Aging and high-altitude polycythemia

CHIODI, HUGO. Aging and high-altitude polycythemia. J. Appl. Physiol.: Respirat. Environ. Exercise Physiol. 45(6): 1019-1020, 1978. - No correlation was found between hemoglobin, hematocrit, or red blood cells and age in 42 healthy mixed Indians living at 4,515 m above sea level. The discrepancy of our results with those of Whittembury and Monge in similar conditions and altitude is discussed and the need for further studies emphasized.

hemoglobin; hematocrit; erythrocytes

To the Editor: The effect of aging on the polycythemia of high-altitude dwellers is still unclear. In reviewing their data on healthy volunteers living in Peru at Morococha, 4,540 m, Cerro de Pasco, 4350 m, and Puno, 3,800 m above sea level, Whittembury and Monge (4, 9) found a pronounced increase in hematocrit with age particularly in Morococha residents. The magnitude of the hematocrit increase reported by these authors and its obvious implications to the health of high-altitude inhabitants prompted us to review our data on the hematologic parameters, as related to age, of healthy mixed Indian males, most of them born above 2,000 m altitude and living permanently in the northwest Argentina at 2,078, 2,939, and 4,515 m above sea level. Hemoglobin values from 42 healthy males (age 22-57 yr) who had been living for 1-22 yr at 4,515 m are plotted against age in Fig. 1. No significant correlation \((r = 0.13)\) between hemoglobin levels and age or length of residence at 4,515 m (2) is shown. It seems worthwhile to mention that in our two oldest subjects, 56 and 57 yr, who lived 22 yr at 4,515 m, hemoglobin was 18.2 and 19.6 g/dl, respectively, well within the normal average for that altitude (2, 3). On the other hand, a hemoglobin value of 22.3 g/dl was present in a 23-yr-old man with only 1 yr of residence at 4,515 m. When hematocrit or red blood cell values from the same 42 highlanders were plotted against age a similar lack of correlation as for hemoglobin was observed. No significant correlation existed between hemoglobin, hematocrit, or red blood cells and age in 41 healthy males, age 20-58 yr, permanent residents at 2,078 m, and 58 healthy males, age 15-58 yr, permanent residents at 2,939 m above sea level.

The discrepancy between our results and those of Whittembury and Monge cannot be explained by differences in racial background, ecology, or measurement techniques because, in both studies, all these factors are similar. In our study hemoglobin values were determined by oxygen hemoglobin capacity, which is more reliable than hematocrit readings, particularly in presence of polycythemia. It seems more likely that the difference between the results of the two investigations could be due to a different age distribution of the subjects. The age of the residents in Morococha at 4,540 m ranged from 4 to 32 yr with about half of them under 18 yr of age, whereas none of our subjects residents at 4,515 m were below 22 yr of age. In lowlanders hemoglobin, hematocrit, and red blood cells undergo a progressive increase from about 1 to 18 yr of age, thereafter remaining rather constant to old age (1, 5-8, 10).

According to Whittembury and Monge, at high altitude the increase in hematocrit with age will not plateau off after age 20 yr. The equation from regression analysis obtained from their data at 4,540 m predicts a hematocrit of about 75% at the age of 30 yr. Because none of their subjects were over 32 yr of age, extrapolation to increased ages makes it impossible to know what could actually happen. In our opinion, to determine the influence of age on high-altitude polycythemia young-sters below 20 yr of age should be separated from the older age groups to avoid a possible bias on the regression line due to the physiological progressive increase of the hematologic parameters between 1 and 18 yr of age. Our data based on a group of older residents at a similar altitude contradict their conclusions and tends to confirm bias of the younger groups data on the overall results.

Considering the importance to the health of the inhabitants of high altitudes a greater number of hematologic measurements on high-altitude populations of both sexes, at various ages of the same individual, are needed to reach firmly established conclusions on the influence of age on high altitude polycythemia.
REFERENCES


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