
Hematologic Parameters in Thai Subjects Over 50 Years Old

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Abstract

Advancing age is associated with the decline of hemoglobin, red blood cell count and other parameters. The conventional normal values of hematologic parameters established by all age populations may not be suitable for the elderly. This study determined the hematologic parameters of Thai subjects aged over 50 years by using a fully automated cell counter. No significant age-related variations of all parameters were found. The MCV of both sexes showed an upward trend at age over 70. The red blood cell count and hemoglobin levels in males were higher than females. These, however, were not significant alterations. These hematologic values should be useful for screening and clinical investigation of the elderly.

The advent of automated cell counter has allowed rapid and precise analysis of hematologic assays. The use of hematologic assays for screening healthy people and investigation of diseases in patients is increasing and is particularly significant in the elderly. It has been shown that hemoglobin value declines with age, possibly due to an overall reduction in hematopoietic reserve^(1,2). There was also a reduction in other red blood cell parameters including hematocrit, red blood cell count and red blood cell indices [mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH),

mean corpuscular hemoglobin concentration (MCHC)]⁽³⁾. As a result of these reductions, old aged populations frequently develop anemia and this may be the most common clinical problems encountered by physicians caring for elderly patients⁽⁴⁾. Therefore, it is considered particularly important to examine the hematologic parameters of every elderly patient. The reason that hematologic quantities have significance individually and as the lower production of hemopoiesis was due to the aging process, normal hematologic ranges only for elderly populations should be used. The aim of

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this study was to evaluate hematologic parameters of subjects aged over 50 and to examine the alterations of such parameters in these old aged populations on account of the aging process.

MATERIAL AND METHOD

Studies were performed in 80 males and 100 females aged 50 to 85 years. They were all apparently healthy joined the check up program on the occasion of H.M. the King's and H.M. the Queen's Birthday celebrations at Ramathibodi Hospital, Mahidol University. They had no nutritional deficiencies or illness, and had not taken any drugs that could interfere with hemopoiesis. All subjects were classified according to their ages into seven age groups as follows : group 1 aged 50 to 55 years, group 2 aged 56 to 60, group 3 aged 61 to 65, group 4 aged 66 to 70, group 5 aged 71 to 75, group 6 aged 76 to 80, and group 7 aged 81 to 85 years.

Venous blood was collected into dipotassium ethylenediaminetetraacetic acid (EDTA) by using 1 mg EDTA/1 ml blood and analysed within 4 hours. The hemoglobin levels, hematocrit, red blood cell count, red blood cell indices [mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC), red blood cell distribution width (RDW), hemoglobin distribution width (HDW)], white blood cell count, differential count of white blood cell, platelet count, platelet distribution width (PDW), and mean platelet volume (MPV) were analysed by the Technicon H-3 Hematology Analyzer (The Technicon Instrument Co., Tarrytown, New York, U.S.A.). This instrument was daily calibrated with the Testpoint, hematology normal control (Bayer Corporation, Tarrytown, New York, U.S.A.). The means, standard deviations and normal ranges were established after excluding the

Table 1. Values of red blood cell parameters as means and standard deviation (X + 2SD) of subjects aged 50-85 years.

Tests	all ages (n=180)	group 1 (n=30) (50-55)	group 2 (n=30) (56-60)	group 3 (n=30) (61-65)	group 4 (n=30) (66-70)	group 5 (n=20) (71-75)	group 6 (n=20) (76-80)	group 7 (n=20) (81-85)
Red blood cell count ($\times 10^6/\mu\text{l}$)	4.4 $\pm$ 1.0 (3.4 - 5.4)	4.6 $\pm$ 0.8 (3.8 - 5.4)	4.7 $\pm$ 0.8 (3.9 - 5.5)	4.6 $\pm$ 1.0 (3.6 - 5.6)	4.6 $\pm$ 1.2 (3.4 - 5.8)	4.2 $\pm$ 1.0 (3.2 - 5.2)	4.6 $\pm$ 1.2 (3.4 - 5.8)	4.4 $\pm$ 0.8 (3.2 - 5.2)
Hemoglobin (g/dL)	13.5 $\pm$ 2.0 (11.5 - 15.5)	13.9 $\pm$ 2.4 (11.5 - 16.3)	13.5 $\pm$ 2.8 (10.7 - 16.3)	13.5 $\pm$ 2.4 (11.1 - 15.9)	13.2 $\pm$ 2.8 (10.4 - 16.0)	12.9 $\pm$ 2.4 (10.5-15.3)	13.8 $\pm$ 1.6 (12.2-15.4)	13.5 $\pm$ 1.8 (11.7 - 15.3)
Hematocrit (%)	44.0 $\pm$ 6.0 (38.0 - 50.0)	44.1 $\pm$ 7.6 (36.5 - 51.7)	44.1 $\pm$ 7.4 (36.7 - 51.5)	43.4 $\pm$ 6.4 (37.0 - 49.8)	42.6 $\pm$ 8.8 (33.8 - 49.5)	41.4 $\pm$ 8.1 (33.8-49.5)	44.1 $\pm$ 4.2 (39.9-48.3)	44.5 $\pm$ 4.0 (40.5 - 48.5)
MCV (fL)	101.2 $\pm$ 8.0 (93.2-109.2)	97.6 $\pm$ 12 (85.6-109.6)	94.2 $\pm$ 10.2 (84.0-104.4)	93.3 $\pm$ 16.0 (77.3-109.3)	96.0 $\pm$ 14.4 (81.6-110.4)	99.0 $\pm$ 11.4 (87.6-10.4)	99.0 $\pm$ 16 (83 - 115)	101 $\pm$ 8.8 (92.2-109.8)
MCH (pg)	30.7 $\pm$ 2.0 (28.7 - 32.7)	30.4 $\pm$ 3.0 (27.4 - 33.4)	28.6 $\pm$ 5.6 (23.0 - 34.2)	29.1 $\pm$ 6 (23.1 - 35.1)	29.2 $\pm$ 7.4 (21.8 - 36.6)	31.5 $\pm$ 5.8 (25.7-37.3)	30.6 $\pm$ 7.8 (22.8-38.4)	30.7 $\pm$ 3 (27.7 - 33.7)
MCHC g/dL	30.3 $\pm$ 1.2 (29.1 - 31.5)	31.5 $\pm$ 1.8 (29.7 - 33.3)	30.7 $\pm$ 2.4 (28.3 - 33.1)	31.3 $\pm$ 3.4 (27.9 - 34.7)	30.9 $\pm$ 3.6 (27.3 - 34.5)	31.3 $\pm$ 1.4 (29.9-32.7)	30.7 $\pm$ 1.6 (29.1-32.3)	30.3 $\pm$ 1.2 (29.1 - 31.5)
RDW (%)	14.0 $\pm$ 1.0 (13.0 - 15.0)	13.5 $\pm$ 1.4 (12.1 - 14.9)	14.0 $\pm$ 2.0 (12.0 - 16.0)	14.3 $\pm$ 2.6 (11.7 - 16.9)	14.2 $\pm$ 2.4 (11.8 - 16.6)	13.8 $\pm$ 1.6 (12.2-15.4)	14.3 $\pm$ 2 (12.3-16.3)	14.0 $\pm$ 1 (13.0 - 15.0)
HDW (g/dL)	2.7 $\pm$ 1.0 (1.7 - 3.7)	2.8 $\pm$ 0.8 (2.0 - 3.6)	2.8 $\pm$ 0.6 (2.2 - 3.4)	2.8 $\pm$ 0.8 (2.0 - 3.6)	2.9 $\pm$ 0.8 (2.1 - 3.7)	2.6 $\pm$ 0.6 (2.0 + 3.2)	2.8 $\pm$ 0.8 (2.0 - 3.6)	2.7 $\pm$ 0.4 (2.3 - 3.1)
% Macrocyte	3.8 $\pm$ 0.8 (3.0 - 4.6)	3.7 $\pm$ 1.7 (2.0 - 5.7)	2.5 $\pm$ 0.5 (2.0 - 3.0)	3.0 $\pm$ 0.5 (2.5 - 3.5)	3.8 $\pm$ 1.8 (2.0 - 4.6)	5.9 $\pm$ 0.6 (5.3 - 6.5)	5.2 $\pm$ 0.5 (4.7 - 5.7)	6.5 $\pm$ 1.9 (4.6 - 7.4)
% Microcyte	1.3 $\pm$ 0.4 (0.9 - 1.7)	0.4 $\pm$ 0.1 (0.3 - 0.5)	2.0 $\pm$ 0.5 (1.5 - 2.5)	1.2 $\pm$ 0.7 (0.5 - 1.9)	2.2 $\pm$ 0.3 (2.1 - 2.5)	1.5 $\pm$ 0.4 (1.1 - 1.9)	1.3 $\pm$ 0.2 (1.1 - 1.5)	1.4 $\pm$ 0.2 (1.2 - 1.6)
Reticulo-cyte count	39622.9 $\pm$ 9432.4 (30190.5 - 49055.3)	38865.3 $\pm$ 6079.8 (32785.5 - 44945.1)	39377.7 $\pm$ 4127.0 (35250.7 - 43504.7)	40296.3 $\pm$ 8379.2 (31917.1 - 4865.5)	39734.6 $\pm$ 4727.4 (35007.2 - 44462.0)	37590.0 $\pm$ 2667.8 (34922.2 - 40257.8)	39113.5 $\pm$ 5392.4 (33721.1 - 44505.9)	38211.5 $\pm$ 5020.4 (33191.1 - 43231.9)

values less or greater than 3 standard deviation from the mean. The effect of age and any significant sex differences between variables were assessed by using an independent sample *t*-Test and one way analysis of variance (ANOVA).

RESULTS

The mean and standard deviations of all hematologic parameters of all age groups are shown in Table 1 and 2. No age related variations were observed in all erythrocyte parameters. Although the values of MCV of subjects aged over 70 (group 5 to group 7) showed an upward trend and correlated with erythrocyte characteristics as the percentage of macroerythrocytes started to elevate at age over 70, but these elevations were not significant alterations. In addition, no significant age-related changes were observed in reticulocyte count, white blood cell count, differential white blood cell count, platelet count and platelet morphology.

The hematologic parameters of both sexes are shown in Table 3. It was found that males had higher but not significant average values of red blood cell count and hemoglobin values than females, while other parameters did not show any difference.

DISCUSSION

Our study showed that no age related changes were observed in any hematologic parameters in subjects aged over 50; and it was found that males, had a higher, but not statistically significant average red blood cell count and hemoglobin level than females. We considered that there were no significant biological variations in hemopoiesis among our subjects when measured by automated cell counter. However, many investigators stated that advancing age was associated with a decline in some hematologic parameters and hematologic

Table 2. Values of white blood cell and platelet parameters as means and standard deviations ($\bar{X} \pm 2SD$) of subjects aged 50-85 years.

Tests	all ages (n=180)	group 1 (n=30) (50-55)	group 2 (n=30) (56-60)	group 3 (n=30) (61-65)	group 4 (n=30) (66-70)	group 5 (n=20) (71-75)	group 6 (n=20) (76-80)	group 7 (n=20) (81-85)
White blood cell count ($\times 10^3$ /uL)	8.0 $\pm$ 2.4 (5.6 - 10.4)	7.8 $\pm$ 1.4 (6.4 - 9.2)	7.1 $\pm$ 2.6 (4.5 - 9.7)	7.5 $\pm$ 2.4 (5.1 - 9.9)	7.3 $\pm$ 2.4 (4.9 - 9.7)	7.2 $\pm$ 2.6 (4.6 - 9.8)	6.7 $\pm$ 2.2 (4.5 - 8.9)	7.5 $\pm$ 2.6 (4.9 - 10.1)
Neutrophil (%)	54.0 $\pm$ 7.0 (47 - 61)	53.8 $\pm$ 6.2 (47.6 - 60)	52.7 $\pm$ 8.6 (44.2 - 61.3)	55.4 $\pm$ 8.7 (46.7 - 64.1)	53.1 $\pm$ 10.1 (43 - 63.2)	54.2 $\pm$ 9.4 (44.8 - 63.6)	57.7 $\pm$ 2.6 (55.1 - 60.3)	52.0 $\pm$ 5.4 (46.6 - 57.4)
Lymphocyte (%)	33.5 $\pm$ 7 (26.5 - 40.5)	32.3 $\pm$ 8.6 (23.7 - 40.9)	35.4 $\pm$ 7.8 (27.9 - 43.2)	32.0 $\pm$ 7.2 (24.8 - 39.4)	33.6 $\pm$ 7.5 (26.1 - 41.1)	34.2 $\pm$ 9.6 (24.6 - 43.8)	29.7 $\pm$ 2.9 (26.8 - 32.8)	36.9 $\pm$ 1.9 (35 - 38.8)
Monocyte (%)	5.0 $\pm$ 1 (4.0 - 6.0)	5.9 $\pm$ 1.4 (4.5 - 7.3)	4.8 $\pm$ 1.3 (3.5 - 5.1)	5.4 $\pm$ 1.6 (3.8 - 7.0)	5.2 $\pm$ 1.3 (3.9 - 6.5)	4.9 $\pm$ 2.1 (2.8 - 7.0)	5.7 $\pm$ 2.6 (3.1 - 8.3)	5.4 $\pm$ 1.9 (3.5 - 7.3)
Eosinophil (%)	3.5 $\pm$ 1.2 (2.3 - 4.7)	4.1 $\pm$ 1.9 (2.2 - 6.0)	3.3 $\pm$ 1.9 (1.4 - 5.2)	2.8 $\pm$ 1.0 (1.8 - 3.8)	3.0 $\pm$ 1.7 (1.3 - 4.7)	3.5 $\pm$ 1.8 (1.7 - 5.3)	2.8 $\pm$ 0.3 (2.5 - 3.1)	2.7 $\pm$ 1.3 (1.4 - 4.0)
Basophil (%)	1.0 $\pm$ 0.5 (0.5 - 1.5)	0.9 $\pm$ 0.5 (0.4 - 1.4)	1.1 $\pm$ 0.4 (0.7 - 1.5)	0.9 $\pm$ 0.4 (0.5 - 1.3)	0.8 $\pm$ 0.2 (0.6 - 1.0)	0.7 $\pm$ 0.3 (0.4 - 1.0)	0.5 $\pm$ 0.3 (0.2 - 0.8)	1.0 $\pm$ 3.0 (0.7 - 1.3)
LUC	3.0 $\pm$ 1 (2 - 4)	3.1 $\pm$ 1.3 (1.8 - 4.4)	2.8 $\pm$ 0.8 (2.0 - 3.6)	2.8 $\pm$ 0.9 (1.9 - 3.7)	2.5 $\pm$ 0.9 (1.6 - 3.4)	2.5 $\pm$ 1.0 (1.5 - 3.5)	2.1 $\pm$ 1.3 (0.8 - 3.4)	3.1 $\pm$ 1.6 (1.5 - 4.7)
Platelet count ($\times 10^3$ /uL)	242.7 $\pm$ 100 (142.7 - 342.7)	263.8 $\pm$ 70 (193.8 - 333.8)	246.7 $\pm$ 80 (16.7 - 326.7)	256.8 $\pm$ 118 (138.8 - 374.8)	251.8 $\pm$ 114 (137.8 - 365.8)	251.8 $\pm$ 128 (123.8 - 379.8)	225.8 $\pm$ 124 (101.8 - 349.8)	242.7 $\pm$ 105 (137.7 - 347.7)
Mean platelet volume (fL)	8.0 $\pm$ 0.5 (7.5 - 8.5)	7.9 $\pm$ 0.6 (7.3 - 8.5)	8.3 $\pm$ 0.9 (7.4 - 9.2)	8.1 $\pm$ 0.7 (7.4 - 8.8)	8.2 $\pm$ 0.9 (7.3 - 9.1)	8.0 $\pm$ 0.7 (7.3 - 8.7)	8.2 $\pm$ 0.4 (7.8 - 8.6)	8.0 $\pm$ 0.8 (7.2 - 8.8)
Platelet distribution width (%)	49.8 $\pm$ 2.5 (47.3 - 52.3)	48.7 $\pm$ 3.8 (44.9 - 52.5)	47.2 $\pm$ 2.2 (45 - 49.4)	49.0 $\pm$ 1.8 (47.2 - 50.8)	48.2 $\pm$ 2.7 (45.5 - 50.9)	50.2 $\pm$ 2.9 (47.3 - 53.1)	49.6 $\pm$ 2.1 (47.5 - 51.7)	51.9 $\pm$ 2.5 (49.4 - 54.4)

Table 3. Values of hematologic parameters as means and standard deviations (X + 2SD) of males and females aged 50-85 years.

Tests	all ages (n=30)	group 1 (n=13) (50-55)	group 2 (n=14) (56-60)	group 3 (n=13) (61-65)	group 4 (n=15) (66-70)	group 5 (n=10) (71-75)	group 6 (n=8) (76-80)	group 7 (n=7) (81-85)
Males								
Red blood cell count ($\times 10^6/\mu\text{L}$)	4.7 $\pm$ 1.2 (3.5 - 5.9)	4.6 $\pm$ 1.0 (3.6 - 5.6)	4.7 $\pm$ 0.8 (3.9 - 5.5)	4.9 $\pm$ 1.2 (3.7 - 6.1)	4.8 $\pm$ 1.4 (3.4 - 6.2)	4.2 $\pm$ 0.8 (3.4 - 5.0)	4.7 $\pm$ 1.0 (3.7 - 5.7)	4.5 $\pm$ 1.5 (3.0 - 6.0)
Hemoglobin (g/dL)	13.7 $\pm$ 2.6 (11.1-16.3)	13.7 $\pm$ 2.8 (10.9-16.5)	13.5 $\pm$ 3.0 (13.0-16.5)	13.9 $\pm$ 2.8 (11.1-16.7)	13.7 $\pm$ 2.2 (11.5-15.9)	13.1 $\pm$ 3.0 (10.1-16.1)	13.6 $\pm$ 0.8 (12.8-14.4)	13.7 $\pm$ 2.2 (11.5-15.9)
Hematocrit (%)	44.0 $\pm$ 7.2 (36.8-51.2)	45.2 $\pm$ 9.2 (36-54.4)	43.3 $\pm$ 8.0 (35.3-51.3)	43.8 $\pm$ 6.2 (37.6-50.0)	44.4 $\pm$ 6.6 (37.8-51.0)	42.4 $\pm$ 6.0 (36.4-48.4)	43.7 $\pm$ 6.2 (37.5-49.9)	45.0 $\pm$ 5.2 (39.8-50.2)
MCV (fL)	95.0 $\pm$ 17.8 (77.2-112.8)	99.2 $\pm$ 11.2 (88.0-110.4)	92.9 $\pm$ 13.8 (79.1-106.7)	91.5 $\pm$ 17.6 (73.9-109.1)	94.3 $\pm$ 19.6 (74.7-113.9)	101.3 $\pm$ 5.8 (95.5-107.1)	97.5 $\pm$ 2.8 (94.7-100.3)	100.3 $\pm$ 3.8 (96.5-104.1)
MCH (pg)	29.5 $\pm$ 7.0 (22.5-36.5)	30.1 $\pm$ 3.0 (27.1-33.1)	27.5 $\pm$ 6.4 (21.1-33.9)	28.5 $\pm$ 6.2 (22.3-34.7)	29.4 $\pm$ 8.0 (21.4-37.4)	33.0 $\pm$ 7.0 (26 - 40.0)	29.7 $\pm$ 1.0 (28.7-30.7)	30.5 $\pm$ 2.8 (27.7-33.3)
MCHC (g/dL)	31.1 $\pm$ 3.4 (28-34.5)	30.9 $\pm$ 1.8 (29.1-32.7)	31.0 $\pm$ 1.4 (29.6-32.4)	31.6 $\pm$ 4.0 (27.6-35.6)	30.8 $\pm$ 4.0 (26.8-34.8)	31.1 $\pm$ 1.0 (30.1-32.1)	30.2 $\pm$ 1.4 (28.8-31.6)	30.5 $\pm$ 1.8 (28.7-31.3)
RDW (%)	14.3 $\pm$ 3.0 (11.3-17.3)	13.8 $\pm$ 2.0 (12.8-15.8)	14.1 $\pm$ 2.0 (12.0-16.0)	14.8 $\pm$ 1.6 (13.2-16.4)	14.2 $\pm$ 1.4 (12.8-16.6)	13.8 $\pm$ 1.6 (12.2-15.4)	14.6 $\pm$ 2.4 (2.2-17.0)	14.3 $\pm$ 1.2 (12.9-15.5)
HDW (g/dL)	2.9 $\pm$ 0.8 (2.1 - 3.7)	2.9 $\pm$ 1.2 (1.7 - 4.1)	2.9 $\pm$ 0.6 (2.3 - 3.5)	2.9 $\pm$ 1.0 (1.9 - 3.9)	2.9 $\pm$ 0.8 (2.1 - 3.7)	2.6 $\pm$ 0.4 (2.2 - 3.0)	2.8 $\pm$ 1.0 (1.8 - 3.8)	2.7 $\pm$ 0.2 (2.5 - 2.9)
White blood cell count $\times 10^3/\mu\text{L}$	7.3 $\pm$ 2.4 (4.9 - 9.7)	7.3 $\pm$ 3.6 (3.7 - 10.9)	5.9 $\pm$ 2.4 (3.5 - 8.3)	8.2 $\pm$ 3.4 (4.8 - 11.6)	7.8 $\pm$ 3.8 (4.5 - 11.6)	6.8 $\pm$ 3.0 (3.8 - 9.8)	5.7 $\pm$ 1.4 (3.3 - 7.1)	6.5 $\pm$ 1.8 (4.7 - 8.3)
Platelet count ($\times 10^3/\mu\text{L}$)	210.7 $\pm$ 40 (170.7-250.7)	267.8 $\pm$ 53.8 (214.0-321.6)	221.8 $\pm$ 32.3 (189.5-254.1)	241.7 $\pm$ 61.4 (180.3-303.1)	246.8 $\pm$ 52.2 (194.6-229)	209.0 $\pm$ 41.8 (167.2-250.8)	197.0 $\pm$ 44.9 (152.1-241.9)	240.5 $\pm$ 70.0 (170.5-310.5)
Females								
Red blood cell count ($\times 10^6/\mu\text{L}$)	4.6 $\pm$ 1.0 (3.6 - 5.6)	4.6 $\pm$ 1.0 (3.6 - 5.6)	4.7 $\pm$ 0.8 (3.9 - 5.5)	4.7 $\pm$ 1.0 (3.7 - 4.7)	4.4 $\pm$ 1.2 (3.2 - 5.6)	4.2 $\pm$ 1.0 (3.2 - 5.2)	4.5 $\pm$ 0.8 (3.7 - 5.3)	4.2 $\pm$ 1 (3.2 - 5.2)
Hemoglobin (g/dL)	13.4 $\pm$ 2.8 (10.6 - 16.2)	13.8 $\pm$ 2.4 (11.4 - 16.2)	13.6 $\pm$ 2.4 (11.2 - 16.0)	13.5 $\pm$ 3.2 (10.3 - 16.7)	12.8 $\pm$ 3.0 (9.8 - 15.8)	12.8 $\pm$ 2.0 (10.8 - 14.8)	14.2 $\pm$ 1 (13.2 - 15.2)	13.1 $\pm$ 1.0 (12.1 - 14.1)
Hematocrit (%)	42.8 $\pm$ 7.2 (35.6 - 50)	43.1 $\pm$ 6.0 (37.1 - 49.1)	41.3 $\pm$ 5.8 (38.5 - 50.1)	43.0 $\pm$ 6.6 (36.4 - 49.6)	41.1 $\pm$ 8.6 (32.5 - 49.7)	40.8 $\pm$ 7.6 (33.2 - 48.4)	44.7 $\pm$ 2.0 (42.7 - 46.7)	43.7 $\pm$ 1.0 (42.7 - 44.7)
MCV (fL)	95.8 $\pm$ 12.4 (83.4-108.2)	95.0 $\pm$ 12.2 (82.8-107.2)	94.5 $\pm$ 11.2 (83.3-105.7)	94.6 $\pm$ 15.0 (79.6-109.6)	97.5 $\pm$ 9.0 (88.5-106.5)	94.0 $\pm$ 13.6 (80.4 - 97.6)	100.6 $\pm$ 16.2 (84.4-116.8)	103.2 $\pm$ 5.0 (98.2-108.2)
MCH (pg)	29.6 $\pm$ 5.6 (24.0 - 35.2)	30.2 $\pm$ 3.0 (27.2 - 33.2)	29.0 $\pm$ 5.4 (23.6 - 34.4)	29.5 $\pm$ 6.0 (23.5 - 35.5)	29.1 $\pm$ 7.2 (21.9 - 36.3)	30.5 $\pm$ 4.6 (25.9 - 35.1)	32.0 $\pm$ 2.4 (29.6 - 34.4)	31.0 $\pm$ 1.0 (30.0 - 32.0)
MCHC (g/dL)	31.1 $\pm$ 2.3 (28.8 - 33.4)	32.0 $\pm$ 1.8 (30.2 - 33.8)	30.7 $\pm$ 2.6 (28.1 - 33.3)	31.1 $\pm$ 3.0 (28.1 - 34.1)	31.0 $\pm$ 2.2 (28.8 - 33.2)	31.4 $\pm$ 1.8 (29.6 - 33.2)	31.5 $\pm$ 0.8 (30.7 - 32.3)	30.0 $\pm$ 1 (29.0 - 31.0)
RDW (%)	13.9 $\pm$ 2.0 (11.9 - 15.9)	13.3 $\pm$ 0.8 (12.5 - 14.1)	13.9 $\pm$ 2.2 (11.7 - 16.1)	13.9 $\pm$ 1.2 (12.7 - 15.1)	14.3 $\pm$ 3.0 (11.3 - 17.3)	13.7 $\pm$ 1.6 (12.1 - 15.3)	13.9 $\pm$ 1.0 (12.9 - 14.9)	13.4 $\pm$ 1.0 (12.4 - 14.4)
HDW (g/dL)	2.8 $\pm$ 0.6 (2.2 - 3.4)	2.7 $\pm$ 0.4 (2.3 - 3.1)	2.8 $\pm$ 0.6 (2.2 - 3.4)	2.8 $\pm$ 0.8 (2.0 - 3.6)	2.9 $\pm$ 0.6 (2.3 - 3.5)	2.6 $\pm$ 0.6 (2.0 - 3.2)	2.8 $\pm$ 1.0 (1.8 - 3.8)	2.7 $\pm$ 1.0 (1.7 - 3.7)
White blood cell count $\times 10^3/\mu\text{L}$	7.3 $\pm$ 2.0 (5.3 - 10.3)	8.2 $\pm$ 3.2 (5.0 - 11.4)	7.4 $\pm$ 3.4 (4.0 - 11.8)	6.9 $\pm$ 3.2 (3.7 - 10.1)	7.0 $\pm$ 2.0 (5.0 - 9.0)	7.5 $\pm$ 2.0 (5.5 - 9.5)	8.1 $\pm$ 3.4 (4.7 - 11.5)	9.5 $\pm$ 2.0 (7.5 - 11.5)
Platelet count ($\times 10^3/\mu\text{L}$)	248.7 $\pm$ 50.5 (198.2-259.2)	260.9 $\pm$ 41.9 (216.1-302.8)	253.4 $\pm$ 40.1 (213.3-293.5)	246.6 $\pm$ 50.3 (196.3-296.9)	265.9 $\pm$ 78.8 (187.1-344.7)	273.2 $\pm$ 84.4 (188.8-357.6)	269.0 $\pm$ 70.5 (198.5-339.5)	247.0 $\pm$ 50.0 (197.5-297.0)

quantities have significance individually^(5,6). Therefore, the conventional reference values established by all age populations used for screening of healthy people and clinical investigation of diseases may not be suitable for the elderly. Moreover, subject specific values will allow better assessment of subsequent results⁽⁷⁾. We assert that normal ranges of hematologic parameters for the elderly should be necessary. The values of hematologic parameters

reported in this study would be more appropriate and useful for the elderly than those obtained from reference values studied from all age populations in order to diagnose or work up of anemia or other diseases in the elderly. However, because of the small sample size of subjects aged over 66, the hematocrit and hemoglobin values seem to be lower than other subgroups. More studies of these age groups must be established.

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REFERENCES

1. Kelly A, Munan I. Hematologic profile of normal populations : Red cell parameters. *Br J Hematol* 1977; 35: 153-60.
2. Lipschitz DA, Mitchell CO, Thompson C. The anemia of senescence. *Am J Hematol* 1981; 11: 47-54.
3. Fraser CG, Wilkinson SP, Neville RG, et al. Biologic variation of common hematologic laboratory quantities in the elderly. *Am J Clin Path* 1989; 92: 463-70.
4. Baisden R. Hematologic problems of the elderly. *Hosp Prac* 1978; 13: 93-104.
5. Skendzel LP. How physicians use laboratory tests. *JAMA* 1978; 243: 1079-80.
6. Besa EC. Approach to mild anemia in the elderly. *Clin Geriatr Med* 1988; 4: 43-55.
7. Gilsanz F, Gomez-Tabera C, Torres M, et al. Reference values in the diagnosis of anemia in the elderly. *Rev Clin Esp* 1996; 196: 289-92.

ค่าปกติทางโลหิตวิทยาของประชากรไทย ที่มีอายุตั้งแต่ 50 ปีขึ้นไป

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อายุที่มากขึ้นจะทำให้มีการเปลี่ยนแปลงของส่วนประกอบของเลือด มีผู้รายงานว่ ฮีโมโกลบิน จำนวนเม็ดเลือดแดงและส่วนประกอบอื่น ๆ ของเลือดจะลดลงในคนสูงอายุ ดังนั้นจึงควรมีค่าปกติทางโลหิตวิทยาสำหรับผู้สูงอายุ การศึกษานี้ได้รายงานค่าปกติทางโลหิตวิทยาของประชากรไทยอายุตั้งแต่ 50 ปีขึ้นไป พบว่าไม่มีความสัมพันธ์ระหว่างอายุกับผลการตรวจสอบทางโลหิตวิทยาในคนที่มียอายุตั้งแต่ 50 ปีขึ้นไป ถึงแม้ว่าจะพบว่า MCV ของทั้งเพศหญิงและเพศชายอายุตั้งแต่ 70 ปีขึ้นไปจะมีค่าสูงขึ้น แต่ก็ไม่มีนัยสำคัญทางสถิติ อย่างไรก็ตามค่าปกติในผู้สูงอายุเกิน 50 ปีก็มีความสำคัญในการตรวจสอบและตรวจภาวะของโรคต่าง ๆ ในผู้สูงอายุ เพื่อการตรวจสอบและวินิจฉัยโรคของผู้สูงอายุจะได้ความถูกต้องและแม่นยำขึ้น

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