Comparison of measurement of selected micronutrients status by Vitastiq® and serum levels in healthy volunteers

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Introduction

It is thought that if people have access to a sufficient quantity and variety of foods, they will meet their nutritional needs. At the same time it is estimated that around two billion people worldwide suffer from at least one vitamin or mineral deficiency. Iron deficiency is the most common nutritional deficiency disorder in the world, followed by a deficiency of vitamin A, D and iodine. Poor vitamin and mineral status is not limited to third-world countries: it is widespread in Western countries due to unbalanced diet. In order to anticipate and prevent the health consequences of micronutrient deficiencies, an easy and cost-effective way of determining vitamin and mineral status is of particular importance.

Insight into the vitamin and mineral status of a person can be obtained in several ways. One way is to assess vitamin and mineral concentration from serum or plasma, in which case both a laboratory and expert analysis are required to interpret the results. A widespread alternative to blood testing is Electro-Acupuncture according to Voll (EAV). EAV has been used for decades in pharmacies and specialist offices. It is based on the acupuncture energy meridians theory and Reinhard Voll's electro-acupuncture research. The EAV methodology provides a quick, non-invasive screening method for determining health imbalances, which can be useful in cases of subclinical deficiencies.

The purpose of this study is to determine whether EAV methodology was efficient in determing micronutrient deficency. For this purpose we compared the status of 5 vitamins and 1 mineral. The samples were drawn from serum and by measurements from Vitastiq, a device which uses the EAV method.

Subjects and methods

This study was performed in collaboration with Policlinic Bonifarmin in April 2015. Twenty healthy volunteers (7 males, 13 females) aged between 23 and 49 (mean age 34, 4±6,5) partipicated in the study. (Inclusion criteria: aged from 20 to 50 years and an absence of acute or chronic ilness or pregnancy; exclusion criteria: usage of medication [antibiotics, analgetics, antidepressants, anticoagulants, oral contraceptives etc].) All participants signed a form of consent prior to measurement. Two contrasting methods for measuring vitamin status were used: blood samples were taken following overnight fasting (at least 12 hours after eating) and the participants' vitamin and mineral status was then measured by Vitastiq. The status of vitamins A, D, E, B12 and folic acid and mineral zinc were measured by both methods. The results from the laboratory test and Vitastiq were then compared using statistical methods (t-test).

Methods for determining micronutrients' levels from serum

Electrochemiluminescence immuno assay (ECLIA) was used to determine vitamin B12, folic acid and vitamin D levels in serum on analyzer Roche Diagnostics Elecsys 2010 (Mannheim, Germany). ECLIA is based on the use of a rutheniumcomplex and tripropylamine (TPA). The chemiluminescence reaction for the detection of the reaction complex is initiated by applying voltage to the sample solution resulting in a precisely controlled reaction.

High-performance liquid chromatography (HPLC) was used to determine vitamin A and vitamin E levels in serum on Agilent 1100 Series HPLC (Santa Clara, California). HPLC is a technique in analytic chemistry used to separate the components in a mixture, to identify each component, and to quantify each component. It relies on pumps to pass a pressurized liquid solvent containing the sample mixture through a column filled with a solid adsorbent material. Each component in the sample interacts differently with the adsorbent material, causing different flow rates for the different components and leading to the separation of the components as they flow out of the column.

Atomic absorption spectroscopy (AAS) was used to determine zinc levels in serum on Analyst 200, PerkinElmer, USA. AAS is a spectroanalytical procedure for the quantitative determination of chemical elements using the absorption of optical radiation (light) by free atoms in the gaseous state. The technique makes use of absorption spectrometry to assess the concentration of an analyte in a sample. It requires standards with known analyte content to establish the relation between the measured absorbance and the analyte concentration and relies therefore on the Beer-Lambert Law.

About EAV

Electro-Acupuncture (EAV) is a diagnostic methodology which was further developed by the German doctor Reinhold Voll in the 1950s. In his research Dr. Voll found that when he tested the electrical conductance on any general area of the human body, there was a fairly low level of electrical conductivity. However, Dr. Voll also found that at certain specific locations on the anatomy, the electrical flow he measured was much more conductive than at other locations. These points found by Voll to be higher in electrical flow correspond to Acupuncture Points and Meridians. Dr. Voll soon discovered that when an internal organ's function or structure changes, the performance of the related meridian and acupuncture points also changed, and that this change could be measured using a device. The name given to this system is EAV, or Electro-Acupuncture according to Dr. Voll. EAV assessments indirectly measure the "Energetic System" of the body.

An EAV device is a type of Electrical Conductivity Meter. The newer generation of devices have specialized software but, essentially, any EAV device is a Conductivity Meter. In using an EAV device, each Meridian Point is tested with a Point Probe (a positive electrode [+]).Regardless of who is tested, regardless of age, weight, sex, or race, a reading of 50 with no change over time (no indicator drop) is an indication of an Energetically healthy or “Balanced” meridian. Readings at points that are significantly above 50 (65+) indicate “Irritation” of the Meridian. Readings above 75 exhibit “Inflammation” of the Meridian. When a reading is significantly lower than 50 (below 40) then it is believed that this meridian is displaying “low energy” properties.

The EAV method has been documented and proven in over a decade of hospital studies in Germany; today EAV is widely used throughout Europe by over 25,000 medical practitioners.

About Vitastiq

Vitastiq is a single innovative hardware and software concept that provides a personalised way of measuring vitamins and minerals through a smartphone.

The technology uses the research of electroacupuncture (EAV) expert Dr. Reinhard Voll. It measures the vitamin content in the skin at various acupuncture points that are outlined on the body and then displays the information on the smartphone screen. Results are achieved by measuring the electrical status of the skin. It can measure the status of vitamins and minerals, as well as omega-3 and omega-6 fatty acids, glucosamine, coenzyme Q10, haemoglobin, pepsin, bile acids and protein status.

Vitastiq provides insight into one's vitamin and mineral levels and personalised advice on improving vitality with the right choice of nutrients.

The Vitastiq mobile app saves and evaluates the history of measurements, which enables the user can keep track of the progress.

Results

Results of measurements are presented in Table 1. Results are presented as deficiency, normal levels and higher than normal levels.

Table 1. Results of measurements (A = normal value, B = below the normal value, C = above the normal value)

SUBJECT 1		**Zinc**	**Vitamin E**	**Folic acid**	**Vitamin A**	**Vitamin B12**	**Vitamin D**
	Vitastiq	A	A	A	A	A	B
	Serum	A	A	A	A	A	B
SUBJECT 2							
	Vitastiq	A	A	A	A	A	A
	Serum	A	A	A	A	A	A
SUBJECT 3							
	Vitastiq	B	A	B	A	A	A
	Serum	A	A	A	C	A	A
SUBJECT 4							
	Vitastiq	B	A	B	A	B	A
	Serum	A	A	A	A	A	A
SUBJECT 5							
	Vitastiq	B	B	A	A	B	A
	Serum	A	A	A	A	A	B
SUBJECT 6							
	Vitastiq	A	B	B	A	A	A
	Serum	A	A	A	A	A	B
SUBJECT 7							
	Vitastiq	A	A	A	A	A	A
	Serum	A	B	A	A	A	A
SUBJECT 8							
	Vitastiq	B	B	A	A	A	A
	Serum	A	A	A	A	C	B
SUBJECT 9							
	Vitastiq	A	A	A	A	A	A
	Serum	A	A	A	A	A	A
SUBJECT 10							
	Vitastiq	A	A	B	A	A	A
	Serum	A	A	A	B	A	B

SUBJECT 11							
	Vitastiq	B	B	A	A	A	A
	Serum	A	A	A	A	A	A
SUBJECT 12							
	Vitastiq	A	B	A	A	A	A
	Serum	A	A	A	A	A	A
SUBJECT 13							
	Vitastiq	A	A	A	A	A	A
	Serum	A	A	A	A	A	B
SUBJECT 14							
	Vitastiq	B	A	A	A	A	A
	Serum	A	A	A	A	A	B
SUBJECT 15							
	Vitastiq	A	A	A	A	A	A
	Serum	A	B	A	A	A	A
SUBJECT 16							
	Vitastiq	A	A	A	A	A	A
	Serum	A	A	A	A	A	B
SUBJECT 17							
	Vitastiq	A	B	A	A	A	A
	Serum	A	A	A	A	A	B
SUBJECT 18							
	Vitastiq	A	B	A	A	A	A
	Serum	A	A	A	A	A	B
SUBJECT 19							
	Vitastiq	A	A	A	A	A	A
	Serum	A	B	A	A	A	B
SUBJECT 20							
	Vitastiq	A	B	A	A	A	B
	Serum	A	A	A	A	A	A

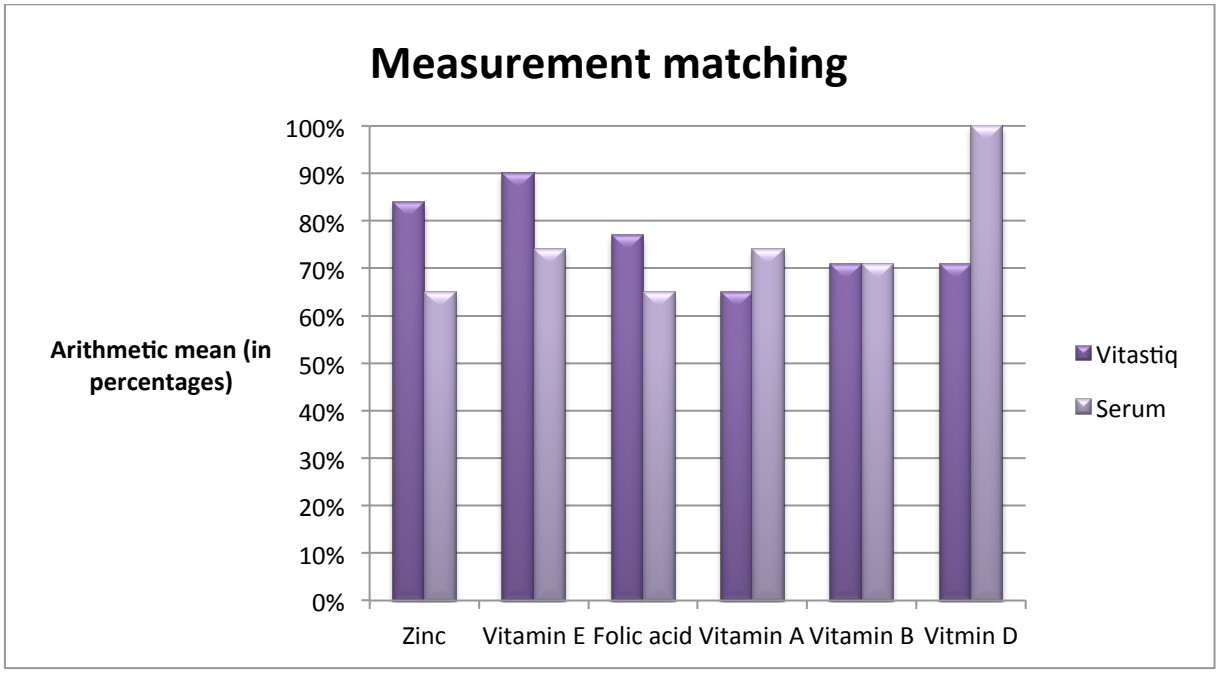

Figure 1. Measurement matching for all the measured parameters (arithmetic mean in percentages)

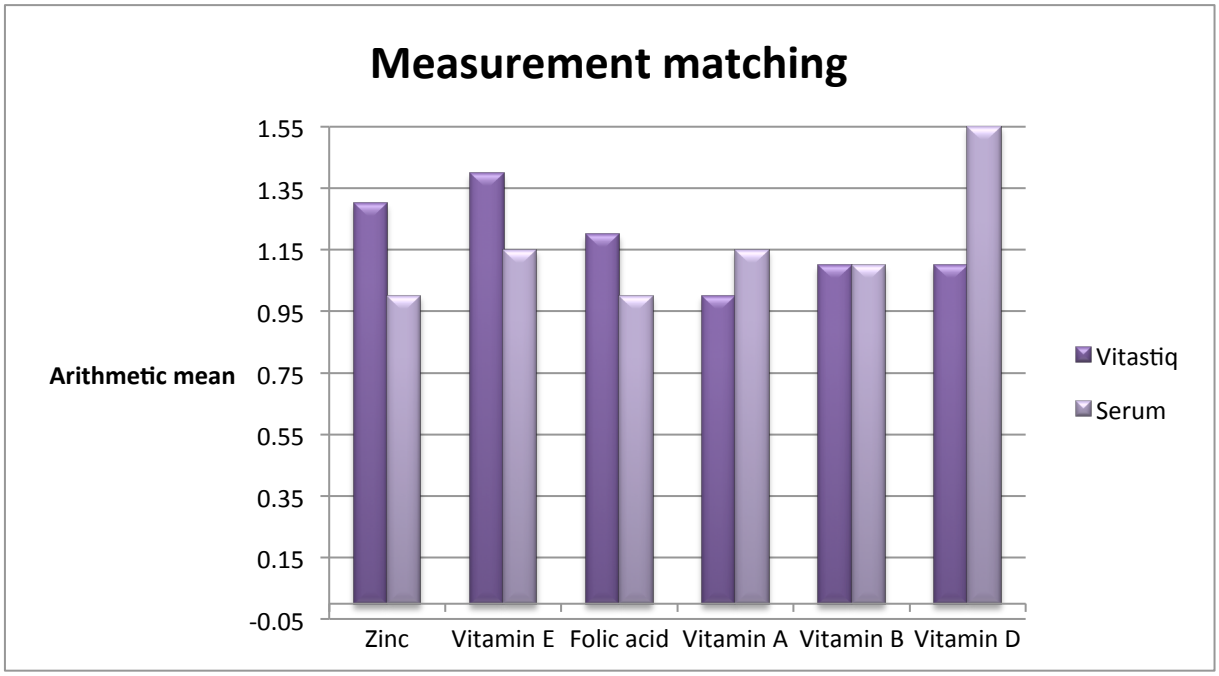

Figure 2. Measurement matching for all the measured parameters (arithmetic mean)

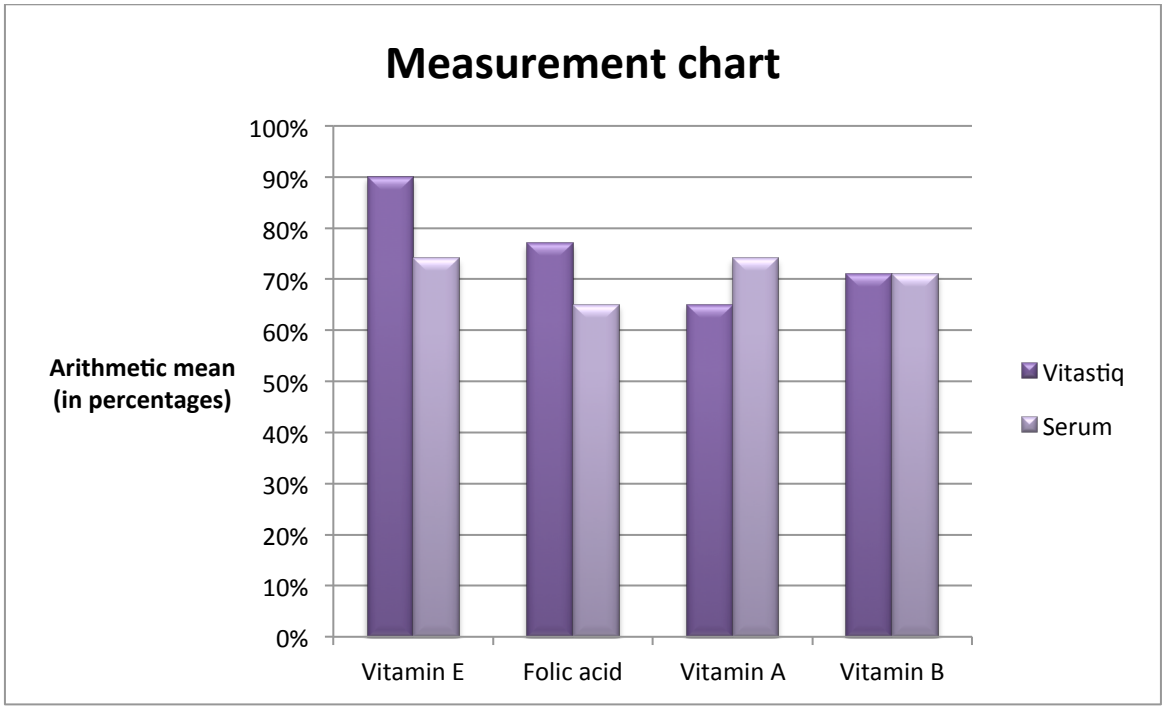

Figure 3. Measurement chart for selected parameters with no significant difference between two methods of measurements (arithmetic mean in percentages)

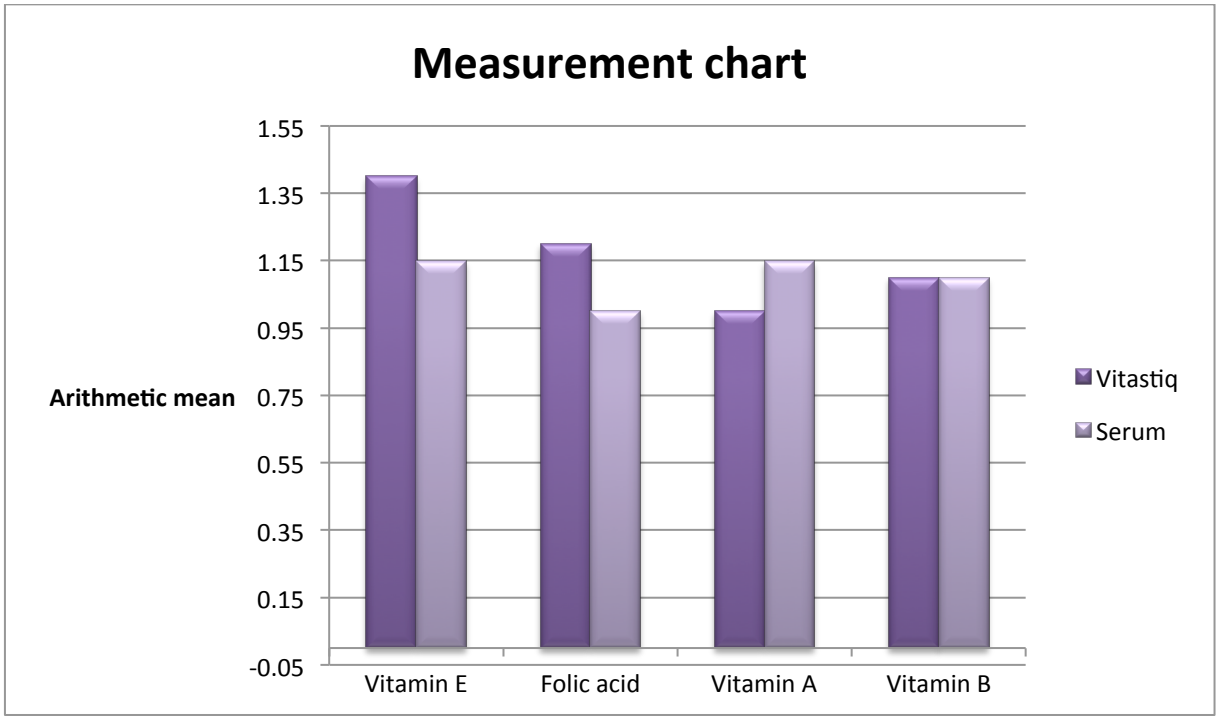

Figure 4. Measurement chart for selected parameters with no significant difference between two methods of measurements (arithmetic mean)

Results

By conducting the paired samples t-test, in which mean differences of laboratory values and Vitastiq values were tested, within statistical error of 1%, we may confirm that in four measurements (folic acid, vitamin E, vitamin A and vitamin B) Vitastiq has accurately measured values within defined categories (no significant statistical

difference), whereas for zinc and vitamin D, *p* was less than 0,01 which indicates that measurements taken in the laboratory and with Vitastiq differ significantly.

The level of zinc differed slightly between the two methods of measurement (6 subjects expressed a mild deficiency when measured by Vitastiq whereas all subjects had normal levels as determined by the laboratory test). The difference in the level of vitamin D was significant between the two methods. It should be taken into account that the deficiencies measured with Vitastiq were mild and it is possible that cutoff values are not completely concordant or comparable between the two methods.

Conclusion

We can conclude that in the performed comparison between two completely different methods there is a high concordance between the assessment of vitamin status using laboratory tests and Vitastiq.

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Auhors:

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Vitaminoteka gathers experts from different fields of the science of nutrition and gastronomy who share the same vision on the strategic goal of the company: to be the best source of information in the field of nutrition. The core business of the company is nutrition consultation, which includes consulting for the food and pharmaceutical industry with the basic aim of new product development and implementing science in marketing activities, as well as the continued education of experts and the general public.

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Polyclinic Bonifarm is a health institution which specialises in the field of clinical pharmacology, toxicology and laboratory diagnostics. The Department of Laboratory Medicine of Polyclinic Bonifarm consists of a Medical-biochemical laboratory and a Toxicology Laboratory, which provide users with a wide range of laboratory tests in the fields of biochemistry, haematology, coagulation, immunochemistry and toxicology.

Vesna Gorički, MD completed acupuncture training with Prof. Dervisevic in 1997. In 2003 she completed a two-year training course in French Homeopathic Therapy. She has run her own pratice in acupuncture and homeopathy for 20 years. She has considerable experience in the use of the organometer BIMED999S.

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