The Role of Trace Elements in Kampo Medicines for the Treatment of Anemic Women During Pregnancy

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Abstract

For the use of Kampo medicines in treating anemia during pregnancy, a total of 90 patients participated in this investigation. The patients were divided into Groups A, B, and C. Group A had 38 patients taking *Toki-shakuyaku-san* and *Kojin*, which contained relatively high Cu, Zn, and Ca for a moderate constitution, Group B had 17 patients taking *Ryutan-shakan-to*, which contained relatively high Cu, Fe and Mg concentrations for a robust constitution, and Group C had 35 patients taking *Kami-kihi-to*, which contained relatively low minerals for a deficient constitution.

For the Hb increases in Group A following medications the increases in Group A were the most, and the Group B were the next, with a relatively lesser for the Group C.

Kampo medicines, which were effective for the treatment of anemia during pregnancy, were found to contain relatively high Cu, Zn, Fe and Ca.

Index Entries: *Kampo* medicines; copper; zinc; anemia; pregnancy.

Introduction

Anemia is a significant problem during pregnancy. A hemoglobin of less than 11g/dL should be investigated and treated to avoid blood transfusion and its related complications. A pregnant woman will lose blood during delivery and the puerperium, and an anemic woman is therefore at increased jeopardy. Anemia in pregnancy may cause increased fetal prematurity, and postpartum hemorrhage. Its incidence is 20-30% of pregnant women in Japan[1)].

Iron deficiency is responsible for about 95% of the anemias during pregnancy, reflecting the increased demands for iron. Therefore, treatment of anemic woman is use of oral iron for the most part[2)].

Because of nausea and vomiting at first trimester and abdominal enlargement at second and third

trimester, they may be deteriorated themselves with gastrointestinal complications by oral iron administration.

Kampo medicines used had no toxicity and adverse effects. They are suitable for the treatment of women with complications during pregnancy.

Kampo medicinal treatments were used according to *Zheng* diagnosis based on the Yin-Yang principle.

In recent years, the relationships concerning diseases linked with minerals, in particular the trace elements, have received increased attention. The purpose of this ongoing research is focused on the effectiveness and the role of the trace element minerals, Mg, Zn, Mn, Cr, Cu, Fe, and Ca in the use of *Kampo* medicines for constitutional deficiencies and the treatment of anemic women during pregnancy.

Materials and Methods

Sample Analysis

A total of 4 Kampo medicines in the form of their finished product, *Kampo* extract granules, were analyzed for mineral contents. Those *Kampo* medicines were *Toki-shakuyaku-san*, *Kojin*, *Ryutan-shakan-to*, and *Kami-kihi-to*, made of Tsumura Manufacturing Co. Ltd., Tokyo, Japan.

The dry ash method from organic matter[3,4] was used for determining all the minerals in the sample medicines. *Kampo* extract granules weighing 2.5-3.0g were used to make the crucible, dried in the oven for 18 hours at 100-103°C. The dried samples were reweighed for determining the mineral contents.

For the flame atomic absorption measurements of Fe, Mn, Ca, Mg, Zn, Cr, and Cu, a spectrophotometer (Model AA-670, Shimadzu Co. Ltd., Kyoto, Japan)[5] was used.

Accuracy of the instrument measurements were assured by checking a number of blank determinations as well as sample weights.

Materials and Method

For the use of *Kampo* medicines in treating anemia during pregnancy, a total of 90 patients participated in this investigation. In order to compare the relative efficacy, the patients were divided into Groups A, B, and C. Group A had 38 patients taking *Toki-shakuyaku-san* 10g/day and *Kojin* 4g/day for a moderate constitution, Group B had 17 patients taking *Ryutan-shakan-to*, which contained relatively high Cu concentrations, 7.5g/day for a robust constitution, and Group C had 35 patients taking *Kami-kihi-to* 7.5g/day for a deficient constitution. All patients were given the group specific medications for 4 weeks.

Results

No patients bias was found with respect to age, height, body weight, and gestational time among the 3 groups, i.e., ranging 27.5-29.6 years, 156.9-158.8cm, 49.2-53.3kg, 39.2-39.9 weeks respectively (Table 1). The mean birth weight and intrapartum hemorrhage were found to be relatively slightly high-

Table 1 Maternal and Neonatal Outcome of Study Group (mean ± S.D.)

	Group A	Group B	Group C
Age (y.o.)	29.6±4.9	27.5±4.7	27.8±5.3
height (cm)	156.9±4.9	158.8±1.7	157.6±3.6
Body Weight (Kg)	49.2±6.5	53.3±4.6	49.8±6.8
Gestational week	39.3±1.2	39.2±1.5	39.3±1.6
Birth-weight (g)	3046.6±419.7	3000.0±281.0	2973.9±333.7
Intrapartum hemorrhage (g)	376.6±241.4	319.7±147.9	341.7±201.1
Initial loss of weight of newborn (%)	5.8±1.6	6.3±1.5	6.0±1.3

No significant difference was found among Group A, Group B, and Group C.

er in Group A. While, the initial loss of weight of newborn was found to be relatively lower in Group A (Table 1).

The mean Hb (g/dL) measurements both before and after medications and the standard deviations for Group A, Group B, and Group C are shown in Table 2. There was no discernible bias on the mean Hb

Table 2 Hemoglobin (g/dL) Before and After Kampo Medication for 4 Weeks (mean ± S.D.)

Constitution types	Measurements before medication	Measurements after 4 weeks
Group A (Moderate Constitution) Toki-shakuyaku-san and Kojin 8 cases	** 10.48±0.19	** ** 11.15±1.21
Group B (Robust Constitution) Ryutan-shakan-to 17 cases	10.34±0.44	10.78±1.31
Group C (Deficient Constitution) Ryutan-shakan-to 17 cases	10.35±0.25	** 10.41±1.04

**: P < .01

Hb after 4 weeks of Kampo medication showed a significant increase in Group A ($p < 0.01$). Again, Group A showed a significant increase when compared to Group C ($p < 0.01$).

Table 3 Daily Dosages of Trace Elements in Kampo Medicines for Anemic woman during pregnancy ($\mu g/g$)

	Group A		Group B		Group C
Fe	238.4		654.0		25.5
Cu	62.16	>	56.33	>	29.25
Zn	98.70	>	54.60	>	20.33
Ca	14355	>	9075	>	6600
Mg	10.360		15.150		3.240
Mn	383.90		381.75		93.00
Cr	2.14	>	1.5		1.5

Group A contained significantly larger amounts of copper, zinc, calcium, and chromium compared to Group B and C.

measurements prior to *Kampo* medicine among each of 3 groups. For the mean Hb measurement following medication, a significant increase was seen in Group A ($p < 0.01$). Also, for the Hb increases in Group A following medications the increases in Group A were again significant when compared to Group C ($p < 0.01$). The daily dosages of the trace elements in each of the 3 groups are listed in Table 3. The daily dosages of Cu, Zn, and Ca usually contained larger amounts when compared to the other groups. The relative order in decreasing amount of Cu, Zn, and Ca, showed that the Group A medication contained the most, and the Group B medication contained the next, with a relatively lesser amount for the Group C, medication.

Discussion

Copper plays an important part in the hemoglobin synthesis[7]. A total of 75 to 150mg of copper is present in the adult human body, approximately 95% of it bound to protein, ceruloplasmin, which is essential for iron utilization[8-10].

Zn enzymes, all metalloproteins, are necessary for the metabolism of cells in the body. Klevay, et al have reported the presence of interactions of Cu and Zn in cardiovascular diseases[7]. High zinc levels are known to cause reduced copper absorption[11].

Calcium plays a major role in bone structure formation. A strong well-developed skeletal system fulfills a number of functions including stem cell formation.

Under conditions of insufficient proteins, serum Ca, Mg, Fe, and Zn decrease and they are accumulated in the liver, heart, kidney, spleen, and testicles. Reduced calcium intake causes low levels of serum Ca and Cu, and low levels of Cu in the liver, kidney, spleen, and bone. Also, zinc levels are decreased inthe bone and accumulated in the liver under reduced calcium status. Reduced magnesium intake causes manganese deficiency and iron accumulation occurs in the liver[12-16].

Thus, the nutritional status of trace elements are influenced by other aspects of nutritional intake.

Copper is widely distributed in foods from plants, whole grains, nuts, beans, legumes, and leafy green vegetables.

Maintenance of our health is closely interrelated with our daily nutritional patterns as we absorb minerals in foods or herbal medicines, and they in turn influence our *Zheng* or constitutions.

Conclusions

We noticed that Cu, Zn, and Ca in *Kampo* medicines play a very important part along Fe for the treatment of anemic women during pregnancy.

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