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Understanding the Trends and Implications of Vitamin B12 Supplementation in Lahore, Pakistan: An Exploratory Study

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ABSTRACT

Vitamin B12 plays a critical role in building muscle strength, the nervous system and general healthiness. But over the past few years, it has been overused and, in some cases, abused due to self-medication, being prescribed to too many people, and being marketed too aggressively by drug companies. **Objectives:** To explore how both healthcare professionals and patients in Pakistan perceive and use vitamin B12 supplements, with a specific focus on understanding the factors contributing to their overuse and related health concerns. **Methods:** In a qualitative explorative research design, 20 healthcare professionals of 5 different medical disciplines and 17 patients who have taken vitamin B12 supplements within the last year were interviewed in-depth. Key patterns in knowledge, prescribing behaviours, self-medication practices, and awareness of safety were identified by means of thematic analysis. **Results:** Vitamin B12 was deemed safe by both doctors and patients in general. The doctors acknowledged giving prescriptions under patient pressure or being influenced by pharma, whereas the patients mentioned social media, peer recommendation, and availability of supplements as major contributors. There was little information on how much could be taken and of the side effects and risks, and little follow-up was done following its intake. **Conclusions:** The popularity and generally non-regulated spread of vitamin B12 use in Pakistan suggest incomplete awareness, clinical practice and policy. The national guidelines, improved education to prescribers, popularization of mass awareness, and regulation of supplement marketing are urgently needed to make their use responsible and safe.

INTRODUCTION

Vitamin B12 is a highly important water-soluble vitamin also known as cobalamin. It is a vital component in various processes in the body, such as the making of red blood cells, functioning of the nervous system and DNA synthesis [1, 2]. It is structurally the most complicated vitamin and comprises a corrin ring that has cobalt [3]. Lack of vitamin B12 may cause megaloblastic anemia, neurological disabilities, and cognitive disabilities [4, 5]. It is usually regarded as safe, but new studies indicate possible cardiovascular disease risks and some cancers in excess amounts in people not deficient in the substance [6, 7]. Compared to other vitamins, only certain bacteria can produce vitamin B12, including Propionibacterium shermanii and Pseudomonas denitrificans, so they are the main animal products supplying vitamin B12 to humans, i.e., meat, dairy products, fish, and eggs [8]. Hematopoiesis, the integrity of myelin sheath, and replication of DNA, especially in rapidly dividing cells, require it [9, 10]. There is a deficiency in vegans, vegetarians, as well as patients with malabsorption problems such as Celiac disease, Crohn's disease or those who have undergone surgeries of their gastrointestinal tract [11]. Use of long-term medications such as metformin and proton pump inhibitors disrupts the absorption of B 12 as well [12]. Laboratory results showing signs and symptoms of B12 deficiency include fatigue, pallor, paresthesia, balance problems, deteriorated thinking ability, glossitis, irritability, and megaloblastic anemia [13]. Oral (500 to 2000 mcg/day), sublingual and

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intramuscular injection (usually a 1000 mcg dose to treat deficiency) are all common methods of supplementation [14]. Although this substance is soluble in water, when taken in excess by non-deficient people, it has raised some concerns, such as acneiform eruptions, rosacea, and the chance of developing cancer [7]. Excessive use of injectable B12 without any diagnosis is among the issues regarding public health in countries such as Pakistan and India. Among the drivers of supplement use, there are unregulated access to supplements, intense pharmaceutical marketing, insufficient clinic guidelines, and insufficient awareness on the part of patients and medical practitioners [15]. To avoid unreasonable risks to the population and excessive spending, the pathway the efforts is a test of the necessity of filling people with national prescribing protocols and improving the level of education on the population level in terms of public health knowledge.

This study aimsedto explore how both healthcare professionals and patients in Pakistan perceive and use vitamin B12 supplements, with a specific focus on understanding the factors contributing to their overuse and related health concerns.

METHODS

This qualitative exploratory study, grounded in an interpretivist framework, aimed to deeply understand how people in Lahore, both healthcare professionals and patients, perceive and engage with vitamin B12 supplementation. Data were collected from different areas of Lahore. Led by a public health postgraduate student trained in qualitative interviewing, the research sought to capture real-life experiences through face-to-face conversations with 20 doctors from different specialities and 17 patients who had used B12 in the past year. The researcher maintained a reflexive journal to stay aware of personal biases and approached participants through referrals and professional networks, ensuring informed consent and comfort throughout. Interviews, conducted between January and March 2025, were rich and in-depth, allowing participants to share openly. These conversations were transcribed, translated, and analyzed thematically using Braun and Clarke's method, with insights carefully organized to reflect the nuances in both doctor and patient experiences. Data saturation was achieved once no new themes emerged, and ethical principles like confidentiality and anonymity were strictly maintained.

RESULTS

20 doctors from different specialities were recruited for the study, and face-to-face interviews were conducted. By analyzing the interviews of these doctors, the following codes, sub-themes/categories and themes were extracted. Analysis of the sociodemographic data showed that Gynaecologists and orthopedic doctors frequently prescribed vitamin B12 for routine symptoms without lab confirmation, while nephrologists and psychiatrists emphasized follow-up challenges due to complex cases. Younger doctors (under 10 years of experience) appeared more influenced by pharmaceutical marketing, unlike senior clinicians who relied more on clinical judgment. These trends highlight how speciality and experience shape prescribing behaviour (Table 1).

Table 1: Sociodemographic Characteristics of Doctors

Participant	Sector	Specialty	Gender	Experience
D01	Private	Gynecology	Female	10 years
D02	Public	Orthopedics	Male	12 years
D03	Private	Pediatrics	Female	7 years
D04	Private	Psychiatry	Male	8 years
D05	Public	Nephrology	Female	5 years
D06	Private	Gynecology	Female	6 years
D07	Private	Orthopedics	Male	9 years
D08	Public	Pediatrics	Female	11 years
D09	Private	Psychiatry	Male	6 years
D10	Private	Nephrology	Female	13 years
D11	Public	Gynecology	Female	15 years
D12	Private	Orthopedics	Male	10 years
D13	Private	Pediatrics	Female	4 years
D14	Public	Psychiatry	Male	7 years
D15	Private	Nephrology	Female	9 years
D16	Private	Orthopedics	Male	8 years
D17	Private	Physiotherapy	Male	5 years
D18	Public	Urology	Male	12 years
D19	Public	Orthopedics	Male	18 years
D20	Private	Psychiatry	Female	8 years

The following core themes are extracted from codes, and a thick description of these core themes was developed by repeatedly reviewing the interview transcripts. Prescription of Supplements Without any Diagnostic Confirmation was frequently reported by doctors, many of whom admitted to prescribing vitamin B12 regularly based on general symptoms. As one doctor explained, "Patients rarely agree to do the test, and most can't afford it, so we prescribe based on symptoms." (D07). The emphasis was often on symptom relief rather than diagnostic accuracy: "If they feel better after the injection, what's the harm? That's enough for me." (D18). Another major theme was the Influence of Marketing Strategies by Pharmaceutical Companies, with nearly all doctors agreeing that pharmaceutical marketing heavily influences prescribing habits. Medical reps frequently provide free samples and promotional materials that highlight B12's benefits. "The reps frequently visit and give promotional material. It creates an impression that B12 can help everyone, so we tend to use it more often." (D14). Additionally, marketing affects patients directly, with some requesting specific

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brands after exposure to social media or television ads: "Sometimes patients even ask for a specific brand they've heard about. I think the marketing is working on both ends." (D03). The Perception of Vitamin B12 as a Harmless Nutrient further normalized its widespread use, as none of the doctors reported concerns about toxicity or potential side effects. "It's not like a drug; it's just a vitamin. It won't harm them even if they don't need it." (D20). The Lack of Uniform Guidelines also contributed to inconsistent practices, as doctors reported no clear national or institutional protocols. "There's no single protocol for all; each doctor does what they feel is right." (D10). Many doctors acknowledged relying on peer advice instead of structured guidance: "There's no one telling us the exact dosing, so we just go with what we've seen others doing." (D08). Finally, Routine Use in Chronic Conditions was widely reported, with B12 prescribed regularly to patients with diabetes, menstrual irregularities, pregnancy, or neuropathies even in the absence of diagnostic evidence. "In diabetic patients or during pregnancy, I usually include B12 without thinking twice. It's safe and helps with symptoms." (D06). This routine prescribing stems from both clinical experience and the belief in the supplement's broad safety margin, making B12 a common, almost automatic part of chronic care in Pakistan (Figure 1).

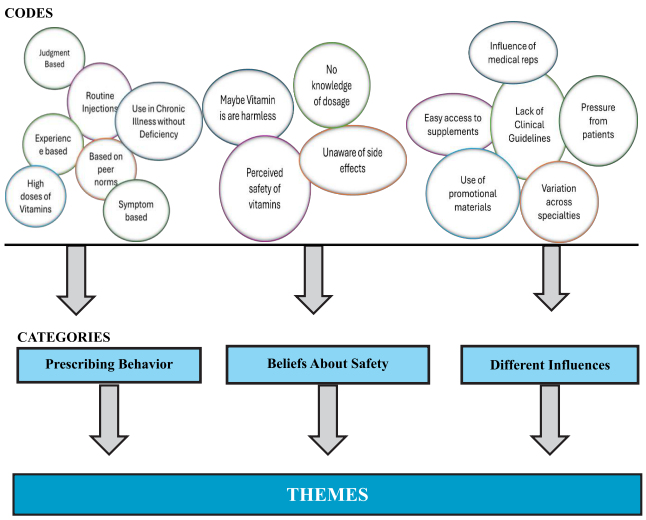

Figure 1: Visual Representation of Coding Tree and Thematic Analysis of Interviews of Doctors

17 patients suffering from different diseases related to gynae, bone-related issues, patients with chronic and acute kidney disease, patients on lifelong dialysis, and those with kidney stones, also patients suffering from any psych disorder like depression, anxiety, or bipolar diseases, overall fatigue and weakness were recruited for the study and were interviewed. A demographic overview of all the patients who participated in the study was presented (Table 2).

Table 2: Sociodemographic Characteristics of Patients (n=17)

Code	Age	Gender	Form of Supplement	Prescribed or Self	Duration	Condition
P01	30	Female	Injection	Prescribed	6 months	Joint Pain
P02	45	Male	Tablet	Self-medicated	1 year	Fatigue
P03	29	Female	Tablet	Self-medicated	3 months	Weakness
P04	50	Female	Injection	Prescribed	8 months	Bone Pain
P05	36	Male	Injection	Prescribed	2 months	Neuropathy
P06	32	Female	Injection	Self-medicated	4 months	Back Pain
P07	27	Male	Tablet	Self-medicated	1 year	Fatigue
P08	40	Female	Injection	Prescribed	6 months	Pernicious anemia
P09	34	Female	Tablet	Self-medicated	5 months	Menstrual Irregularities
P10	41	Male	Injection	Prescribed	3 months	Diabetic Neuropathy
P11	38	Female	Injection	Self-medicated	7 months	Body Weakness
P12	33	Female	Injection	Self-medicated	6 months	Tiredness
P13	48	Male	Tablet	Prescribed	9 months	Gastric Ulcer
P14	35	Female	Tablet & Injection	Self-medicated	1 year	General Weakness
P15	28	Female	Injection	Prescribed	2 months	Joint Aches
P16	43	Male	Injection	Prescribed	4 months	Memory Issues
P17	37	Female	Tablet	Self-medicated	5 months	Fatigue & Mood Swings

These interviews were translated and transcribed. Then a thematic Analysis was performed, and different codes, sub-themes, and themes were extracted from them. Among patients, female participants in their 30s–40s commonly used B12 for fatigue and menstrual issues, often influenced by peer or social media advice. Male patients over 40 preferred injections, perceiving them as more effective. Younger patients (<35) cited platforms like YouTube and Instagram for health guidance, while older patients relied on pharmacy or peer advice. Across all ages, awareness of proper dosing and follow-up was low, highlighting widespread unregulated use. The following core themes are extracted from the codes, and a thick description was developed through repeated review of the interviews. Self-Medication and Peer Advice was a dominant theme, with many patients' using vitamin B12 supplements without consulting a doctor, often based on advice from friends, family, pharmacists, or social media. "I saw a video saying B12 helps with fatigue. I bought it from the pharmacy, no doctor involved." (P15). This trend was especially common among working adults in their 30s and 40s who preferred quick fixes. "My friend was taking B12 injections and felt better, so I started the same." (P03). Over-the-counter availability made this even easier, as patients described vitamin B12 as being as accessible as common painkillers. "B12 ampules and tablets are just kept like Panadol. You say you're feeling low, and they give it."

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(P13). Limited Awareness About Risks and Dosage was widespread; most participants did not understand the potential for overdose or the need for diagnostic testing. "I didn't know you could overdose on vitamins. I thought the more, the better." (P12). Many perceived B12 as a harmless wellness product. Symptom-Driven Consumption was also common, with nonspecific complaints like fatigue and low energy. "I get tired after work, and someone said B12 helps, so I tried it. It made sense to continue." (P05). Trust in Injectables Over Oral Supplements was prominent among users who believed injections were more effective. "Tablets don't work for me... injections give me strength quickly. The doctor also gave them without tests." (P13. Lack of Follow-Up or Monitoring was evident, as most patients reported continuous use without medical evaluations or repeat testing. "I never did any test; I just kept taking it because I felt better. No one told me to stop." (P03). Perception of B12 as an Energy Booster reinforced this unregulated use. Participants described B12 as a remedy for stress and fatigue. "My job is tiring, and someone told me B12 helps with energy. I started taking tablets on my own."(P02).(Figure 2).

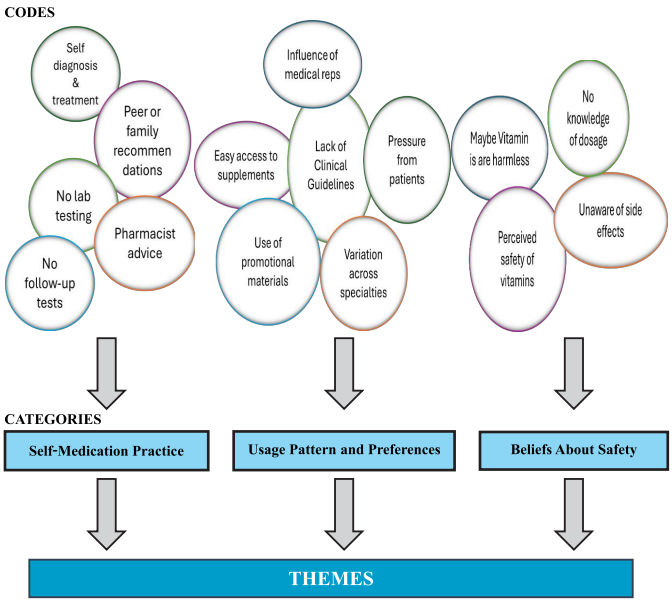

Figure 2: Visual Representation of Coding Tree and Thematic Analysis of Interviews of Doctors

DISCUSSION

This qualitative study provides a nuanced understanding of the perceptions and practices related to the overuse of vitamin B12 supplementation in Lahore, Pakistan. By capturing voices from both healthcare professionals and patients, the study reveals intersecting factors contributing to the widespread, often unmonitored, use of vitamin B12. The findings expose critical gaps in clinical judgment, public awareness, and regulatory oversight, alongside an absence of standardized national guidelines. Physicians across specialties including gynecology, orthopedics, psychiatry, and internal medicine frequently prescribe B12 injections based solely on symptoms such as fatigue, joint pain, numbness, and dizziness, without lab confirmation [16]. This symptom-based approach stems from diagnostic shortcuts and the assumption that B12 is harmless. Many clinicians expressed the belief that B12 poses no risk, reinforcing a culture of routine supplementation without biochemical justification. Another concern is the strong influence of pharmaceutical marketing. Medical representatives provide free samples and persuasive narratives promoting B12 as universally beneficial [17, 18]. These efforts shape prescribing behaviors and blur clinical need with commercial influence. In the absence of standardized protocols, even within the same departments, prescribing patterns rely on personal experience, peer advice, or outdated knowledge, indicating a lack of structured medical education and weak oversight. On the community side, self-medication with B12 is normalized. Many patients use B12 supplements without consultation, relying on peer advice, pharmacists, or social media [19]. Over-the-counter availability in oral and injectable forms worsens this behavior [20]. The findings strongly underscore the need for comprehensive interventions at multiple levels. First, the development and implementation of evidence-based, context-specific national guidelines are essential to standardize the prescription, dosing, and monitoring of vitamin B12 supplementation. These protocols should be disseminated across all levels of healthcare, accompanied by mandatory clinical training to address existing knowledge gaps. Second, regulatory frameworks must be strengthened to monitor pharmaceutical marketing practices, limit unsupervised over-the-counter sales, and ensure ethical standards in supplement promotion. Finally, public health campaigns are needed to improve awareness among patients about the appropriate use of B12, potential risks of overuse, and the importance of medical consultation and testing.

CONCLUSIONS

This study reveals the widespread and unregulated use of vitamin B12 supplements among both healthcare providers and patients in Lahore, shaped by clinical traditions, pharmaceutical marketing, and sociocultural beliefs. Physicians often prescribe B12 based on vague symptoms without diagnostic confirmation, while patients rely on peer influence and media narratives that portray B12 as a harmless health enhancer. These patterns point to critical gaps in clinical training, continuing education, and public health literacy. To ensure safe and rational use of B12 supplements, there is an urgent need for national prescribing guidelines, tighter regulatory oversight, and

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public awareness campaigns rooted in evidence-based practice.

Authors Contribution

Conceptualization: IF
Methodology: IF, JS
Formal analysis: IF, JS
Writing review and editing: IF, JS

All authors have read and agreed to the published version of the manuscript

Conflicts of Interest

The authors declare no conflict of interest.

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