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**Original Research Article**

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## **Prescribing trend of vitamins and other dietary supplements in tertiary health facility in Benin City**

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### **Abstract**

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**Purpose:** Vitamins and other dietary supplements (VDS) are widely used in Nigeria. The purpose of this study was to evaluate the prescribing trends of VDS in tertiary health facility in Benin City, and the relative contribution of the cost of VDS to the prescribed medicines.

**Method:** In a retrospective study, data on medicines prescribed were collected from 2428 patient case files in Paediatric and General Outpatient Departments (GOPD) in Central Hospital, Benin City. WHO prescribing indicators were then applied to evaluate all the prescription records, including the proportion of prescribed medicines that were vitamins, mineral supplements or other dietary supplements (DS). The contributions of VDS to the amount paid by the patient for prescribed medicines were then evaluated.

**Results:** Average number of medicines per encounter in the health facility was  $3.9 \pm 1.17$  ( $4.0 \pm 1.27$  in the GOPD and  $3.8 \pm 1.07$  in the paediatric unit). Generic medicines prescribing was generally low in both

Departments. The proportions of prescription with VDS were 63.8% for adult and 85.9% for children. These contribute 28.3% and 23%, respectively, to the costs of prescribed medicines. Multivitamins were mostly prescribed for children (74.3%) and adult (25%). Proportion of prescriptions containing single vitamins and mineral products were highest for vitamin C for both adult (12.2%) and children (32.1%). Herbal supplements were only prescribed (10.6%) for adult patients. Malaria fever was the most clinical conditions where VDS were prescribed.

**Conclusion:** Majority of patients receiving treatment in the facility are expected to receive prescriptions for VDS. This routine addition of VDS to prescription medicines often significantly increases the cost of prescribed medicines to patients.

**Keywords:** Drug prescribing, Vitamins, dietary supplements, herbal supplement.

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**Indexing:** Index Copernicus, African Index Medicus

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### **Introduction**

Dietary supplement (DS) is a product (other than tobacco) that is intended to supplement the diet that bears or contains one or more of the following dietary ingredients: a vitamin, a mineral, an herb or other botanical, an amino acid, a dietary substance for use by man to supplement the diet by intake, or a concentrate, metabolite, constituent, extract, or combinations of these ingredients<sup>1</sup>. DS have been highly commercialized and widely used by individuals, physicians have been prescribing DS mainly to enhance patient care and to increase revenue. There are less information relating the role of multivitamin in disease prevention to the individual vitamins<sup>2</sup>, however vitamins and other DS

prescribing has become popular<sup>3</sup>. Only few vitamins and mineral/ dietary supplements were available until recently in Bangladesh, majority where of single ingredient preparation and patient have satisfactorily been treated with them<sup>4</sup>. There is increasing market and use DS in United States, with estimated sales of over 21 billion dollar for the year 2006<sup>5,6</sup>. Although the rate of use of DS is increasing, the growth of vitamins and DS market is difficult to relate only on the basis of nutritional status of the people, since there have not been any sudden change in the nutritional status of the patient.

There have been controversial reports about the status of vitamins in clinical medicine<sup>7-12</sup>. However, in cases where patients are deficient of specific vitamins

and minerals, those particular vitamins might be prescribed separately for them<sup>13</sup>. DS prescribing has increased significantly without a laboratory confirmation of specific deficiency of such vitamins and minerals in patients<sup>14</sup>. This act of incessant prescribing of DS by the physician offers little or no benefit to the patients but rather causes excessive intake of prescribed DS which might even become harmful as a result of drug-food or drug-DS interaction thereof<sup>15</sup>. There are often pressures on prescriber from advertisement and literature of the pharmaceutical manufactures to prescribe their drugs rather than depending on specific and evidence base articles<sup>16</sup>. As a result of their large profit margin, the use of OTC medications, including DS may only increase revenue rather than enhance patient care<sup>17</sup>. Many patients on the average without the advice of their physician take at least one DS along with their prescription medication<sup>18,19</sup>. The inappropriate use of medications is a public health problem resulting in an increased likelihood of adverse drug events, drug interactions, and increased costs<sup>20,21,22</sup>.

Due to limited resources in Nigeria, inappropriate and incessant prescribing of DS would rather amount to wastage of money thereby makes the patients unable to afford the core essential and life-saving medicines in the prescriptions. Studies also revealed that majority of patients not prescribed dietary supplements tends to wrongly assume that their suffering from their conditions might be prolonged. Consequently, they often request for dietary supplements from the pharmacies or patent medicine stores on self-medication basis when their prescription is being dispensed.

There is little or no available data in Nigeria on prescribing trends of dietary supplements. This study was therefore design to evaluate the prescribing trend of DS in tertiary health facility in Benin City and their level of contribution to the cost of all prescribed medicines.

The results of this study can be used to design educational intervention programmed for physicians to improve their DS prescribing habit.

## Methods

### Setting

The study was conducted in the General Outpatient Department (GOPD) and Paediatric Out-patient Department (POPD) of the Central Hospital (CH) Benin City. CH is a tertiary health facility which offers comprehensive patient care services for majority of Edo State indigenes and other neighbouring States. The facility has 450-bed with different wards and specialties. Medicines prescribed in this hospital are usually dispensed in the hospital

pharmacy, and in instances where the medicines are not available, patients are advised by the pharmacists to purchase their medicines from community pharmacies.

### Study Design and data collection

Prior to the commencement of this study, appropriate approval was obtained from the hospital authorities. Data on medicines prescribed from July 2011 to June 2012 were collected from the General Outpatient Department (GOPD) and Paediatric Outpatient Unit.

A total of 2428 case files of patients were retrieved from the medical records department through systematic random sampling. This excluded case files of patients with any illegible prescriptions and patients who were critically ill and required to be admitted resulting in the evaluation of 1206 prescriptions from GOPD and 1222 from POPD. The data on medicines prescribed in each of the prescriptions were recorded using World Health Organization's (WHO) recommended standard drug use indicators format<sup>23</sup>. Other information collected in a predesigned data collection format included the (patients' socio-demographic characteristics, disease conditions treated, the DS and all other medicines prescribed. The average cost of each DS and each other medications in each prescription in at least three pharmacies was then sought and recorded against each medication.

### Outcome measures

The primary outcomes of this study were the proportions of VDS in the prescribed medicines and the percentage contribution of VDS to the total cost of the medicines prescribed. These included the proportion of prescriptions containing single vitamins and mineral supplements, proportion of prescriptions containing multivitamins and proportion of prescription containing herbal supplements. The secondary outcomes were the average numbers of medicines per encounter, average numbers of VDS per encounter, percentage of VDS prescribed by generic name, and the percentage of medicines prescribed from essential medicines list or formulary.

### Data Analysis

Data collected were entered into a computer spread sheet, Microsoft Excel, and double checked. Statistical analysis was done using Statistical Package for Social Science (SPSS) version 20. Other than the cost of medicines, the indicator outcomes were determined as previously reported<sup>23</sup>. Descriptive statistics were used in the presentation of results. Data comparison was done using the Student's t test. At 95% confidence interval, 2-tailed p values less than 0.05 were considered significant.

## Results

A total of 2428 patient case files were successfully evaluated, out of which 1206 and 1222 patient medical records were assessed in GOPD and POPD respectively. The demographic characteristics of patients who visited the hospital are as shown in Table 1. Majority of the patients from GOPD (65.6%) were females while 53.1% of those from POPD were males. The highest proportions (28%) of the patients at the GOPD were 30-44 years, while the lower proportions were in the age range of 16-20 years. About half (46%) of the children were in the age range of 1-5 years, while the least proportions (8.8%) were between the age range of 11-14 years.

Prescribing indicators in the two departments are shown in Table 2. The total numbers of medicines prescribed at GOPD and POPD were 4831 and 4589 respectively. Average number of prescribed medicines was  $3.9 \pm 1.17$ , while the average number of DS per encounter was  $0.97 \pm 0.69$ . The proportion of DS prescribing was highly significant ( $p < 0.05$ ) in both GOPD and POPD but generic medicines prescribing was generally low in both units ( $p > 0.05$ ). The prescribing rates of vitamins and DS among different patient sub groups are shown in Table 3. Multivitamins were mostly prescribed for adult (25%) and children (74.3%) respectively. Proportion of prescription containing single vitamins/mineral

products was higher for vitamin C (12.2% and 32.1%) for both adult and children. The least single vitamins/minerals and DS was Vitamin A 0.2% in the children population, while folate was least prescribed 1.2% for adult. Herbal supplement was only prescribed (10.6%) for adult patients.

**Table 1:** Age and gender distribution of patients

Variables	COPD N(%)	POPD N(%)
Male	415 (34.4)	649 (53.1)
Female	791 (65.6)	573 (46.9)
Age (years)		
< 1		382 (31.3)
1-5		562 (46.0)
6-10		170 (13.9)
11-15		108 (8.8)
16-20	84 (7.0)	
21-29	273 (22.6)	
30-44	338 (28.0)	
45-54	238 (19.7)	
55-64	143 (11.9)	
$\geq 65$	130 (10.8)	
Total	1206 (100%)	1222 (100%)

**Table 2:** Prescribing indicators at GOPD and POPD

Prescribing Indicator	Value Obtained		Average	Ref value [24]	p value
	GOPD	POPD			
Total number of drugs prescribed	4831	4589			
Average number of drugs encounter	$4.0 \pm 1.27$ (rang1-9)	$3.76 \pm 1.07$ (range1-8)	$3.9 \pm 1.17$	1.6-1.8	<0.0001
Average number of DS encounter	$0.81 \pm 0.73$	$1.12 \pm 0.64$	$0.97 \pm 0.69$		<0.0001
Percentage encounter with DS	63.80%	85.90%	74.85		<0.0001
Percentage encounter with antibiotics	42.80%	89.40%	66.1	20-26.8%	<0.0001
Percentage of DS prescribed by generic name	13.10%	15.50%	14.3	100%	0.234
Percentage of drugs prescribed in EDL	84.10%	99.10%	91.6	100%	<0.0001
Total cost of drugs prescribed	₦ 2,243,679.90 (US\$13,626.97)	₦ 2,186,008.00 (US\$13,276.700)		0.006	0.006
Cost of DS prescribed	₦ 692,880.00 (US\$4,208.20)	₦ 571,320.00 (US\$3,469.91)			
Average percentage cost of DS per encounter	30.88%	26.14%			<0.0001

DS = dietary supplements (vitamins, multivitamins, mineral supplements and herbal supplements), GOPD= General Outpatients Department, POPD = Paediatrics Outpatients Department, ₦ = Nigerian naira, US\$1.0 = ₦164.65, p value significant at  $p < 0.05$  (pair sample t test)

**Table 3:** Vitamins and other dietary supplements prescribed

Supplements	COPD N (%)	POPD N (%)
Multivitamins	301 (25)	908 (74.3)
Vitamin C	147 (12.2)	392 (32.1)
Vitamin B	101 (8.4)	29 (2.4)
Vitamin E	-	-
Vitamin A	-	3 (0.2)
Folate	21 (1.7)	-
Iron	80 (6.6)	40 (3.3)
Calcium	99 (8.2)	-
Fish Oil	55 (4.6)	-
Glucosamine/Chondroitin	50 (4.1)	-
Herbal medicine	128 (10.6)	-

**Table 4:** Clinical conditions for which dietary supplements were prescribed

Clinical conditions	COPD N(%)	POPD N(%)
Malaria	315 (26.1)	473 (38.7)
Hypertension	174 (14.4)	-
RTI	68 (5.6)	264 (21.6)
Peptic Ulcer Disease	89 (7.4)	15 (1.2)
Diarrhoea	-	112 (9.2)
Arthritis	86 (7.1)	-
Diabetes	47 (3.9)	-
UTI	55 (4.6)	50 (4.1)
RTA/Injury	74 (6.1)	19 (1.6)
Otitis media	8 (0.8)	39 (3.2)
Candidiasis	32 (2.7)	-
PID	51 (4.2)	-
Pain	45 (3.7)	-
Allergy	22 (1.8)	52 (4.3)
Premenstrual syndrome	14 (1.2)	-
Conjunctivitis	-	47 (3.8)
Immune suppression	-	8 (0.7)
Bronchi pneumonia	-	65 (5.3)
Dysentery	-	32 (2.6)
Jaundice	-	6 (0.5)
Others	126 (10.5)	40 (3.3)
TOTAL	1206	1222

Table 4 shows the patterns of medical conditions occurring among patients in the studied unit. Malaria fever occurred most frequently for both adult (26.1%) and children (38.7%) population, followed by hypertension (14.4%) and peptic ulcer disease (7.4%) for adult and respiratory tract infections (21.6%) and diarrhoea (9.2%) for children respectively. Jaundice

(0.5%) and immunosuppression (0.7%) were the least clinical conditions where vitamins and other DS were prescribed.

## Discussion

This study revealed that the rate of dietary supplements prescribing was high for both adult and children population. For the average of 3.9 medicines per encounter in all prescriptions, DS encountered was 0.97. Not less than 63% of the prescriptions had DS prescribed and multivitamins were prescribed for 74.3% of the children and 25% of adults while herbal supplements were prescribed for 10.6% of the adult patients but none for children. While malaria accounted for the most clinical conditions where vitamins and other DS were prescribed, the average percentage contribution of DS to the cost of medicines prescribed per encounter was 28.9% for adults and 23.1% for children.

The rate of DS prescribing in this study is much higher than the results obtained in previous study carried out in Dhaka.<sup>24</sup> In an earlier report in Nigeria, 69% of the prescriptions in Lagos contained vitamins/minerals<sup>25</sup>. In other developing countries, consultants prescribed vitamins/minerals to 50% of their patients<sup>26</sup>. Study have also showed that 43% of patients seeking care takes one form of DS or the other with prescription medication and had the potential for significant drug-dietary supplement interactions<sup>27</sup>. In many countries, the need for nutritional supplements is compelling as many people do not have enough of the supplements in their diet. While many dietary supplements are known to have health benefits, some may interact with medications or pose other risk and most have not been tested<sup>28</sup>. Some dietary vitamins have been associated with increase in risk to developing cancer<sup>29-31</sup>. The co-administration of Artemisinin in various forms with vitamin C and multivitamins - especially those preparations containing trace elements and minerals with antioxidant properties "reduces the efficacy of the artemisinin-based antimalarial drug therapy"<sup>32</sup>. Moreover, many dietary supplements are not licensed, and manufacturers are often not required to demonstrate their efficacy, safety, or quality in most countries before they are made available in the market<sup>33</sup>. Instances where written sales materials for herbal dietary supplements were sold through online retailers included illegal claims that the products could treat, prevent, or cure diseases such as diabetes, cancer, or cardiovascular disease were identified in 2010 by United States Government Accountability Office<sup>28</sup>. It thus appear that the prescribers of the dietary supplements in this study may be thinking that patients cannot get all the nutrients they need from food, dietary supplements boost the immune system or help get rid of toxins and patients' health will only be optimal if supplements are taken. These are rather

irrational prescribing habits as the overall cost of the medications to the patients that is vital in adherence to drug therapy is not often considered<sup>34</sup>. Moreover, the average number of medicines per prescription (3.9) was much higher than the reference standard in World Health Organisation document<sup>23</sup> and that reported for South Africa (2.6)<sup>35</sup> and Bangladesh (1.44)<sup>36</sup> indicating a high level of unnecessary poly-pharmacy. The implication is that the patient may have more to risks of adverse drug reactions/interactions and medicines than s/he can cope with in terms of cost and adherence. As the resources of many patients in Nigeria available to purchase medicines are limited, channelling of their resources on DS which would make them unable to purchase the core, essential and life-saving medicines may result to prolong illness because of poor adherence to medication. On many occasions, the dietary supplements prescribed were more expensive than the core medication prescribed in the course of treating patient ailment.

While the results of our study will provide a useful guide for further national survey of DS usage, the overall application of our results may be limited by the fact that the study was limited to a single tertiary health care facility. The use of DS may be far more extensive than reported here because many people in Nigeria often regularly request for DS from pharmacies and patent medicine stores when they are sick and use them along with the medicines prescribed by physicians.

## Conclusion

Most prescription in the facility studied contain at least a dietary supplement which contribute to higher number of medicines per patients encounter and significantly higher cost of drug therapy if the supplements were not prescribed. While the supplements may be useful to some of the patients, they often will be simply contributing to extra cost of treatment and possible adverse effects and drug interaction. This calls for national policy on use of supplements as well as better education of prescribers on rational prescribing.

## Declarations

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### Conflict of Interest

No conflict of interest associated with this work.

## Contribution of Authors

The authors declare that this work was done by the authors named in this article and all liabilities pertaining to claims relating to the content of this article will be borne by them.

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