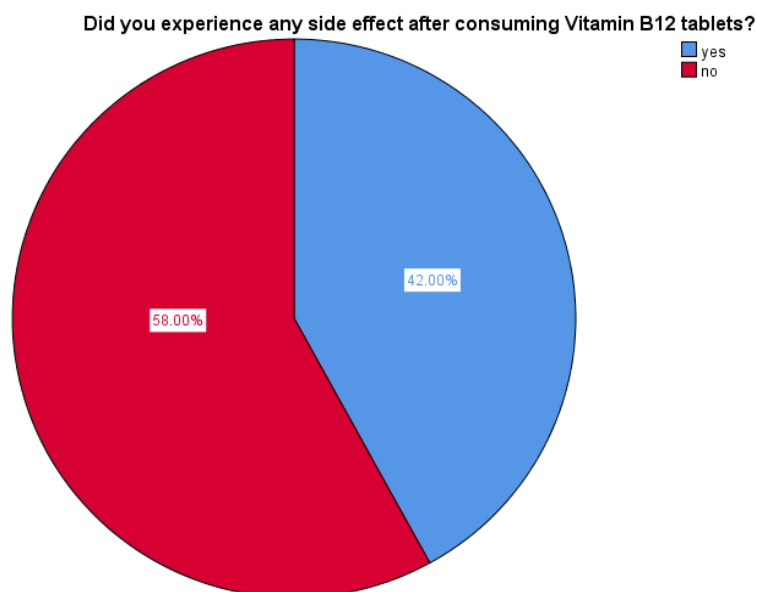


Figure 5: Pie chart representing participants who experienced and not experienced side effects after taking vitamin B12 tablets. Blue denotes participants who experienced side effects after taking vitamin B12 tablets and red denotes participants who did not experience any side effects after taking vitamin B12 tablets. 58% participants did not experience any side effects after taking vitamin B12 tablets whereas 42% participants experienced side effects after taking vitamin B12 tablets.

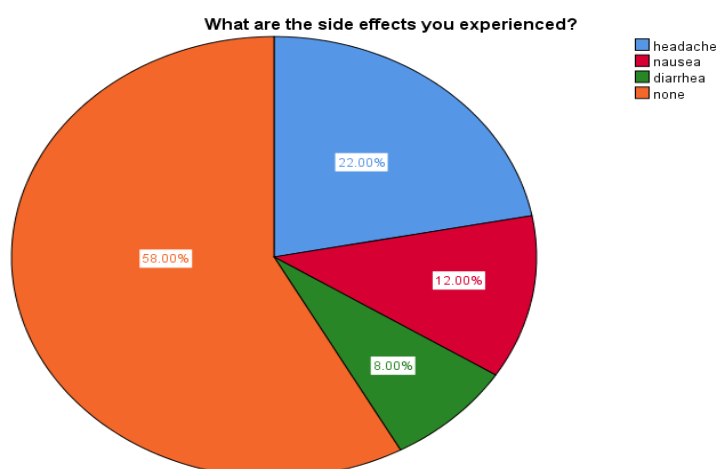


Figure 6: Pie chart representing all the side effects experienced by the participants taking vitamin B12 tablets. Blue denotes participants who experienced headache, red denotes participants who experienced nausea, green denotes participants who experienced diarrhea and orange denotes participants who did not experience any side effects. 22% participants

experienced headache, 12% participants experienced nausea, 8% participants experienced diarrhea and 58% participants did not experience any side effects.

CONCLUSION

Thus in the present study most of the participants were not aware of Vitamin B12 and its supplements. Most of the participants in the present study were consuming B12 tablets, and most of the participants were aware of diabetes and they are checking their sugar levels routinely. Vitamin B12 levels should be routinely diagnosed and Vitamin B12 supplements should be administered routinely to prevent Vitamin B12 deficiency.

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CONFLICT OF INTEREST

The authors declare that there were no conflicts of interest in the present study.

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