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ЭРҮҮЛ МЭНДИЙН ШИНЖЛЭХ УХААН

"DISCOVERING FUTURE TOGETHER"

XY Congress of the Asian Society of Clinical Pathology and Laboratory Medicine

ABSTRACT BOOK

WELCOME ADDRESS

Dear Colleagues and Guests,
On behalf of Mongolian Association of Laboratory Medicine and Division of Health Care of the Dept. Health Policy Implementation and Coordination, Ministry of the Health, Mongolia, it is great pleasure to invite you to the 15th Asian Society of Clinical Pathology and Laboratory Medicine Congress to be held on September 06-08, 2018 in Ulaanbaatar, Mongolia.

It is my great pleasure to invite you to attend this Congress in 2018. This biannual Congress since in 1975 with the spirit to improve human health by the practice of clinical pathology and laboratory medicine. The theme of the Congress "Discovering Future Together" provides us a valuable opportunity to discuss, learn, exchange and set the new accomplishment, understanding and horizon on ongoing scientific achievements and upgrading technologies in the field of Clinical Pathology and Laboratory Medicine.

The program will include exciting lectures and presentations by distinguished scientists from different country covering major highlights in both basic and clinical research in the field of clinical pathology and laboratory medicine. More than 150 physicians and doctors, guests are attending to join us in 2018. We are looking forward to meeting you in this particular Congress to initiate new discussion, collaboration and friendship and hope it would be the most memorable times of your visit in Mongolia.

Sincerely yours,

Professor MUNKHTUVSHIN Namid
President, Mongolian Association of Laboratory Medicine
Head, Central Scientific Research Laboratory, National Institute of Medicine, Mongolia

МОНГОЛ УЛСЫН ЗАСГИЙН ГАЗАР ЭРҮҮЛ МЭНДИЙН ЯАМ
МОНГОЛ УЛСЫН ЗАСГИЙН ГАЗАР МОНГОЛ УЛСЫН ГАДААД ХАРИЛЦААНЫ ЯАМ
2018 ASCPaLM MALM
IFCC International Federation of Clinical Chemistry and Laboratory Medicine
ASCPaLM
MONGOLIAN ASSOCIATION OF LABORATORY MEDICINE

06 Sep (Thu)

Blue Sky Hotel Tower, Topaz Ballroom

08:30-12:00	REGISTRATION, NATIONAL SEMINAR OF MALM	
12:00-12:45	**Lunch Break**	
13:00-14:40	**NATIONAL SEMINAR OF MALM: BASIC & APPLIED SCIENSES**	
Chairperson (s)	Chairs: Dr. Bilegtsaikhan Tsolmon, Dr. Oyundelger Munkhtuvshin	
13:00-13:20	The effect of negative and positive regulator proteins on the IFN-γ/TLR9 synergistic signal transduction	Baljinnyam T (Mongolia)
13:20-13:40	Role of negative and positive regulators on the TLR7 ligand/IFN-γ signaling in the endothelial cells	Baasansuren E (Mongolia)
13:40-14:00	To determine specific protein M2BPGi in blood serum	Bumdari Yo (Mongolia)
14:00-14:20	Application specialist role in Laboratory Medicine	Enkhdelger M (Mongolia)
14:20-14:40	The determination study to regulating action of hepatitis c virus *in vitro* infection on type ii interfereon-induced interferon stimulating genes	Batkhishig M (Mongolia)
14:40-15:00	**Coffee break**	
15:00-16:40	**NATIONAL SEMINAR OF MALM: CLINICAL & TRANSLATIONAL SCIENSES**	
Chairperson (s)	Jambaldorj Jamiyansuren, Enkhsaikhan Lkhagvasuren	
15:00-15:20	Association of serum triglyceride to high density lipoprotein cholesterol ratio with insulin resistance	Narkhajid G (Mongolia)
15:20-15:40	Rhesus factor blood test result of patients who visited the united Hospital Laboratory of Khuvsgul Province	Tserendulam Ch (Mongolia)
15:40-16:00	Antimicrobial Sensitivity And Resistance Pattern Of Community-Acquired Urinary Tract Infections In Ulaanbaatar, Mongolia	Davaatseren B (Mongolia)
16:00-16:20	The last 2 years comparison early detection of Cervical cancer	Soyol-Erdene G (Mongolia)
16:20-16:40	15th ASCPaLM 2018 International Congress	Oyundelger M (Mongolia)
18:30-21.00	**WELCOME RECEPTION, NATIONAL DRESS FESTIVAL**	

15th ASCPaLM 2018 **DETAILED PROGRAM**

07 Sep (Fri)

Blue Sky Hotel Tower, Crystal Ballroom

07:30-08:30	**REGISTRATION**	
08:30-08:55	**OPENING CEREMONY** Munkhtuvshin Namid President, Mongolian Association of Laboratory Medicine Foreign delegates from ASCPaLM & WASPaLM Sarangerel D Minister, Ministry of Health, Mongolia Tsogtbaatar D Minister, Ministry of Foreign Affairs, Mongolia Lia Gardenia Partakusuma President, ASCPaLM	
08:55-09:00	**GROUP PHOTO**	
Chairperson (s)	Masami Murakami, Munkhbat Batmunkh	
09:00-09:30	Diagnostic Philosophy of MTM and or Versus Conventional Medicine	Munkhtuvshin Namid (Mongolia)
09:30-10:30	**KEYNOTE SPEECH 01:** **LABORATORY MEDICINE POLICY**	
Chairperson (s)	Munkhtuvshin Namid, Junghan Song	
09:30-10:00	The Future and Challenges of Laboratory Medicine; Advance technology towards clinical effectiveness	Ida Parwati (Indonesia)
10:00-10:30	Korean Laboratory Automation Systems: current status and future perspectives	Yeo-Min Yun (Korea)
10:30-10:50	Coffee break	
10:50-12:10	**SYMPOSIUM 01:** **CLINICAL CHEMISTRY**	
Chairperson (s)	Ida Parwati, Yeo-Min Yun	
10:50-11:10	Significantly Higher Albumine Creatinine Ratio (ACR) among Diabetic Retinopathy Patients in Indonesia Population (Study of Type II Diabetes Mellitus Population at Yogyakarta Region)	Ira Puspitawati (Indonesia)
11:10-11:30	Serum 25(OH)D2 and 25(OH)D3 Levels in Patients with Type 1 and Type 2 Diabetes Mellitus by Liquid Chromatography Tandem Mass Spectrometry	Yi Ching Lin (Taiwan)
11:30-11:50	Role of Adiponectin in Central Obesity Adults with Low 25 Hydroxy Vitamin D Level	Pusparini (Indonesia)
11:50-12:10	Effectivity and Efficiency of HbA1c Test in Hospital	Andrea Aprilia (Indonesia)
12:10-13:00	**Lunch**	

13:00-14:00	**KEYNOTE SPEECH 02: NEW TRENDS ON LABORATORY MEDICINE**	
Chairperson(s)	Lia Gardenia Partakusuma, Anar Damdinsuren	
13:00-13:30	A Novel Mechanism of Autoimmune Hypertriglyceridemia: Identification of GPIHBP1 Autoantibodies	Masami Murakami (Japan)
13:30-14:00	Regulation Mechanism of Multi-drug resistant Acinetobacter baumannii	Chiueh Tzong-Shi (Taiwan)
14:00-15:20	**SYMPOSIUM 02: CLINICAL MICROBIOLOGY**	
Chairperson (s)	Po-Ren Hsueh, Gye Cheol Kwon	
14:00-14:20	Carbapenem non-susceptibility and independent predictors of the carbapenemase production among the Enterobacteriaceae isolates causing intra-abdominal infections in the Asia-Pacific Region: results from the Study for Monitoring the Antimicrobial Resistance Trends (SMART)	Po-Ren Hsueh (Taiwan)
14:20-14:40	Evaluation of Antimicrobial Prescriptions of Bloodstream Infections Caused by Either Klebsiella pneumoniae or Escherichia coli	Osman Sianipar (Indonesia)
14:40-15:00	Diagnostic value of cytomegalovirus (CMV) immunoglobulin M (IgM) and correlations with hematological parameters and liver function test	Lydiana Parmadi (Indonesia)
15:00-15:20	The emerging opportunistic pathogen Abiotrophia defective, a case report and review	Shin-Yi Tsai (Taiwan)
15:20-15:40	**Coffee break**	
15:40-17:00	**SYMPOSIUM 03: HEMATOLOGY**	
Chairperson (s)	Shuji Tohda, Chiueh Tzong-Shi	
15:40-16:00	Next-Generation Sequencing in the detection of secondary mutations as mediators of chemotherapy resistance in leukemia	Anar Damdinsuren (Mongolia/Japan)
16:00-16:20	The Effectiveness of Blood Ordering Being Utilized for Elective General Surgery In Saiful Anwar General Hospital Malang Indonesia	Siti Fatonah (Indonesia)
16:20-16:40	The Proportion and Factors Associated with Clopidogrel Resistance in Patients with Acute Coronary Syndrome and/or Post Percutaneous Coronary Intervention at National Cardiovascular Center, Jakarta	Rahajuningsih Dharma (Indonesia)
16:40-17:00	Cytogenetic Mutation in Families Suffering from Beta Thalassemia Hb Sickle in North Sumatera	Christie Nur Andani (Indonesia)

[illegible] ASCPaLM 2018

[illegible] Sep (Sat)

Blue Sky Hotel Tower, Crystal Ballroom

07:30-08:30	**WASPaLM & ASCPaLM JUNCTION BOARD MEETING (Invitation only)**	
08:30-09:30	**KEYNOTE SPEECH 03: LABORATORY MEDICINE POLICY**	
Chairperson (s)	Hwan Sub Lim, Gansuvd Balgansuren	
08:30-09:00	Proactive Consultation and Patient Safety	Fang-Yeh Chu (Taiwan)
09:00-09:30	Personalized Medicine: It impacts to the future medical laboratory	Lia Gardenia Partakusuma (Indonesia)

09:30-10:50	**SYMPOSIUM 04: CLINICAL IMMUNOLOGY**	
Chairperson (s)	Tjin Shing Jap, Bilegtsaikhan Tsolmon	
09:30-09:50	Reporting rs 9277534 Genotype Using NGS Empirical Data for HLA-DPB1 Expression Level Matching	Gansuvd Balgansuren (USA)
09:50-10:10	Application of P16/Ki-67 Dual Stain in Thin-preparation Anal Pap Smears in Men Who have Sex with Men and Human Immunodeficiency Virus	Shu-Hsing Cheng (Taiwan)
10:10-10:30	Analysis of Antinuclear Antibodies (ANA) Testing with Indirect Immunofluorescence Assay (IFA) and Automated Enzyme-linked Immunosorbent Assay (ELISA) Methods	Dwi Priyadi Djatmiko (Indonesia)
10:30-10:50	15th ASCPaLM Support companies introduction	HUMAN, Mongolpharma
10:50-11:10	**Coffee break**	
11:10-12:30	**SYMPOSIUM 05: CLINICAL ONCOLOGY**	
Chairperson (s)	Hyosoon Park, Lu Jang-Jih	
11:10-11:30	The importance of S1P lyase in the pathophysiology of hepatocellular carcinoma and colon cancer	Uranbileg Baasanjav (Mongolia/Japan)
11:30-11:50	Analysis of Anova protein disulfide isomerase type A member 4 (PDIA4) in tissue, circulation and mRNA levels as biomarkers of early detection of breast cancer metastasis	Stefanus Lembar (Indonesia)
11:50-12:10	Precision medicine for hereditary and oncological disorders	Jan-Gowth Chang (Taiwan)
12:10-12:30	KSLM & MALM MOU	
12:30-13:30	**Lunch**	
13:30-14:30	**KEYNOTE SPEECH 04: NEW TRENDS ON LABORATORY MEDICINE**	
Chairperson(s)	Fang-Yeh Chu, Uranbileg Baasanjav	
13:00-13:30	Recent concept & future development of hemostasis testing	Teruto Hashiguchi (Japan)
13:30-14:00	Korean laboratory accreditation program: present and future	Hwan Sub Lim (Korea)
14:30-15:10	**SYMPOSIUM 06: DIAGNOSTIC NEW APPROACH**	
Chairperson (s)	Rahajuningsih Dharma, Hayato Miyachi	
14:00-14:30	Evolution to microscopic colitis-like change: possible pattern of ulcerative colitis?	K K Prasad (India)
14:30-15:00	The comparison of Expression of Neutrophil Gelatinase-Associated Lipocalin (NGAL) in Serum and Urine among the Pre dialysis Patients and its Relationship	Tinny Endang Hernowati (Indonesia)
15:10-15:30	**CLOSING CEREMONY**	

POSTER PRESENTATIONS:
DIAGNOSTICS ON HEMATOLOGY 01

Title	Poster #
Establishing Reference Intervals for Whole Blood Viscosity Using a Cone-Plate Viscometer in a Korean Population	1-1
The Relationship between Hemoglobin, Ferritin and Serum Transferrin Receptor in Pregnant Women	1-2
The Management of Iron Deficiency Anemia (Ida) and Its Impact - a Nationwide Population Based Cohort Study	1-3
Systemic Lupus Erythematosus with Bone Marrow Dysplasia: Myelodysplastic Syndrome and Aplastic Anemia	1-4
Hemoglobin Shuangfeng (Alpha 27 [B8] Glu Substituted by Lys): the First Instance in Taiwan	1-5
Pancytopenia and Bone Marrow Involvement in Disseminated Histoplasmosis: a Case Report	1-6
Evaluation and application of RNA Fusion Gene Panel for the Patients with Acute Leukemia	1-7
Validation of the Next-Generation Sequencing Assay for the Detection of Actionable Mutations in Acute Lymphoblastic Leukemia	1-8
Development of the Ultra Performance Liquid Chromatography – Tandem Mass Spectrometry Method for the Quantitative Plasticizers in the Blood Bag	1-9
Pilot Study of Pre-Analytical Sample Integrity Checks to Detect Interfering Substance using an Automated Coagulation Analyzer ACL TOP 350 CTS (IL, USA)	1-10

The Relationship between Hemoglobin, Ferritin and Serum Transferrin Receptor in Pregnant Women

Dr. Banundari Rachmawati MD, SpPK(K)[1], Prof. Dr. Hertanto Wahyu Subagio, MD, MS, SpGK(K) [2]

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[2] *Clinical Nutrition department, Faculty of Medicine, Diponegoro University, Semarang Indonesia*

Background: Serum (soluble) transferrin receptor /sTfR measurement is particularly promising for evaluation of iron status when iron deficiency is simultaneously present with overt or sub clinical infection or inflammation. sTfR often used for iron status in pregnancy because it isn't confounded by gestational effect.

Objective: The purpose of this study is to analyse the correlation between Haemoglobin, ferritin and sTfR

Method: Design of this study was analytical study, cross sectional approach. 54 pregnant women 14-24 weeks gestational aged, were taken by using purposive sampling, This study was conducted in Karangawen sub district, Demak district, Central Java Province. Haemoglobin level was determined by hematology analyzer, less than 4 hours after blood sampling, Ferritin and sTfR level were examined by Elisa. SPSS was used for statistical analyses. Pearson correlation and linier regression were used for data analysis

Result: We found there were a negative correlation between haemoglobin and sTfR (r = -0,544, p=0.000) and between ferritin and sTfR (r=-332, p=0,014), There was no correlation between Hb and Ferritin (r=0,202, p=0,202). The linier regression between Hb and *sTfR* was: y = 11,074 – 0,035(x) , which are y = Hb and x = sTfR

Conclusion: The higher the Hb level will be the lower the sTfR level, the higher the level of Ferritin will be the lower the sTfR

Keyword: Pregnant woman, Haemoglobin, Ferritin, STfR

THE CORRELATION BETWEEN HEMOGLOBIN, FERRITIN AND SERUM TRANSFERRIN RECEPTOR IN PREGNANT WOMEN

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ABSTRACT
Background: Serum (soluble) transferrin receptor / sTfR measurement is particularly promising for evaluation of iron status when iron deficiency is simultaneously present with overt or sub clinical infection or inflammation. sTfR often used for evaluation of iron status in pregnancy because it isn't confounded by gestational effect.
Objective: The purpose of this study is to analyze the correlation between Hemoglobin, ferritin and sTfR
Method:
Design of this study was analytic with cross sectional approach. 54 pregnant women, with a gestational age of 14-24 weeks, hemoglobin <11.0 g/dl were obtained by purposive sampling. This study was conducted in Karangawen, Demak, central Java Province. Hemoglobin level was determined by Hematology auto analyzer, less than 4 hours after blood collection. Ferritin and sTfR level were determined by Elisa. Statistical analysis using SPSS, Pearson's correlation and linier regression were used for data analyses
Result: There was a moderate negative correlation between Hemoglobin and sTfR (r = -0,544, p=0.000) . There was no correlation between Hb and Ferritin (r=0,202, p=0,202) and a mild negative correlation between Ferritin and sTfR (r=-332, p=0,014), The linier regression between Hb and *sTfR* was : y=11,074 – 0,035(x), which are y= Hb and x= *sTfR*
Conclusion:
The higher the Hb and Ferritin level will be the lower the sTfR level
sTfR examination is better than ferritin to evaluate iron status in pregnant women

Keyword: Pregnant woman, Hemoglobin, Ferritin, STfR

INTRODUCTION

Anemia is the major nutritional problems in Indonesia and the most common cause is iron deficiency. Iron deficiency anemia is common in all ages and social strata but mainly in children, young women and the elderly. Iron deficiency can be caused by chronic blood lost, inadequate iron intake or absorption and increased requirements as in the period of growth and pregnancy. Although it is known that

iron deficiency is not the only cause of anemia, but if the prevalence of anemia is high then iron deficiency is usually considered the most dominant cause[1,2,3,4,5]

The iron status is determined based on the measurement of three iron pools, which are metabolic pool, reserve pool and transit pool. Determination of metabolic iron pool status is done by measuring hemoglobin levels, if hemoglobin levels is normal, subjects may not have iron deficiency. Another way is measuring red blood cell indices. The reserve pool is determined by measuring serum ferritin levels, when levels below the reference value indicate depletion of iron reserves to iron deficiency. Healthy subjects with low serum ferritin levels were highly correlated with iron deficiency.[6,7,8] Ferritin is an acute-phase protein, its levels will increase in response to inflammation. Growing pregnancy in pregnant women will cause ferritin levels to decrease drastically due to the release of iron deposits to meet the needs of erythrocytes, while hemoglobin levels will decrease as a result of hemodilution, however the determination of iron status using serum ferritin parameters in pregnant women is less accurate [9,10.] Transit pools can be measured directly as serum iron and transferrin, wherein transferrin can also be measured with total iron binding capacity (TIBC) parameters, erythrocyte protoporphyrin and reticulocyte hemoglobin [6.11]

The levels of serum ferritin, serum iron and TIBC in healthy individuals are adequate enough to measure iron status but in patients suffering from infectious or malignant diseases, the use of these parameters are not sufficient to distinguish anemia due to iron deficiency and anemia due to chronic diseases. The most definitive diagnosis in this condition is by iron deposits staining by Perl on bone marrow preparations, but this procedure is not easy and not always workable because it is invasive. Therefore, serum soluble transferrin receptor (sTfR) is a very useful alternative[12,13]

Serum transferrin receptor levels increase in iron deficiency and are not affected by chronic diseases. Various studies concluded that sTfR is a sensitive and specific indicator to determine the iron status. Serum transferrin receptor examination can distinguish between anemia caused by iron deficiency with anemia due to chronic diseases, inflammation, and malignancies[14,15,16,17,18.] This parameter is a specific marker of iron deficiency in pregnancy, since it is not affected by the effects of pregnancy [10.13, 16, 19]

The purpose of this study was to analyze the correlation between Hemoglobin, ferritin and sTfR in pregnant women

METHODS

The study was conducted in Karangawen, Demak, Central Java Province with consideration of anemia prevalence in pregnant women in this district is very high. The target population of this study is pregnant women, the affordable population is pregnant women in Karangawen and Tlogorejo Public Health Services, Demak. The sample size was determined by the premiere health statistic program with α 0.05, power 0.8, the estimated r = 0.4 obtained the number of samples 47, in this study taken 54 samples purposively.

Inclusion criteria: Gestational age 14-24 weeks, Hemoglobin level: <11.0 g / dl (anemia), not suffering from other diseases (hemorrhage, tuberculosis, chronic diarrhea, and disease requiring routine control to the hospital), no hyperemesis gravidarum, has not received iron supplementation and is willing to follow the research (sign the informed consent). The research design used was analytical research with cross sectional approach. Hemoglobin examination was done less than 4 hours after venous blood sampling, using Hematology analyzer at Installation of Clinical Pathology Laboratory of dr Kariadi Hospital Semarang. Determination of serum ferritin and sTfR level using elisa method[19,20]was done in IDD (Iodine Deficiency Disorders) laboratory, sub micronutrient, Faculty of Medicine Diponegoro University. Processing and data analysis using computer, SPSS program. Descriptive analysis is done by making the frequency table, we found that data is normally distributed so that to analyze the correlation between variables is used Pearson's correlation test. In the corresponding result, continued with linear regression test.

RESULT

Characteristics of respondents

The characteristic respondents showed in table 1

Table 1
Characteristics of respondents

Parameter	n	%
Age		
< 20 years	20	37.0 %
20 – 30 years	29	53.7 %
> 30 years	5	9.3 %
total	54	100 %
Gravida		
Primi	28	51,9%
2 - 3	22	40,7%
4 >	4	7,4%
total	54	100%
Abortion		
0	48	88.9%
1	6	11.1%
Total	54	100%
Education		
No formal education	6	11.1%
Elementary School	25	46.3%
Junior High School	17	31.5%
Senior High School	6	11.1%
Total	54	100%

The age of subjects is between 17-35 years which are 37.1% are under 20 years old and 9.3 % are over 30 years old, 51.9 % subjects are primigravida, 11,1% have had abortion, 57.4% up to elementary school and only 11.1% subject graduated from senior high school

The level of serum Ferritin and Serum Soluble Transferin Receptor(sTfR)

Table 2
Level of serum ferritin and *sTfR*

Parameter	n	%
Ferritin		
< 12 ng/ml(Iron deficiency)	14	25.9 %
≥ 12 ng/ml(Iron sufficient)	40	74.1 %
Total	54	
sTfR		
> 28 nmol/L(Iron deficiency)	20	37 %
≤ 28 nmol/L (Iron sufficient)	34	63 %
Total	54	

We found 14 subjects (25.9%) had serum ferritin level below the reference range and 20 subjects(37%) had sTfR level below the reference range(table 2)

Correlation between variables

Table 3
Correlation between serum hemoglobin, ferritin and *sTfR* levels

Variable	Pearson's correlation	Hemoglobin	Ferritin	sTfR
Hemoglobin	r	1	0.176	-0.544**
	p	-	0.202	0.000
Ferritin	r	0.176	1	-0.332*
	p	0.202	-	0.014
sTfR	r	-0.544**	-0.332*	1
	p	0.000	0.014	-

Data analysis using Pearson's correlation test (table3) was obtained a moderate negative correlation between Hemoglobin and sTfR level (r = -0,544, p=0.000). There was no correlation between Hemoglobin and ferritin (r=0,202, p=0,202) .This study also found there was a negative correlation between ferritin and sTfR (r=-332, p=0,014). The linier regression between Hb and *sTfR* was : y=11,074 – 0,035(x) , which are: y=Hb and x=*sTfR*

DISCUSION

There were 54 subjects who met the inclusion criteria, the age in between 17-35 years old, 37.1% under 20 years old and 9.2% above 30 years old. Majority of subject (57,4%) not completing 9 years of basic education. Twenty eight subjects (51,8%) are primigravida, 6 subjects (11,1%) have had abortion. The high number of subjects who are pregnant at the age of < 20 years old are very vulnerable to the fetus being conceived. In accordance with government health policy, the best time for woman to get pregnant at the age of 20-30 years

Evaluation of Iron status based on measurement of three iron pool which are metabolic pool, reserve pool and transit pool. Hemoglobin is used for evaluation of iron status in metabolic pool. When the hemoglobin level is normal, the iron level is sufficient. Transit pool can be measure using the level of serum ferritin, when the

level is below reference range indicate iron depletion to deficiency. Low serum ferritin level in healthy subject correlate with iron deficiency[6,7,8,21,22,23], however Ferritin is an acute phase protein where the level can increase as a response to inflammation. The level of serum ferritin in subject with anemia chronic diseases can increase as an effect of inflammation. This study found 14(25.9%) subject with serum ferritin level below reference range, while 20(37%) subject with sTfR level below reference range.

Subject who have normal ferritin level were 40 people while only 34 people with normal sTfR level, this is likely due to inflammatory factors that cannot be ignored because in this study inflammation marker did not evaluate. Increasing the age of pregnancy will cause drastically decrease of serum ferritin level as the effect of release of iron deposit for erythrocyte metabolism whereas hemoglobin levels decrease as a result of dilution. Consequently, the accuracy of iron status such as ferritin and hemoglobin will decrease in pregnancy. [3,4]

Transit pool can be directly measure as serum Iron and transferrin. Transferrin can be evaluate with Total Iron Binding Capacity (TIBC). Serum iron tend to be decrease in both iron deficiency and inflammation. Total iron binding capacity tend to be increase in iron deficiency and decrease in inflammation condition and chronic diseases. Transferrin saturated percentages which is serum iron / TIBC ratio will decrease in iron deficiency. [6,11]

Serum ferritin levels, serum iron and TIBC in healthy subject adequate enough for evaluate iron status, however using this parameters for subject with infection, malignancy is not accurate to differentiate iron deficiency anemia and anemia chronic diseases. A definitive diagnosis for this case can be done with bone marrow iron staining, however this procedure is invasive and complicated, hence t the stfr parameter can be used as an alternative parameter[13,14]

Transferrin receptors are expressed on the surface of human cells that require iron and works as iron transporter molecule. Transferrin receptor expression depend on iron concentration in cytoplasmic. Transferrin receptors will be cut off when reticulocytes mature and the pieces dissolve in the form of serum soluble transferrin receptors (sTfR). The level of sTfR will increase in iron deficiency and does not affected with chronic diseases. Many studies found that sTfR is a sensitive and specific to determine iron status. Measurement of sTfR can be distinguish

between iron deficiency anemia and anemia chronic diseases, inflammation and malignancies. [12,15,16,17] This parameter is a specific marker for iron deficiency in pregnancy because it is not affected by pregnancy. [10,13,16].

In this study, the number of subject with serum sTfR level below reference range higher than subject with serum ferritin level below reference range that because sTfR more describe functional iron which are not affected by active acute phase reactant and also pregnancy

Based on Pearson's correlation test we found there was a moderate negative correlation between hemoglobin levels and STfR (r = -0,544, p=0.000) which is the higher Hb level, the lower sTfR level. This is in accordance with the theory that Hb is the final and severe stage of iron deficiency. Iron is transported in plasma in complex forms with transferrin. Iron uptake by cell is mediated by transferrin receptor (TfR) which is found on the cell surface, so that the TfR level will be proportional to iron requirements

Circulating TfR will undergo a proteolysis process into a serum soluble transferrin receptor (sTfR) and the amount is proportional to the number of TfR in the cell, because the majority of iron cells are required by erythroid precursor cells therefore sTfR is proportional to erythroid precursor cells. The amount of sTfR will increase in conditions of iron deficiency when cells compete to get iron sufficient. As a consequence, sTfR will be high in patients with hyperplastic anemia such as hemolytic anemia, chronic blood loss and patients with iron deficiency.

There was no correlation between Hb and Ferritin (r=0,202, p=0,202), this is due to the metabolic pool where hemoglobin parameters are used, if hemoglobin levels is normal, the patient may not be iron deficient. While Ferritin describes the reserve pool, if the level below the reference value indicates depletion of iron reserves to iron deficiency. [6,7,8] If the reserve pool runs out it will cause metabolic iron levels to decrease. Ferritin itself is not free from the effects of inflammation and pregnancy.

There was a mild negative correlation between ferritin and *sTfR*(r=-332, p=0,014), it means the higher ferritin levels the lower sTfR levels. If the possibility of inflammation and the effects of pregnancy can be removed, a negative correlation between ferritin and sTfR may be stronger. The analysis was continued with a linear

regression test on the variable with the results of the previous analysis obtained a moderate correlation. Regression results between Hb and sTfR obtained by : y = 11,074 - 0,035 (x), which are y = Hb and x = sTfR. This means that it can be predicted that the Hb value is 11.074 - 0.035 times the sTfR level

CONCLUSION

The higher the Hb and Ferritin level will be the lower the sTfR level. sTfR examination is better than ferritin to evaluate iron status in pregnant women

REFERENCE

1. Stoltzfus RJ, Dreyfuss ML. Guidelines for the use of iron supplements to prevent and treat iron deficiency anemia. International Nutritional Anemia Consultative Group (INACG). Washington : ILSI Press; 1998.
2. Stolzfus RJ. Defining iron-deficiency anemia in public health terms: A time for reflection. J Nutr 2001; 131 Suppl:565-7.
3. Dallman PR, Yip R, Oski FA. Iron deficiency and related nutritional anemias. In: Nathan DG, Oski FA, editors. Hematology of infancy and childhood 4th ed. Philadelphia: WB Saunders Co; 1993: 413-50
4. de Mayer. Pencegahan dan pengawasan anemia defisiensi besi. WHO.Jenewa. Diterjemahkan oleh Ronardy D.H. Jakarta: Widya Medika; 1993.
5. Almatsier S. Prinsip dasar ilmu gizi. Jakarta: Gramedia Pustaka Utama; 2001. 208-12, 239-58
6. Gibson RS. Principles of nutritional assessment. New York: Oxford University Press; 1990:349-75, 520-6, 542-51.
7. Looker AC, Gunter EW, Johnson CL. Methods to assess iron status in various NHANES surveys. Nutr Review 1995; 53: 246-54.
8. Urabe A. Establishing Diagnosis of Anemia. Asian Med J 1999; 42:51-5.
9. Ahluwalia N. Diagnostic utility of serum transferrin receptor measurement in assessing iron status. Nutr Rev 1998; 56:133-41.
10. Akesson A, Bjellerupp J, Berglund M, Bremme K, Vahter Ml.Serum transferrin receptor : a specific marker of iron deficiency in pregnancy. Am J Clin Nutr 1998; 68: 241-6
11. Hoffbrand AV, Pettit JE. Essential haematology. 3rd edition. Carlton: Blackwell Scientific Publications; 1993:12-52.
12. Ferguson BJ, Skikne BS, Simpson KM, Baynes RD, Cook JD. Serum transferrin receptor distinguished the anemia of chronic disease from iron deficiency anemia. J Lab Clin Med 1992; 119:385-90
13. Carriaga MT, Skikne BS, Finley B , Cutler B, Cook JD. Serum transferrin receptor for the detection of iron deficiency in pregnancy. Am J Clin Nutr 1991; 54: 1077-81.
14. Remacha AF, Sarda MP, Parellada M, Ubeda J, Manteiga R. The role of serum transferrin receptor in the diagnosis of iron deficiency. Haematologica 1998; 83:963-6.

15. Sandoval M, Aggio M, Roque M. Multiparametric analysis for the diagnosis of iron deficiency anemia. Medicina B Aires 1999; 59 : 710-6.
16. Zhu-Yi, Haas JD. Response of serum transferrin receptor to iron supplementation in iron depleted, non anemic women. Am J Clin Nutr 1998; 67 : 271-5.
17. Punnonen K, Irjala K, Rajamaki A. Iron deficiency anemia is associated with high concentration of transferrin receptor in serum. Clin Chem 1994; 40:774-6.
18. Lee R. Iron deficiency and iron deficiency anemia. In: Lee Gr, Paraskevas F, Foerster J, Greer JP, Lukens J, Rodgers GM editors. Wintrobe's Clinical hematology 10th ed volume I. Philadelphia: Williams & Wilkins; 1999: 979-1011
19. Lewis SM, Bain BJ, Bates I. Dacie and Lewis practical haematology 10 th ed. Philadelphia: Churchill-Livingstone-Elsevier; 2006: 133-5, 149-50
20. Fairbanks VF, Klee GG. Biochemical aspects of hematology. In: Burtis CA, Ashwood ER editors. Tietz Fundamentals of clinical chemestry 4 th ed .Philadelphia: WB Saunders Company; 1996: 730
21. JB Henry.Clinical diagnosis and management by laboratory methods 17th ed..Philadelphia: WB Saunders Company: 655
22. Hoffbrand AV, Pettit JE, Moss PAH. Kapita selekta hematologi edisi 4. In: Mahanani DA editor. Jakarta: Penerbit buku kedokteran EGC; 2002: 31-2
23. Higgins T, Eckleldt JH, Barton JC, Doumas BT. Hemoglobin, Iron and Bilirubin. In: Burtis CA, Ashwood ED, Bruns DE editors. Tietz Texbook of Clinical Chemistry and molecular diagnostics.5th ed. St Louis Missouri: Elsevier saunders; 2012: 1007-10

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