SERUM IRON CONCENTRATIONS IN THE PATIENTS BY USING TMF-14 (DEVA AUH THADA THWAY HSAY)

by
Dr Moe Moe Yee
Associate Professor
Department of Chemistry
Bago University

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Moe Moe Yee[1*], Kyaw Naing[2#], Theim Kyaw [3]

ABSTRACT

Myanmar indigenous medicines containing Kyauk-thway (ferric ammonium citrate) were used for the treatment of anaemia and other ailments. The ash and moisture contents were determined by ashing method and oven dried method.The essential nutritive elements (Fe, Zn, Cu), toxic elements (Pb, As), mineral elements (Na, K, Mg, Ca) were determined by Atomic Absorption Spectroscopy (AAS). Total iron concentrations in the sample were also determined by using 1,10-phenanthroline spectrophotometric method. Comparative studies of iron concentrations between AAS results and Spectrophotometric results were carried out. Zinc, copper, lead and arsenic were not detected in the sample. The nitrogen content (%) in the sample was determined by micro Kjeldahl method. The citric acid content (%) was determined by gravimetric method. TMF-14 (Deva Auh Thada Thway Hsay) were prepared based on Myanmar traditional medicine manual. Deva Auh Thada Thway Hsay is a good quality Myanmar traditional medicine and it is mainly used in disorders of heart and bile. It is also used as Heart Tonic and Blood Tonic for various anemic patients.The serum iron concentrations in 30 out-patients of Yangon Traditional Medicine Hospital (YTMH) before and after taken TMF-14 for two weeks were determined by Lisa 300 plus autoanalyzer. According to the interview data, all patients acknowledged that they feel well after taking the medicine for two weeks. However, after giving, TMF-14 to 30 patients for two weeks, it was found that serum iron contents were increased only in 16 patients, decreased in 12 patients, unchanged in 2 patients. In the case of 12 patients who have lower serum iron concentration after taking the TMF-14, they also acknowledged that they feel well after taking the medicine. It can be considered that if TMF-14 will not be given to these 12 patients, they might have more decreased of serum iron concentrations in their blood sample.

Keywords: Myanmar indigenous medicines, Kyauk-thway, AAS, nutritive elements, mineral elements, serum iron concentrations , TMF-14

[1]Associate Professor, Dr., Department of Chemistry, Bago University, *moemoeyee21@gmail.com
[2]Deputy Permanent Secretary, Dr., Ministry of Education, Nay Pyi Taw, Myanmar,
[#] drkyawnaing2009@gmail.com
[3]Rector (Retired) , Dr., Department of Traditional Medicine, University of Traditional Medicine, Mandalay

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Myanmar indigenous medicines containing Kyauk-thway (ferric ammonium citrate) were used for the treatment of anaemia and other ailments. The ash and moisture contents were determined by ashing method and oven dried method.The essential nutritive elements (Fe, Zn, Cu), toxic elements (Pb, As), mineral elements (Na, K, Mg, Ca) were determined by Atomic Absorption Spectroscopy (AAS). Total iron concentrations in the sample were also determined by using 1,10-phenanthroline spectrophotometric method. Comparative studies of iron concentrations between AAS results and Spectrophotometric results were carried out. Zinc, copper, lead and arsenic were not detected in the sample. The nitrogen content (%) in the sample was determined by micro Kjeldahl method. The citric acid content (%) was determined by gravimetric method. TMF-14 (Deva Auh Thada Thway Hsay) were prepared based on Myanmar traditional medicine manual. Deva Auh Thada Thway Hsay is a good quality Myanmar traditional medicine and it is mainly used in disorders of heart and bile. It is also used as Heart Tonic and Blood Tonic for various anemic patients.

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Aim

The aim of the research was to determine the elemental contents in TMF-14 and to perform clinical trial on anaemic patients of Yangon Traditional Medicine Hospital using TMF-14 (Deva Auh Thada Thway Hsay).

Objectives

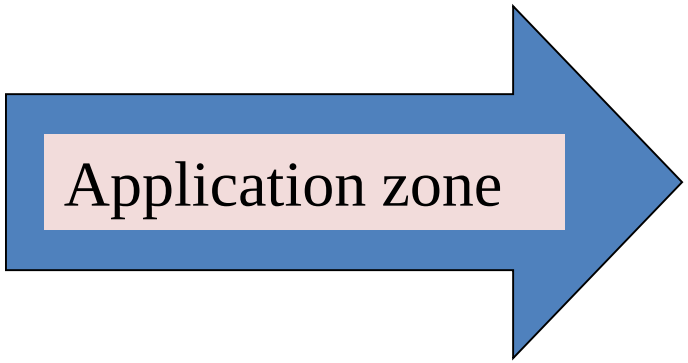
- To prepare TMF-14 (Deva Auh Thada Thway Hsay) based on Myanmar traditional medicine manual
- To determine the ash, moisture, nitrogen and citric acid contents in TMF-14 (Deva Auh Thada Thway Hsay)
- To determine the essential nutritive elements (Fe, Zn, Cu), toxic elements (Pb, As), mineral elements (Na, K, Mg, Ca) in TMF-14 (Deva Auh Thada Thway Hsay) by Atomic Absorption Spectroscopy (AAS)
- To determine the weight of single dose, daily dose and maximum intake of drug According to Drugs Manufacturer's Specification
- To determine the iron content by using uv-visible spectrophotometer
- To determine the serum iron concentrations in out-patients of Yangon Traditional Medicine Hospital (YTMH) before and after taken TMF-14 for two weeks by Feren spectrophotometric technique

OUTLINE

- INTRODUCTION
- MATERIALS AND METHODS
- RESULTS AND DISCUSSION
- CONCLUSION
- REFERENCES

INTRODUCTION

- originally prepared from medicinal plants, chemical origins and animal origins
- Local indigenous physicians use Thway Hsay in the treatment of various kinds of diseases caused by blood.



- mostly used in rural areas, towns and even in oversea regions
- specially suitable for monks, elder people and females in the treatment of dizziness, giddiness, gynaecological disorders and fever by using different vehicles

Uses

- used as heart tonic, blood tonic and blood purifier

Mineral nutrient

Man also has a dietary requirement for quite a wide range of mineral nutrient.

Amount of single dose

- specified as the amount of ywei gyi or ywei lay seed, as the amount of tamarind seed, as the amount of betel nut, the amount of tea-spoon full, as the amount of pe-tha (of weight) and as the number of tablets and capsules according to their instruction pamphlets.

Amount of daily dose

- amount of single dose multiplied by maximum intakes for one day

Iron content → in a healthy adult is ≃ 4grams (71 mmol)

− Heminic iron (ferrous iron)

(60% in hemoglobin and 5% in myoglobin)

− Non-heminic iron (ferric iron)

(about 35% of total iron is stored in liver, bone marrow, reticuloendothelial cells of the spleen and epithelial cells of the intestine)

Serum iron concentration → range of expected values in men is 11 to 30 μmol/L and in women 9 to 28 μmol/L

TMF-14 → Deva Auh Thada Thway Hsay

Brownish red colour, powder, smell of musk, cool, rich in taste and astringent

mainly used in disorders of heart and bile

also used as Heart Tonic and Blood Tonic for various anemic patients

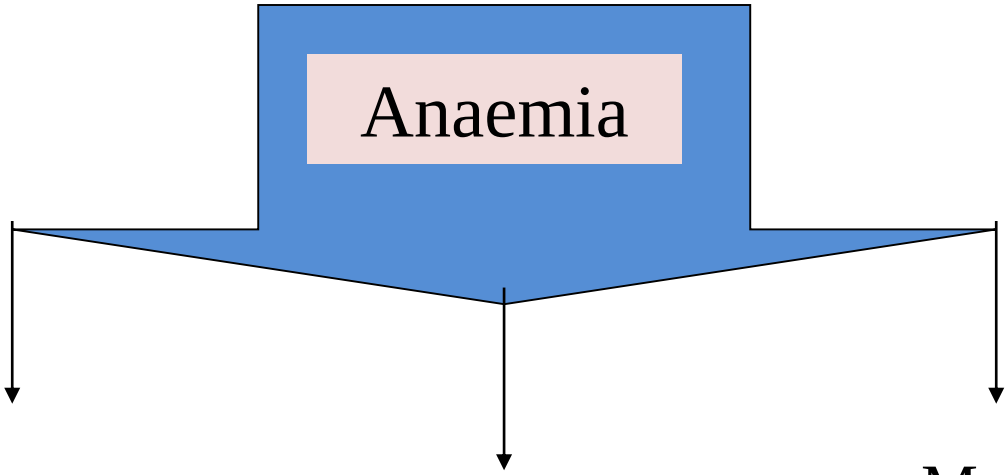
Ingredients of Deva Auh Thada Thway Hsay (TMF-14)

Nant thar phyu (နံ့သာဖြူ), Nant thar ni (နံ့သာနီ), Kon sar gamone (ကွမ်းစားဂမုန်း), Pannu (ပန်းနု), Pe nant thar (ပဲနံ့သာ), Thit gya poe (သစ်ကြံပိုး), U pa tha ka (ဥပသကာ), Gant gaw wut san (ကံ့ကော်ဝတ်ဆံ), Kon ku man (ကုံကုမံ), Phalar nge (ဖာလာငယ်), New cho (နွယ်ချို), Myat lay pwint (မြတ်လေးပွင့်), Htein pwint (ထိမ်ပွင့်), Dan ta ku ni (ဒန္ဒကူးနီ), Einda ni kyauk (ဣန္ဒနီကျောက်), Einda nan kyauk (ဣန္ဒနံကျောက်), Myin thilar kyauk (မြင်းသီလာကျောက်), Kyant thway (ကြံ့သွေး), Kyauk-thway (ကျောက်သွေး), Let char (လက်ချား), Theindaw (သိန္ဓော), Tayoke pha yound (တရုတ်ဖယောင်း), Myay ni (မြေနီ), Gold flakes (ရွှေဆိုင်း), Kadoe (ကတိုး), Bird nest (ငှက်သိုက်), Ngar gyi un phat (ငါးကြီးအန်ဖတ်)

Figure. Photograph of TMF-14 (Deva Auh Thada Thway Hsay

Therapeutic Uses of Deva Auh Thada Thway Hsay (TMF-14)

- ✓ – It can also be taken with boiled milk for diarrhea, heavy perspiration and unable to sleep.
- ✓ – It can also be taken with sugar water for palpitation, shortness of breath and giddiness.
- ✓ – It can also be taken with decoetion of Zee phyu thee for diarrhoea and dysentery.
- ✓ – It can also be taken with Nant thar ni water for disorders of blood and bile.
- ✓ – It can also be taken with sugar cane juice for mental disorders.
- ✓ – It can also be taken 2 g for adult and 1 g for children, 2 to 3 times daily.



Normocytic

Microcytic

Macrocytic

1.Bleeding
2.Malaria,Tuberculosis,*etc*.
(MCV within 79 to 96 fL)

1. B_{12} deficiency
2. Folate deficiency
(MCV > 79 to 96 fL)

MCV = mean cell volume

1. Iron deficiency anaemia
2. Anaemia of chronic diseases
3. Heterozygous thalassemia
4. Sideroblastic anaemia
(MCV < 79 to 96 fL)

Causes of Iron Deficiency Anaemia

- Breast feeding, pregnancy or menstruation
- Donating blood more than five times each year
- Gastrointestinal bleeding
- Growing quickly
- Not eating enough iron-rich foods
- Problems with how iron and other foods are absorbed
- Babies less than one year old may have anaemia from drinking cow's or goat's milk that can damage the baby's intestine so that it bleeds and cannot absorb nutrients
- Babies who are fed formula need to have the formula mixed correctly

Symptoms of Iron Deficiency Anaemia

- dizziness, giddiness and weakness
- loses weight and has a lowered resistance to disease
- pale skin colour (pallor)
- fatigue and dyspnoea
- irritability
- shortness of breath and irregular heart beat
- sore tongue
- brittle nails and concave pale nail beds
- pica
- unusual food craving
- decreased appetite
- headache
- short attention span
- apathy

MATERIALS AND METHODS

Collection of the sample

TMF-14 → prepared based on Myanmar traditional medicine manual at Yangon Traditional Medicine Hospital

These sample → stored at room temperature

Sample → TMF – 14 (Deva Auh Thada Thway Hsay)

Ash % → by using muffle furnace

Elemental contents (Na, K, Mg, Ca, Fe, Cu, Zn, Pb, As) → by using Atomic Absorption Spectrophotometer

Moisture contents → oven-dried method

Nitrogen contents → micro-Kjeldahl digestion method

Iron (II) contents → by using uv-visible spectrophotometer

Citric acid contents → gravimetric method

Serum iron concentrations → Feren spectrophotometric method

RESULTS AND DISCUSSION

Table 1. The Ash and Moisture Contents (%) in TMF-14

Sample	Mean Ash (%)	Mean Moisture Content (%)
TMF- 14 (Deva Auh Thada)	11.4430 ± 0.0569	8.67 ± 0.01

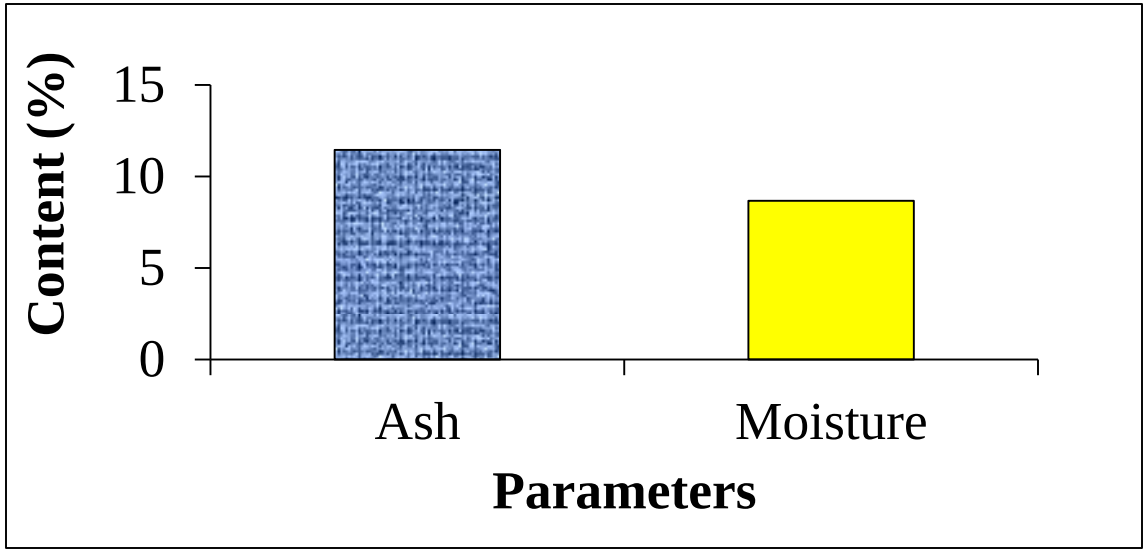


Figure 1. Histogram of Ash and Moisture Content (%) in TMF-14

Table 2. Elemental Contents in TMF-14 as Determined by AAS

Elemental Contents (%)*	TMF – 14 (Deva Auh Thada)
Na	0.067
K	0.082
Ca	0.057
Mg	0.078
Fe	0.025

* based on sample weight

Table 3. Iron Contents, Nitrogen Contents and Citric Acid Contents in TMF-14

Parameters	TMF-14 Sample
Iron content (%)	0.025
Nitrogen content (%)	1.260
Citric acid content (%)	1.370

Table 4. Weight of Single Dose, Daily Dose and Maximum Intake of Drug According to Drugs Manufacturer's Specification

Adult	TMF-14 (Deva Auh Thada)
Single dose (g)	2.041
Maximum intake (time)	3.000
Daily dose (g)	6.120

Table 5. Iron Contents in Daily Dose of TMF-14 as Determined by AAS and Visible Spectrophotometric Method

Sample	Iron Content (mg)	
	AAS	**UV-Vis**
TMF-14 (Deva Auh Thada)	1.530	1.501

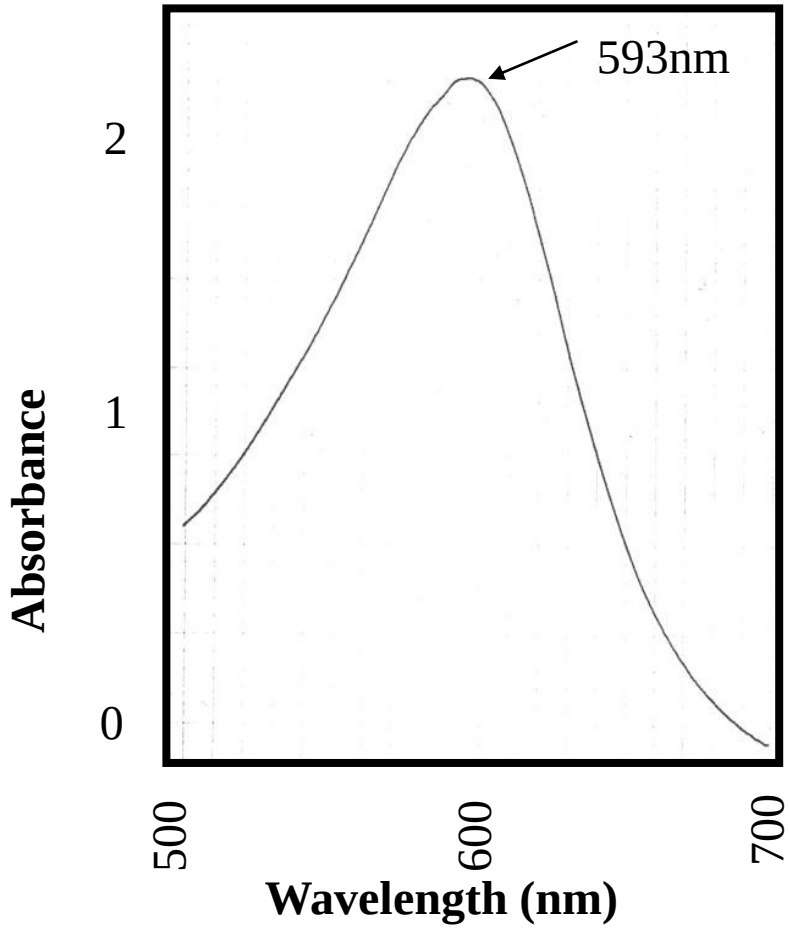


Figure 2. Visible spectra of standard ferrous ammonium sulphate by complexation with ferene S

Table 6 (a). Comparison of Serum Iron Concentrations in Out-patients of YTMH before and after taking TMF-14 for Two Weeks

Reg.No.	Age and Sex	Serum iron conc: (μmol/L)	
		before TMF-14	after TMF-14
7466/06	26, F	6	14
8642/06	50, F	17	22
7972/06	30, F	15	16
7103/06	16, M	14	16
656/06	39, F	15	18
10126/06	47, F	4	8
10903/06	65, F	10	13
10904/06	41, F	14	16
10941/06	41, F	11	13

Reg.No.	Age and Sex	Serum iron conc: (μmol/L)	
		before TMF-14	after TMF-14
11235/06	19, F	8	10
127/07	40, F	12	16
442/07	30, F	6	7
739/07	21, F	13	27
929/07	40, F	12	17
2774/04	37, F	26	27
2261/07	54, F	12	15

Literature range of Female = 9-28 μ mol/L
Literature range of Male = 11- 30μ mol/L

Table 6(b). Comparison of Serum Iron Concentrations in Out-patients of YTMH before and after taking TMF-14 for Two weeks

Reg.No.	Age and Sex	Serum iron conc : (μ mol/L)	
		before TMF-14	After TMF-14
1390/06	52, F	20	15
7953/06	35, F	8	6
2097/04	52, F	15	10
8474/06	34, F	29	13
2342/05	40, M	24	20
10064/06	58, M	20	16
11309/06	33, F	16	9.5
824/07	53, F	15	14
3219/06	65, F	13	8
1045/07	22, M	18	13

Reg.No.	Age and Sex	Serum iron conc : (μ mol/L)	
		before TMF-14	After TMF-14
1343/07	48, M	17	13
610/07	46, F	12.3	6
7278/06	77, F	17	17
7964/06	20, F	14	14

Literature range of Female = 9-28 μ mol/L
Literature range of Male = 11- 30μ mol/L

Figure 3. Comparison of (Reg. No. 7466/06) patient's condition before and after taking TMF-14 for two weeks

CONCLUSION

The ash and moisture content (%) of TMF-14 were 11.443 % and 8.67 %. The iron content of TMF-14 was found to be 0.025% and the related daily dosage of iron content for adult was 1.530 mg. The daily requirement level of iron is 10-15 mg. According to the experimental results, the level of iron contents in these medicines is allowable. Zinc, copper, lead and arsenic were not detected in the sample. According to the observation of patients' diet forms, there is no significant difference in their daily intakes of iron content obtained from food they consumed. Therefore, during research period, it is assumed that there is no affect of food on serum iron content in blood. In the case of 12 patients who have lower serum iron concentration after taking the TMF-14, they also acknowledged that they feel well after taking the medicine. It can be considered that if TMF- 14 will not be given to these 12 patients, they might have more decrease of serum iron concentrations in their blood sample. So this medicine is used for any people who suffers from anaemia and other ailments according to their instruction. It is concluded that this work will be of much benefit to produce more effective and higher quality Myanmar indigenous medicines.

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Thank You
AWAI YAR
CARDIAC TONIC
HEART

APPENDIX

Calculation of Iron Content by AAS

Sample = sample no.1

Elemental determination = Iron

Data given by AAS = 8.91 mg /L

Ash weight = 8.638 g

Sample weight = 100 g

1000 cm^3 of sample solution contains 8.91×10^{-3} g of Fe

100 cm^3 ---------- ? = $8.91 \times 10^{-3} \times \frac{100}{1000}$

$= 0.89 \times 10^{-3}$ g

100 cm^3 of sample solution contains 0.3 g of ash

$\therefore$ 0.3 g of ash contains 0.89×10^{-3} g of Fe

8.638 g ----------? = $0.89 \times 10^{-3} \times \frac{8.638}{0.3} = 25.626 \times 10^{-3}$ g = 0.025 g

8.638 g of ash obtained from 100 g of sample

100 g sample contain 0.025 g of Fe

$\therefore$ Percent of Fe in sample 1 = 0.025 %

100 g sample contain 0.025 g of Fe

6.12 g (daily dose) ---------- ? = $0.025 \times \frac{6.12}{100} = 1.530 \times 10^{-3}$ g

= 1.530 mg