



Evaluation of vitamin and mineral tablets and capsules in Yemen market

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ABSTRACT

Vitamin and mineral tablets or capsules are the most common supplement provide without prescriptions. The goal of this study was to review label information and investigate the disintegration properties of tablets and capsules commercially available at Yemen market. The labels were examined for product-related information. The first disintegration test stage was performed using Simulated Intestinal Fluid pH 6.8 for 20 minutes. Products did not disintegrate were further investigated using pharmacopeia disintegration conditions for dietary supplements. The results show that provided label information in tested supplements was difficult to understand and in some cases pseudo-scientific. Drug Identification Number was found in nine out of eleven tablets and twenty seven out fifty capsules only. Four out of eleven tablets and eighteen out of fifty capsules did not disintegrate within 20 minutes. By using pharmacopeal disintegration conditions for dietary supplements, three out of four tablet brands did not fully disintegrate and eight out of nineteen capsules brands passed the test. Industries should give an exact label recommendations and essential information to allow the consumers to make an informed decision on their products rather than using pseudo-scientific terms. Type packaging, storage and number of ingredients my effect disintegration. So continuous inspection are recommended.

Keywords: vitamin, mineral, tablets, capsules, disintegration and markets.

INTRODUCTION

Some research suggests that some vitamin supplements may increase mortality and may consider as a category of food [1]. Vitamin and mineral complexes contain microelements (calcium, magnesium, phosphorus) and microelements (iron, copper, iodine, selenium, chromium, zinc and manganese). Their interactions are not as easy as it seems: some compete others during absorption, some produce antagonistic effect on the level of [2,3].

Absorption of minerals, vitamins, drugs or food is a complex process. It can be generalized as passive absorption via a par cellular pathway, facilitated transport through membranes via transporters and active energy consuming transport mechanisms [4,5]. In the case of facilitated and active transport, the uptake mechanism can be specific to individual substances or to substance classes e.g. ions, amino acids, peptides or carbohydrates [6,7]. Absorption of calcium for example depends on the location within the gut [8]. In the duodenum it happens via an active transport mechanism, while in the jejunum and ileum calcium is absorbed via passive diffusion. The extension of the active calcium uptake is greater as compared with the passive diffusion. In the duodenum, calcium enters the cytoplasm of enterocytes through a calcium channel ECa2 [9].

In the cytoplasm, a carrier protein called "calbindin" transports calcium to the basolateral membrane where it is pumped out of the cell via a calcium-ATPase and becomes systemically available. The availability of calbindin depends directly on vitamin D. Another example for partially localized mineral uptake is iron. Efficient absorption of inorganic iron requires an acidic environment due to the pH dependent solubility of iron [10]. Drugs, such as antacids, proton inhibitors or excipients, which interfere or neutralize gastric acid secretions, may therefore, interfere with iron absorption. An acetic pH condition is only in the stomach and in the beginning of the duodenum before bile and pancreatic secretions neutralize gastric fluids [11].

Alternatively, organic bound iron is absorbed by endocytosis of hemoglobin or myoglobin by the enterocytes. This process is not limited to acetic environments and can take place throughout the gut. However, available supplements contain inorganic iron. An example of a specialized absorption of vitamins is cobalamin (Vitamin B12). The absorption depends on the availability of an intrinsic factor secreted by the stomach [12]. Both molecules bind to each other to form a complex that can bind to specific receptors in the brush border of the intestine and are absorbed [11]. The given examples clearly show that the absorption of minerals and vitamins is a complex process which involves in some cases specific transporters. Furthermore, for certain minerals or vitamins the absorption via active transport might be limited to absorption windows, favourable pH values, the presence of transporters or may depend on the availability of co- or intrinsic factors. Active ingredients can only be absorbed if they are released into solution from the dosage form. Disintegration is the first step in this process for immediate release dosage forms. The importance of tablet disintegration has been recognized as a first step towards achieving rapid bioavailability of the active ingredients [13].

As the solubility of the drug decreases, rapid disintegration becomes increasingly important for compressed tablets [14]. The formulation of the product can have a significant effect on the rate of disintegration and dissolution and may be influenced by the physicochemical properties of the active ingredients and excipients as well as the manufacturing process [14].

The goal of this study was to review label information and investigate the disintegration properties of tablets and capsules commercially available at Yemeni market which is the most basic quality control parameters for absorption.

EXPERIMENTAL SECTION

2.1. Materials

Sodium hydroxide ; BDH supplies-Poole-England; Potassium phosphate monobasic and Sodium acetate anhydrous; Sigma chemical Co.USA. Disintegration apparatus; ERWEKA –GMBH ; Hensenstam ;Germany and PH - measurement, Hana , Italy. Mineral with Vitamin Capsules and Mineral with Vitamin Tablets are illustrated in tables 1 and 2 respectively.

2.2. Equipments and Methodology

The disintegration was determined using a disintegration tester ERWEKA –GMBH ; Hensenstam ;Germany which complies with USP <701> standards[15]. The test units were inserted into the observation cylinder and the basket assembly was attached to the test apparatus. The appropriate immersion medium was filled into each beaker, and the test was started immediately after the basket assembly was attached.

The stage 1 performed using Simulated Intestinal Fluid (SIF) USP 28 pH 6.8 without enzymes and a test time of 20 minutes was applied. Products which did not disintegrate were further investigated using the conditions outlined in chapter <2040> [15] as stage 2.

The stage 2, using the conditions outlined in chapter <2040> (14) for tablets, water was used as an immersion fluid, and the test duration was 30 minutes. If capsules were investigated, 0.05 M acetate buffer pH 4.5 was used as immersion fluid, and the test duration was 45 minutes. products which not disintegrate in this stage we using stage 3 .

The stage 3, using the condition of stage1. (Simulated Intestinal Fluid pH 6.8 without enzymes) but for 90 minute. Disks were used in all stages.

The acceptance criteria for a successful test are the same for pharmaceutical and nutraceutical preparations. If all six units disintegrate, the test is passed. If one or two units do not fully disintegrate, then twelve additional units are tested. Only two units out of the total of eighteen tested units are allowed to fail complete disintegration.

RESULTS AND DISCUSSION

As illustrated in Tables 1 and 2 the results show that; According to the Drug Identification Number (DIN), which indicates that the product is registered by Ministry of General Health and populations – Yemen, which means the product, must meet quality and safety requirements set by the regulatory agency. The examination of the product labels showed that in Table 1, one out of eleven tablets brands investigated had a (DIN). Also nineteen out of forty eight capsules brands investigated had DIN numbers as shown in Table 2. According to the outer package products investigated; *Pregnahealth* package (Biopharm -Yemen) is similar to *Pregnacare* package (Vitabiotic - U.K). Also *Muvit gold* (Shephaco –Yemen) is similar to those of *Dynamisan* (Novartis – Switzerland). According to the

information on the outer package; some package described the amounts of vitamins and minerals constituents. For recommended daily allowance RDA only given by two products {*ex. Pregnacare , Juvamine* }. One of the products noted to be manufacture according to the Korean Good Manufacturing Practice (GMP). The information “once a day” or “only one” was not considered as a sufficient statement and such statements were considered to reflect the appropriate daily dose and not any formulation aspects of the product.

Some companies used terms of more general and informative character to describe their product such as terms like; New Formula, 24 Vitamins and Minerals, No artificial flavor's - no gluten - no lactose - no soy - without beta-carotene, Unique formulation, High potency multivitamins & multi-minerals formula from A to Z, Advanced formula, For all day energy, Complete dietary supplement, Complete Tonic Supplement, Bio-active integrated nutritional supplement, Energizer & Biotonic food supplement, Restorative for mental & physical activities, The right amount - High potency multivitamins & multi-minerals formula & the platinum formula, A balanced tonic to revitalize physical and mental vitality in young to advancing age people, Comprehensive formulation. Protect & improve biological functions and activities. Also a similarly unclear term was used “The platinum formula and Formula ultra – complete.”

According to the internal label information's. All product supply with short label information's such as therapeutic effect, precautions, interactions, side effect, overdose etc) and only *Vitamin - Z* (Cipla – india) described the therapeutic effect of each vitamins and minerals.

Appearance disintegrated medium during work, some products give viscous matrix such as (Vitona plus, vitamount) and only Pregnavit by (Shephaco -Yemen) produce persistent foam in both mediums. According to the Cost; the cost varies between 480 – 2500 YR for tables and 200 -2500 YR for capsules. The disintegration study was performed in three stages.

In stage one; we investigated the disintegration of the tablet and capsules products at pH 6.8 in simulated intestinal fluid (SIF) without enzyme for 20 minutes. The test was performed without the use of the disks, in which twenty three out of fifty nine brands tablets and capsules failed in disintegration time test. Five out of eleven tablets and eighteen out of forty eight capsules brands did not pass the first stage. **In stage two;** the test conditions applied was according to the USP chapter <2040> for minerals were the use of a disk in the observation cylinder is allowed. Only products failed to pass stage one test where investigated and the results show that eleven tablets and capsules brands out of the twenty three tested products did not disintegrate. Means three out of five tablets and eight out of eighteen capsules did not pass. **In stage three;** the same conditions in stage I was used but for 90 minutes and the results show that only seven out of eleven tested products don't disintegrate, in which two out of three tablets and five out of the eight capsule brands didn't pass. All investigated products were combination products containing a variety of different ingredients. Only in very few cases the combination/formula could be traced to dietary schedule: In many cases it was rather difficult to identify or to differentiate the product name from the brand name. Additional disturbing factors were highlighted, “The paltemnium Formula”, “The Right amount”. Such information has more advertisement character and should be avoided on the front of the label. In many cases the font sizes of some labels were rather small due to the limited space and of the long ingredient lists and other additional information given. However, plenty of self advertisement and pseudo-standards were found on the product, However, Korean GMP manufacturing does not guarantee drug release or disintegration; it guarantees proper process validation and documentation. Industry should follow already existing label requirements to help consumers to have all required information easily readable on the label. Only this will ensure that consumers can make informed choices. The USP 28 lists standard test methods for the quality of oral dosage forms [15].

Drug release or dissolution requirements are core tests for the *in vitro* evaluation of pharmaceutical products. There are no dissolution requirements specified for most minerals and vitamins. Therefore, disintegration was adapted as an easy and cheap test to have at least one quality control parameter for the dosage form. The chapters <701> [15] and <2040> [15] describe the disintegration of tablets and capsules for pharmaceuticals and dietary supplements respectively. The test apparatus is the same. However, different conditions are applied.

Test duration and the use of disks in the observation cylinder had an important impact on the ability of products to pass the disintegration test. However, if a vitamin or mineral is poorly soluble or its dissolution is slow, then dissolution and not disintegration is the most critical parameter. Yet, it has to be pointed out that a product which fails disintegration will presumably fail dissolution criteria. Furthermore, if a mineral has to be absorbed within an absorption window and the dosage form does not release its content in a timely manner, then the therapy might be compromised or fail.

An extended release dosage form on the other hand only releases parts of its total content at the absorption window like the duodenum and releases most of its dose in the jejunum, ileum and colon. This might cause a therapeutic failure due to insufficient absorption of some minerals or vitamins in deeper segments of the gut. Consequently, extended release dosage forms must show scientific evidence that the intended mineral or vitamin doses can be absorbed throughout the gastrointestinal passage.

A recent study by Kamba *et al.* investigated the mechanical forces applied in the disintegration apparatus [16]. A tablet by itself hits the screen of the basket-assembly with a force of 0.19 N. The disk forces on the basket were reported as 0.31 N. This shows that a tablet might undergo two defined impulsive forces in the basket assembly: one when the disk hits and one when it hits the basket screen while the basket-rack assembly is moving up and down. Such forces might apply to the dosage form for each movement cycle of the basket assembly.

Motility forces in the human intestine were reported [17]. Recent studies by [18] have shown that gender and menstrual cycles have an influence on motility pattern. Furthermore there are several diseases which impact motility like Parkinson's disease, diabetes mellitus and thyroid diseases [19]. Therefore, many patients which have such diseases and take mineral supplements might have compromised motility. This might influence the disintegration of the administered dosage form. However, the results show that there are products on the market which do not meet basic quality control measurements. Such products, and those needing higher mechanical forces to disintegrate (stage two in the present study), might therapeutically fail in patients due to insufficient motility forces, ultimately this applies to capsules and tablets. Only recognized test methods should be allowed to be used on the label.

Health professionals, the industry and the consumer need to know how to identify a qualitatively acceptable product from a product with unknown quality. Meaningful disintegration standards accompanied with dissolution criteria are needed. Only this will ensure therapeutically efficacious dosage forms.

Table 1: Evaluation of information and disintegration of Vitamin and Mineral Capsules present in Yemen markets

Brand/product manufacturer	Front label information	DIN	Lot #	Stage 1	Stage 2	Stage 3	Directions	Other label information	Cost (Y.R)
Multiplus Sona Nutrition – Dublin,Ireland	@Complete multivitamin's &minerals. Has 35 vitamins , minerals , lutein , lycopene , ginseng and omega3	*****	574254	+			One capsule daily within meal of the day or as directed by your health professional	Established EU recommended daily allowance in some component	1300
Neovita Savoy laboratories (international) ltd.London W1M9LA , Engeland	@Dietary supplement with ginseng for health & vitality. @This unique formulation has 10 vitamins , 6 minerals , iron & ginseng.	*****	BW8 235043	+			Adult should take one capsule daily , preferably during meals .		1080
Omega - H3 Vitabiotics LTD. 1 Apsley Way , London NW2 7HF , ENGLAND	Bio-tonic capsuls for health and vitality. Complex composition of 27 of the vital biological active elements concentrated in each Omega - H3 Capsule	*****	7201347	+			One capsule to be taken daily with breakfast or with 1 st meal of the day . If necessary the capsules may be taken twice a day for the 1 st few weeks	Component is established P.A.B , U.S.P , I.N.N , B.P , F.P or U.S.N.F	1300
Royal vit G SEDICO pharmaceutical Co. 6 October city – Egypt	@Restorative for mental & physical activities . @Each capsule	4758	0907606	+			One capsule daily or as prescribed by	Ginseng picture	600

	contain vitamins , mineral, royal jelly lyophilized , ginseng and traces of elements and amino acids .						physician.		
Vitona plus Egyptian International Pharamaceutical Industries Co. A.R.E (EIPICO	@Energizer & Biotonic food supplement. @With royal jelly, ginseng and zinc	0010328	071780	+			One capsule daily (after breakfast) or as prescribed by physician.		800
Vitamount (for women) Amoun Pharmaceutical Co. S.A.E. , El -Obour city , Cairo , Egypt .	@The right amount @ High potency multivitamins & multiminerals formula. @The platinum formula.	461	591	-	-	-	One capsule daily preferably after breakfast .	@Smile women's picture	1000
Vitamount (for men) Amoun Pharmaceutical Co. S.A.E. , El -Obour city , Cairo , Egypt	@The right amount @ High potency multivitamins & multiminerals formula. @The platinum formula.	471	4849	-	-	-	One capsule daily preferably after breakfast		1000
Vitamax Glaxo Wellcome Egypt S.A.E. , El-Salam city , Cairo , S.A.E.	@Energizer & Biotonic. @Each soft – gelatin capsule contain royal jelly , ginseng , 13 vitamins , 8 bio-elements , 11 minerals and trace elements .	*****	064486A	-	-	+ 55 min	Unless otherwise prescribed by the physician , the usual dose is one capsule daily or every other day after breakfast .		650
Vitamax plus Glaxo Wellcome Egypt S.A.E. , El-Salam city , Cairo , S.A.E.	@With antioxidant. @Each soft – gelatin capsule contain 35 ingredients : royal jelly , ginseng , 12 vitamins , 6 bio-elements , 15 minerals and trace elements	***** *	064445B	-	-	+ 45 min	Unless otherwise prescribed by the physician , the usual dose is one capsule daily or every other day after breakfast .		750
Nutria-plus PHARMACARE INT. MFG.CO. YEMEN ,R.O.Y.	@Vitamins + minerals including iron with ginseng .	*****	511334	+			One capsule daily or as prescribed by physician.	@Hard capsule	600
Supradyn Bayer consumer care ltd., basel,switzland by RP scherer GmbH & Co KG, Eberbach , Germany	@High potency multivitamins prepration with minerals and trace elements. @Each capsule Contain 12 vitamins, 8 minerals and trace of elements.	*****	F0 134	+			Adult should take one capsule daily , preferably during meals.	@With some detail such as adverse effect , precaution	2400
Muvit Shaphaco Pharmaceutical Ind., Attan ,Sana'a-Yemen.	@Multivitamins Food supplement for all day energy . @Each cap.	*****	2686	+			One capsule daily or as prescribed by	@Hard capsule	400

	contain 12 vitamins						physician.		
Vitop Misr co. for pharm. indmataria – Cairo . Egypt	@Multivitamins and minerals	3472	154096	-	+		One capsule or more daily		550
Ginseng ton Huons co.,Ltd. Korea	@Korea ginseng root multivitamin mineral.	9855	7001	-	+		The usual adult dosage is One capsule daily	@The drug is manufacture d in accordance with Korea (KGMP) as recommende d by WHO. @Ginseng picture	1050
Ginsavit Gulf pharmaceutical industries (Julphar), UAE	@Ginseng extract , Multivitamin and minerals @ A balanced tonic to revitalize physical and mental vitality in young to advancing age people.	*****	281	+			One capsule daily or as prescribed by physician.	@Beef picture on the packet .	600
Plus Mega lifesciences Ltd.,Thailand	@Multivitamin and minerals .	*****	709124	+			One capsule daily or as prescribed by physician.	@Each componene is established by USP , BP or Ph.Eur.	1100
Homtamine ginseng extract Korea united pharm.inc. , Korea	@Korea ginseng root multivitamin minerals.	*****	E1153703	+			One capsule daily or as prescribed by physician.	@Ginseng picture	1100
Juvamine (anti-age) Lab. Juva sante , Paris – France	@Vitamine A,C,E , selenium ,zinc,beta-carotene	*****	A042	+			One daily capsule to take with a large glass of water.	@Smile woman picture @Hard capsule	1400
Supertin PT prafa , indonesia	@Multinutrients ,ginseng, royal jelly , multivitamins , minerals and trace of elements	*****	TQ 0139	-	+		One capsule daily or as prescribed by physician.		800
Geracid Chemical industries development (CID) co. – Egypt	@ Vitamins & minerals	6515	101	+			1 or 2 capsule three times daily or as prescribed by physician. In case of pregnant the daily dose not exceed 2 capsules	@Hard capsule	200
Glovit Global pharma , UAE	@Multivitamins + minerals @BIOTONIC High potency vitamins & minerals with amino acid @ Safe product in recommended doses	*****	GG138	+			1 capsule daily with a meals or as prescribed by physician		1200
Glovit – A,C&E Global pharma ,	@Essential antioxidant	*****	AG-12	+			1 capsule daily with a		900

UAE	vitamins for better cellular vitality. @ has colorant additives						meals or as prescribed by physician		
Muvit antioxidant Shaphaco – Yemen	@Multivitamins + minerals complete dietary supplement for better cellular vitality	*****	MA01	-	-	-	1 capsule daily with fruit juice or water as food supplement	@Don't give to children's .	1200
Muvit - gold Shaphaco - Yemen	@complete dietary supplement for all day energy @Vitamins , minerals , amino acids and ginseng (high potency) @Foe stimulating physical and mental functions	*****	2027	+			1 capsule daily with a meals or as prescribed by physician mar recommended 2 or more capsule daily .	@Like dynamesan packet shape.	840
Pregnahealth Biopharm ind. Yemen	@One-a-day @With folic acid 400 ug @Comprehensive formulation of vitamins & minerals including folic acid , Vit B12, iron , Vit B6 , calcium & Vit D @During pregnancy and lactation	*****	067250	+			1 capsule daily with or immediately after your main meal. Swallow with a full glass of water or a cold drink TAKE ON FULL STOMACH	@No gluten ,no sugar .no starch .no salt or yeast , not tested on animals @Suitable for vegetarian @ with %RDA @ Like pregnacare packet shape .	720
Pregnasafe Modern pharma - Yemen	@One-a-day @vitamins & minerals for mother & fetus ISO 9001-2000 @During pregnancy and lactation	10153/2003	07326	+			1 capsule daily Swallowed as a whole with sufficient fluid preferably during or after meals for female and male or as prescribed by physician , take on full stomach		720
Juvamine anti stress sommeil(relaxation) Lab.Juva sante, Paris-France	Magnesium & 8 vitamins Functions nerveuses	*****	D071	+			One daily capsule to take with a large glass of water.		1350
Pregnacare Vitabiotic –UK	@A careful balance of 16 (vitamins & minerals) including folic acid For bevore conception through all of pregnancy and breast feeding @one-a-day @with folic acid	*****	PW746P	+			1 capsule daily with or immediately after your main meal. Swallow with a full glass of water or a cold drink TAKE ON	@No gluten ,no sugar .no starch or far , no salt or yeast , no artificial colors no preservatives ,not tested on animals @%RDA @ hard	1050

	400ug						FULL STOMAC H	capsule @ With precautions ... ex, anticoagulan t	
Global formula ADWIA - SAE	@Nutritional supplement @protect & improve biological functions and activities @multivitamins, minerals, antioxidant , biotonic , trace elements & amino acid	*****	015097	-	+		1 red capsule in the morning and 1 capsule in the evening	@Contain red & blue capsules	750
Mineravit EIPICO - EGYPT	@Vitamins &minerals	0003741	075295	-	+		1 capsule daily with a meals or as prescribed by physician		265
Vitapollean KOREA PHARMA CO. LTD.	@Vitamins, minerals & pollen extract @ stimulating of metabolism , treatment of vatigue , multivitamin substance	10938	6001	+			1 capsule 2 times daily (adult) and once daily (children)	@With GMP	1200
Viva ACAPI - SAE	@Ginseng, garlic, vitamins ,minerals ,phosphlipid, trace element, electrolyte , amino acid @Bioenergetic, antioxidant & immunomodulato r @ Activated l- carnitine with liposomal technology	0007449	07105001	+			1 capsule daily or as prescribed by physician	@Horse picture	840
Pharovit PHARCO PHARMA- EGYPT	@High potency multivitamins with minerals & zinc	0011131	3036102	-	-	-	1 capsule daily with a meals or as prescribed by physician		500
Vitacap Mega -THAILAND	@Vitamin & mineral supplement	25/2002	702023	-	+		1 capsule daily with a meals or as prescribed by physician	@Manufact ured under license from mega life science- australia @Each component established by usp & ph.eur.	750
Pharmaton capsules PHARMATON SA - SWITZERLAND	@Ginseng extract (g115) , vitamins , minerals & trace element @Combination of active substances to combat fatigue & to restore physical	*****	06513401	+			1-2 capsule daily	@ With some details such as side effect , precautions ...	2500

	efficiency									
V2 plus PHARCO –Egypt	@Ginseng extract vitamins , minerals &essential phospholipids	0004759	622	-	+			One capsule or more daily .	420	
Mixavit-m Gulf – pharma,U.A.E.	@Multivitamins & minerals	0004758	124	+				One capsule daily or prescribed by physician	800	
Gervizine RAMEDA- pharmaceutical Co. 6 October city – Egypt	@For maximum vitality	0010630	06376	+				One capsule daily or prescribed by physician	480	
Pacivite-g Korea pharma CO,LTD.	@natural Korean ginseng ext., aloe ext. , Multivitamins & minerals	9890	7002	+				One capsule daily	@ With GMP. @ With some precautions details.	960
Super-v Modern pharm,yemen.	@Strength & Vitality @L-carnitine , ginseng ,royal jelly , antioxidants multivitamins & minerals	*****	06185	-	+			1 capsule daily Swallowed as a whole with sufficient fluid preferably during or after meals or prescribed by physician	900	
Geriaton Dar Al dawa Naur- jordan	@nutritional supplement	8679	6176	+					@ With hoarse picture.	1050
Vitamin Z Cipla ltd. India	@vitamins, minerals plus zinc	*****	SU6005	-	-		+ 53 min	One capsule daily after food or prescribed by physician	@ With falcon heag picture on packet @ Described each component therapeutic effect .	290
V 2 PHARCO pharm , Alexandria ,EGYPT.	Multivitamins & minerals	0003745	450	+				One capsule or more daily or prescribed by physician	330	
VITAGINSENG 900mg Korean Ginseng research CO,LTD	Supplement Multivitamins & With ginseng and minerals	*****	3033	-	-		-	One capsule daily	@ with aloe . . @ISO 9001-2001.	1200
Oramin-G Daewon pharm.co. ltd., Korea	@ Natural Korean ginseng extract , aloe extract , multivitamins and minerals .	*****						The usual adult dosage is One capsule daily	The drug is manufacture d in accordance with Korea good manufacturi ng practice (kGMP) as recommende d by WHO. Each	960

								component is established by USP,BP or KP .	
Pregvit zinc PHARCO pharmaceutical , Egypt	@Multivitamins and minerals enriched with zinc ,iron and hematinics @ Beneficial before and during pregnancy and lactation.			-				1 or 2 capsule daily or as prescribed by physician.	600
Perherpar	Multivitamins @ and minerals	*****	712508	+				1 capsule daily or as prescribed by physician	@ its names indicate to be herbal 1000
Ministry of Health	Multivitamins @ and minerals @ 2 capsules (red and blue)	*****	*****	+				1 red capsule in the morning and 1 capsule in the evening	@Contain red & blue capsules ----

Table 2: Evaluation of information and disintegration of Vitamin and Mineral tablets present in Yemen markets

Brand/product manufacturer	Front label information	DIN	Lot #	Stage 1	Stage 2	Stage 3	Directions	Other label information	Cost (Y.R)
Centrum Loderle lab. Division USA	@ High potency multivitamins & multiminerals formula. From A to Z @ Advanced formula	*****	66941	+			One tablet daily	@Component established by U.S recommend daily allowance (U.S.RDA)	880
Vitamin 15 Enteric coated Solco Basle ltd., Switzerland	@ 15 vitamins and essential minerals	*****	450702	-	-	-	Prophyliaction : 1-2 tablets daily Therapeutic: 2-4 tablets daily (adult & children)		2500
Multitables Lab. Wolfs N.V., Belgium	@ 10 vitamins + 8 minerals and iron	0007483	07C19	-	-	+	1 tablet daily not suitable for children under 10		1100
Dynamisan Novartis , switzerland	@for all day energy . Complete dietary supplement @vitamins , minerals , amino acids and ginseng @ complete tonic supplement	*****	07001	+			1 tablet daily for adult not suitable for children under 13	@With %RDA @not used for pregnant and lactating women @with some details such as precautions additives ..	1350
Juvamine top forme 23 Lab. Juva sante , Paris – France	@Formula ultra – complete @ 23 element essentials 12 vitamins , 8 trace-elements & 3 macro-nutrients	*****	TS099	+			One daily tablet to take with a large glass of water.		1350
Materna Wyeth-canada	@Vitamins&mineral supplement	*****	446864	-	+		One tablet daily		950
Pregnavit Shaphaco - Yemen	@Multivitamins-minerals fortified with omega-3 @through all of pregnancy and breast feeding	*****	4077	+			1 tablets daily with or immediately after your main meal. Swallow with	@ persistent foam in all stage .	840

							a full glass of water or a cold drink TAKE ON FULL STOMACH		
Solus Lifeplan products LTD;ENGLAND	Bio-active integrated nutritional supplement	*****	Pc06/1/15	-	-	-			1300
Multivitamins + Iron Lifeplan products LTD;ENGLAND	Multivitamins+IRON	*****	BC 06-2-2	+			Take one tablet daily with food and little liquid.	@ with %RDA @ inactive ingredients are documented	1100
Provit Alkanpharma, EGYPT	13vitamin ,8 minerals ,B-complex , antioxidant and trace Element..	*****	039	-	+		One tablets daily after meals as prescribed by physician.	@Once daily.	480
9-vita Shanghai medicine @ health product ; China	@ multivitamins	*****	F7040Z	+			Different according to therapeutic use .		1350

The front label information is the information which can be seen together with the product name. DIN is the drug identification number, Stage 1, 2 and 3 refers to the performed disintegration tests, + fully disintegrated, - not fully disintegrated. Other label information refers to additional text which was found on the label to describe the product and cost.

CONCLUSION

We conclude that; some products sold on the Yemeni market use statements on their label which are difficult to define. However, such terms and statements seem to be pseudoscientific and of unjustified value to the product. So such statements should be avoided. Most of manufactories depend on the packaging appearance which affect customer acceptance. Cheaper product does not (necessarily) better but also expensive one is not necessarily better. Only recognized test methods should be used on the labels. Dosage form and active ingredients need to be matched with their intended therapeutic use to ensure that the active ingredients is released at it site of absorption. Today's customers cannot assume that the product they buy will have an acceptable quality with regard to the disintegration behavior.

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