Reference values of Neutrophil-Lymphocyte Ratio, Lymphocyte-Monocyte Ratio, Platelet-Lymphocyte Ratio, and Mean Platelet Volume in healthy adults in South Korea

Department of Anesthesiology and Pain Medicine, Anesthesia and Pain research Institute, Yonsei University College of Medicine

Jeong Soo Lee, Na Young Kim, Se Hee Na, Cheung Soo Shin

Background

❖ With the correlation between inflammatory status and disease or cancer prognosis, there is a growing interest in research aimed at better understanding the disease status or predicting the prognosis of patients with simple blood tests.

❖ The NLR, LMR, PLR and MPV, which can be measured in simple blood tests, is easily obtained, and determined in a cost-effective manner. .

❖ Currently, there is no standardized level of measurement demonstrating the significance of a value when it is higher than that of the average healthy patient. Therefore, the present study was designed to evaluate the gender- and age-specific reference values of NLR, LMR, PLR, and MPV according from blood samples taken from a healthy patient population.

Method

❖ This retrospective study was approved by the Institutional Review Board (IRB) of Gangnam Severance Hospital, Yonsei University College of Medicine, Seoul, South Korea (protocol number: 3-2016-0281; date of approval: December 2016).

❖ From January 2014 to December 2016, data from routine blood analyses were collected from healthy patients in the checkup center of a tertiary hospital.

❖ Retrospective data review was then performed on an electronic medical record system. Data were treated anonymously as only age, gender, BMI, medical history including cancer diagnosis, and smoking status were considered.
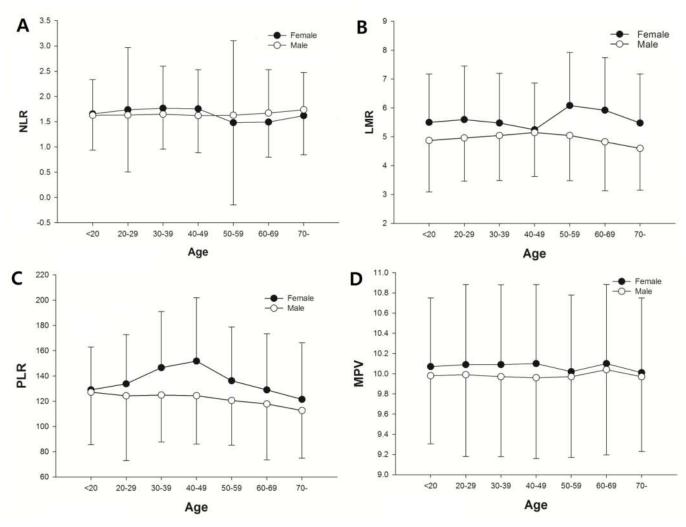
Table 1. Basic sample characteristics (n=12160)

	Categories	Subject tested
Gender	Male	6268 (51.5%)
	Female	5892 (48.5%)
Age (yrs)	Male	46.64 (10.79)
	Female	45.99 (11.14)
BMI (kg/m²)	<18.5	633 (5.2%)
	18.5-24.9	8044 (66.15%)
	25-29.9	2931 (24.10%)
	>30	441 (3.63%)

BMI, body mass index. Values are mean (SD), or number (proportion).

Results

❖ From January 2014 to December 2016, 20,122 patients visited the health checkup and received a routine blood analysis that included assessment of differential counts of white blood cells. After the initial data screen, we had a collection of 12,160 samples from patients without any medical history, including cancer treatment (Table1)..

❖ NLR, LMR, PLR, and MPV were analyzed based on gender and age (Table 2, Figure 1). .

Fig 1. NLR, LMR, PLR, MPV in men and women in different age groups. NLR, neutrophil-to- lymphocyte ratio; LMR, lymphocyte-to-monocyte ratio; PLR, platelet-to-lymphocyte ratio; MPV, mean platelet volume. Data shown are mean (standard deviations) of mean in men and women, respectively, in each age group,

Conclusions

❖ This study provides preliminary reference data on NLR, LMR, PMR, and MPV from different age and gender groups in South Korea. The data suggest that **different cutoff values should be set according to race and age**.

❖ *Despite being inexpensive and easy, the application of hematologic markers in clinical practice can be challenging because of a lack of standardization and evidence.*

Table 2. NLR, LMR, PLR, MPV representing reference value according to age.

	Total		Age	-19	20-29	30-39	40-49	50-59	60-69	70-
NLR	1.65 (0.107-3.193)	F	1.662 (0.064-3.260)	1.654 (0.326-2.982)	1.736 (-0.682-4.153)	1.765 (0.136-3.394)	1.754 (0.238-3.271)	1.481 (0.121-2.841)	1.493 (0.129-2.856)	1.618 (0.100-3.136)
		M	1.634 (0.144-3.125)	1.627 (0.274-2.979)	1.631 (0.151-3.111)	1.647 (0.289-3.006)	1.620 (0.182-3.058)	1.626 (0.016-3.237)	1.671 (0-3.355)	1.735 (0.286-3.184)
LMR	5.31 (2.008-8.612)	F	5.598 (2.130-9.067)	5.498 (2.219-8.778)	5.595 (1.953-9.237)	5.476 (2.095-8.857)	5.243 (2.067-8.418)	6.081 (2.481-9.681)	5.920 (2.356-9.483)	5.476 (2.157-8.794)
		M	5.048 (2.000-8.096)	4.870 (1.374-8.366)	4.957 (2.023-7.891)	5.042 (1.995-8.088)	5.147 (2.161-8.134)	5.042 (1.980-8.104)	4.823 (1.502-8.143)	4.596 (1.752-7.440)
PLR	132.40 (46.794-218.006)	F	142.759 (52.026-233.491)	128.976 (62.324-195.62)	133.747 (57.275-210.218)	146.600 (59.489-233.71 2)	151.780 (53.371-250.18 9)	136.221 (52.732-219.71 0)	128.949 (41.929-215.96 9)	121.429 (33.601-209.25 6)
		M	122.726 (46.962-198.491)	127.126 (45.464-208.78 7)	124.242 (**23.661**-224.823)	124.884 (52.123-197.64 4)	124.338 (49.324-199.35 3)	120.515 (51.374-189.65 5)	117.836 (30.876-204.96)	112.600 (38.628-186.57 2)
MPV	10.020 (8.471-11.570)	F	10.066 (8.541-11.590)	10.074 (8.742-11.407)	0.092 (8.537-11.647)	10.088 (8.537-11.639)	10.098 (8.565-11.631)	10.015 (8.528-11.503)	10.013 (8.489-11.537)	10.011 (8.562-11.460)
		M	9.975 (8.407-11.542)	9.983 (8.659-11.307)	9.989 (8.400-11.577)	9.966 (8.415-11.517)	9.965 (8.398-11.532)	9.975 (8.407-11.542)	10.040 (8.386-11.693)	9.967 (8.518-11.417)

NLR, neutrophil-to- lymphocyte ratio; LMR, lymphocyte-to-monocyte ratio; PLR, platelet-to-lymphocyte ratio; MPV, mean platelet volume. Unit: MPV,iL.