

A RACIAL DIFFERENCE IN ERYTHROCYTE SEDIMENTATION

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Erythrocyte sedimentation rate (ESR) was examined in blacks and whites aged 18 to 74 years in the first National Health and Nutrition Examination Survey (NHANES I). In each age and sex group, median ESR was 2 mm/hr to 13 mm/hr higher in blacks than in whites even after exclusion of persons with extreme hemoglobin values or history of conditions affecting ESR. Apparently healthy blacks were more likely than whites to have elevated ESR greater than 20 mm/hr in women and 9 mm/hr in men. These data suggest a racial difference in ESR that is independent of age, hemoglobin concentration, and certain chronic diseases. (*J Natl Med Assoc.* 1993;85:47-50.)

Key words • erythrocyte sedimentation
• hemoglobin • blacks

In the United States, blacks in the general population had lower hemoglobin concentrations and total white blood cell counts compared to whites in a national survey.^{1,2} However, no reports were found of racial differences in erythrocyte sedimentation rate (ESR). Because substantial differences in population distribution by race might effect the use of ESR as a sickness index for an occult or suspected disease,³ data are presented from the first National Health and Nutrition Examination Survey (NHANES I) suggesting higher ESRs in healthy blacks compared to whites.

METHODS

In 1971 to 1974, NHANES I collected hematologic

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and other health data for a scientifically designed sample representative of the civilian noninstitutionalized population of the United States aged 1 to 74 years.^{1,4,5} This report is restricted to nonpregnant persons aged 18 to 74. Erythrocyte sedimentation rate was measured by an adaptation of the Wintrobe method that yielded mean values systematically higher than those usually reported because of unknown factors. The minimum ESR was 1 mm/hr and the maximum 72 mm/hr. For this reason, absolute mean values of ESR are not given, since they would not correspond to the usual clinical ranges of normal. Results are reported as black-white differences. However, since both blacks and whites were measured with the same method, this should not effect black-white comparisons within this population.

To exclude persons with anemia, polycythemia, or other conditions affecting ESR from selected analyses, the following exclusion criteria were used:

- hemoglobin concentration below the sex-specific third (males 13 g/100 mL, females 11.4 g/100 mL) or above the 97th percentile (males 17.8 g/100 mL, females 15.9 g/100 mL) of the nonpregnant sample,
- positive response to interview questions, "Has a doctor ever told you that you had any of the following conditions?" and "Do you still have it?" for these conditions: arthritis, gout, chronic bronchitis or emphysema, tuberculosis, rheumatic fever, heart failure, enteritis (recurrent or chronic), colitis, spastic colon, mucous colitis, hepatitis, thyroid disease, kidney disease, pleurisy, malignant tumor or growth, or trouble with blood not clotting properly,
- current use of birth control pills.

In general, other variables from the physical and laboratory examination were either not relevant or available only for a portion of the population. Exclusion of persons with oral body temperature greater than 37.6° C or a total white blood cell count greater than 12 000 cells/mm³ resulted in essentially the same racial

TABLE 1. EXCESS ERYTHROCYTE SEDIMENTATION RATE (BLACK-WHITE, MM/HR) IN BLACK COMPARED TO WHITE PERSONS* AGED 18-74 YEARS BY AGE AND SEX, UNITED STATES 1971-1974

| Age | No. of White | No. of Black | Black ESR—White ESR (mm/hr) | | |
|--------------|--------------|--------------|-----------------------------|--------|-----------------|
| | | | Mean | Median | 95th Percentile |
| Men | | | | | |
| 18-24 | 581 | 117 | 2.85 | 3 | 0 |
| 25-34 | 626 | 110 | 2.65 | 3 | 3 |
| 35-44 | 508 | 76 | 2.10 | 4 | 2 |
| 45-54 | 573 | 120 | 2.33 | 3 | 7 |
| 55-64 | 462 | 69 | 7.59 | 11 | 17 |
| 65-74 | 1212 | 258 | 6.18 | 6 | 4 |
| Women | | | | | |
| 18-24 | 989 | 262 | 5.92 | 4 | 14 |
| 25-34 | 1350 | 289 | 5.00 | 6 | 10 |
| 35-44 | 1172 | 300 | 6.44 | 7 | 10 |
| 45-54 | 649 | 116 | 8.69 | 10 | 8 |
| 55-64 | 500 | 104 | 4.88 | 3 | 6 |
| 65-74 | 1354 | 278 | 5.87 | 6 | 6 |

Abbreviations: ESR = erythrocyte sedimentation rate.

*Pregnant women excluded.

differences as presented here. Statistical analysis was performed using the Statistical Analysis System (SAS) for preliminary unweighted and for final weighted analyses including the procedures SESUDAAN, PCTL, TABULATE, and GLM.⁶⁻⁸

RESULTS

At each age, median ESR was 2 mm/hr to 11 mm/hr higher in blacks than in whites among men and 2 mm/hr to 13 mm/hr higher among women, even after exclusion of persons with extreme hemoglobin values and history of conditions affecting ESR (Tables 1 and 2). Because of the small numbers of black men and 55- to 64-year-old black women, the differences in the 95th percentiles were less consistent in these groups. However, the 95th percentiles were consistently higher in black women than in white women by 1 mm/hr to 17 mm/hr after exclusions. Significantly greater percents of black women than white women had ESR greater than 20 mm/hr under age 55 (ages 18 to 74, $Z = 4.27$, $P < .0001$). The percent of black men with ESR greater than 9 mm/hr was generally greater than that of white men with negative histories (ages 18 to 74, $Z = 3.15$, $P < .002$) (Table 3). These results were supported by an unweighted analysis of covariance with the log of ESR as the dependent variable and race, age, and hemoglobin as independent variables. Before and after the exclusions listed above, black race was significantly associated with higher log ESR in men

($P = .0001$) and women ($P = .0001$). Significant interactions were seen for race with age and hemoglobin in men only. The age interaction is apparent in Tables 1 and 2. The positive coefficient of the race-hemoglobin interaction term indicates larger black-white differences at higher hemoglobin values in men.

DISCUSSION

These data suggest a racial difference in ESR that is independent of age, hemoglobin concentration, and chronic diseases. The mechanism is unclear. Although plasma fibrinogen and gamma globulin concentrations were not measured in NHANES I, serum total protein concentration was slightly higher and serum albumin slightly lower in blacks than in whites. Higher gamma globulin levels have been reported in blacks than whites.⁹ Smoking was not related to ESR in an NHANES I subsample. Although it cannot be excluded, incomplete ascertainment of conditions associated with elevated ESRs seems unlikely to explain the findings. Analyses of data from the south region confirmed the racial difference, excluding bias arising from examination location or season.

Further research is needed to confirm the existence of racial differences in ESR in normals. If confirmed, the cause of the differences should be sought by investigations of levels of ESR, fibrinogen, and gamma globulin by race. Further studies might also determine whether

TABLE 2. EXCESS ERYTHROCYTE SEDIMENTATION RATE (BLACK-WHITE, MM/HR) IN BLACK COMPARED TO WHITE PERSONS* AGED 18-74 YEARS BY AGE AND SEX, UNITED STATES 1971-1974

| Age | No. of White | No. of Black | Black ESR—White ESR (mm/hr) | | |
|--------------|--------------|--------------|-----------------------------|--------|-----------------|
| | | | Mean | Median | 95th Percentile |
| Men | | | | | |
| 18-24 | 518 | 89 | 2.65 | 4 | -1 |
| 25-34 | 525 | 95 | 2.95 | 3 | 4 |
| 35-44 | 393 | 59 | 2.48 | 4 | 0 |
| 45-54 | 386 | 80 | 2.51 | 2 | 0 |
| 55-64 | 242 | 35 | 6.26 | 11 | 4 |
| 65-74 | 594 | 116 | 4.85 | 6 | 3 |
| Women | | | | | |
| 18-24 | 545 | 136 | 6.13 | 5 | 17 |
| 25-34 | 736 | 156 | 5.79 | 6 | 15 |
| 35-44 | 668 | 170 | 6.39 | 7 | 11 |
| 45-54 | 321 | 59 | 9.68 | 13 | 7 |
| 55-64 | 224 | 44 | 2.94 | 2 | 1 |
| 65-74 | 484 | 92 | 6.27 | 7 | 5 |

Abbreviations: ESR = erythrocyte sedimentation rate.

*Pregnant women and persons with selected conditions associated with alterations in erythrocyte sedimentation rate excluded.

TABLE 3. EXCESS ELEVATED ERYTHROCYTE SEDIMENTATION RATE (BLACK-WHITE) IN BLACK COMPARED TO WHITE PERSONS AGED 18-74 YEARS BY AGE AND SEX, UNITED STATES 1971-1974

| Age | All Persons* | | Persons Without Selected Conditions† | |
|--|--------------------|-------|--------------------------------------|-------|
| | Percent Difference | z | Percent Difference | z |
| Men (Black-White Percent ESR > 9 mm/hr) | | | | |
| 18-24 | 17.14 | 2.77‡ | 10.45 | 1.73 |
| 25-34 | 11.92 | 1.77 | 13.33 | 1.96§ |
| 35-44 | 19.42 | 2.44§ | 16.50 | 2.07§ |
| 45-54 | 11.58 | 1.66 | 6.85 | 1.07 |
| 55-64 | 23.39 | 2.34§ | 6.07 | 0.74 |
| 65-74 | 9.97 | 2.12§ | 0.00 | 0.00 |
| Women (Black-White Percent ESR > 20 mm/hr) | | | | |
| 18-24 | 16.74 | 3.40‡ | 8.51 | 2.45§ |
| 25-34 | 17.77 | 5.22‡ | 10.29 | 3.51‡ |
| 35-44 | 23.28 | 5.16‡ | 16.19 | 5.12‡ |
| 45-54 | 34.46 | 5.44‡ | 24.35 | 3.33‡ |
| 55-64 | 12.76 | 1.72 | 0.46 | 0.12 |
| 65-74 | 12.75 | 2.37§ | 1.15 | 0.29 |

Abbreviations: ESR = erythrocyte sedimentation rate.

*Pregnant women excluded.

†Pregnant women and persons with selected conditions associated with alterations in ESR excluded.

‡ $P < .01$ from two-tailed z test of difference in proportions.

§ $P < .05$ from two-tailed z test of difference in proportions.

racial differences in ESR should be taken into account in interpreting ESR in clinical settings, especially in women under age 55.

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