UNIVERSITÀ DEGLI STUDI FIRENZE

FLORE
Repository istituzionale dell'Università degli Studi di Firenze

Twenty-four-hour blood pressure changes in young Somalian blacks after migration to Italy

Questa è la Versione finale referata (Post print/Accepted manuscript) della seguente pubblicazione:

Original Citation:

Twenty-four-hour blood pressure changes in young Somalian blacks after migration to Italy / P.A. MODESTI; TAMBURINI C; HAGI MI; CECIONI I; MIGLIORINI A; NERI SERNERI GG. - In: AMERICAN JOURNAL OF HYPERTENSION. - ISSN 0895-7061. - STAMPA. - 8:(1995), pp. 201-205. [10.1016/0895-7061(94)00189-I]

Availability:

This version is available at: 2158/213791 since:

Published version:

DOI: 10.1016/0895-7061(94)00189-I

Terms of use:

Open Access

La pubblicazione è resa disponibile sotto le norme e i termini della licenza di deposito, secondo quanto stabilito dalla Policy per l'accesso aperto dell'Università degli Studi di Firenze (https://www.sba.unifi.it/upload/policy-oa-2016-1.pdf)

Publisher copyright claim:

(Article begins on next page)

12 October 2024

AJH 1995; 8:201–205

Twenty-Four-Hour Blood Pressure Changes in Young Somalian Blacks After Migration to Italy

Pietro Amedeo Modesti, Carlo Tamburini, Mohamed Isse Hagi, Ilaria Cecioni, Angela Migliorini, and Gian Gastone Neri Serneri

Blood pressure changes induced by migration from Somalia to Italy were studied in 25 normotensive clinically healthy blacks (aged 29 ± 6 years) who had immigrated from Mogadishu to Florence. Basal and 24-h ambulatory blood pressure, venous compliance, and daily urinary electrolyte excretion were measured on arrival and 6 months later.

After 6 months both basal pressure ($P < .05$ for systolic blood pressure, $P < .01$ for diastolic blood pressure) and 24-h blood pressure ($P < .004$ for systolic blood pressure, $P < .01$ for diastolic blood pressure) had significantly increased. Urinary sodium excretion had also increased ($P < .001$), whereas plasma renin activity was significantly reduced ($P < .05$). The ambulatory pressure increase was significantly related to the urinary sodium increase ($r = 0.49$; $P < .01$). At follow-up 8 of 25 blacks were hypertensive according to the WHO definition (basal diastolic blood pressure >90 mm Hg).

In conclusion, an increase in 24-h blood pressure is detectable after immigration and changes seems to be mainly related to higher sodium intake in the Western diet. Am J Hypertens 1995;8:201–205

KEY WORDS: **Ambulatory monitoring, blood pressure, longitudinal study, blacks, immigration.**

Blacks living in Western countries have higher blood pressure levels and a three- to fivefold greater death rate from hypertension than whites.[1,2] This considerable difference, observed in blacks of all ages, has been related to both genetic and environmental factors, such as increased sodium sensitivity[3,4] and the lower income and substandard health care facilities that blacks often face in Western countries.[5,6]

Immigration studies are a useful tool to evaluate the effects of environmental factors. Previous longitudinal studies concerning migration of blacks to urban areas in New Zealand,[7] Kenya,[8] and Israel,[9] were performed by measuring changes in resting blood pressure. Ambulatory blood pressure monitoring could be a more useful tool to assess the effects of environmental changes, as it gives a more representative index of blood pressure levels than isolated resting readings. Moreover, differences have been reported between resting and ambulatory blood pressure response to changes in sodium intake.[10]

The aim of the present study was to evaluate the effects of migration in a group of young normotensive blacks, in whom the biasing effects of inequalities of income and difficult access to effective health care had been eliminated to a great extent. Changes in ambulatory blood pressure induced by immigration were studied in black immigrants who received a standard diet and found employment after their arrival in Italy.

Received March 4, 1994. Accepted September 26, 1994.
From the Clinica Medica I, Florence, Italy.
Address correspondence and reprint requests to Pietro Amedeo Modesti, MD, PhD, Clinica Medica I, Center for the Heart and Thrombosis Research, University of Florence, Viale Morgagni 85, 50134 Florence, Italy.

© 1995 by the American Journal of Hypertension, Ltd.

0895-7061/95/$9.50
0895-7061(94)00189-I

METHODS

Subjects Investigated and Enrollment Procedure The group most represented in all the Somalian people who immigrated to Florence from Somalia between January and December 1992 (n = 59 subjects), was the Hawiye tribe (n = 51, 86%) and this ethnic group was chosen for our study to have a homogeneous population.

Within 2 days of their arrival in Florence, the Somalians applied to a Somalian community social center and were invited to complete a questionnaire asking for details of clinical history, family history, weight, height, smoking habits, alcohol consumption, and current drug treatment (including contraceptive drugs). Normotensive healthy subjects younger than 40 years were immediately invited to participate in the study.

Of 51 Hawiyes, 5 (9.8%) were not present on the examination day; 9 (17.6%) declined participation in the study; 3 (5.8%) were not included because of marked obesity (body mass index >28 kg/m^2) or hypertension (diastolic blood pressure >90 mm Hg); 9 (17.6%) were excluded because they were older than 40 years. The remaining 25 subjects (16 men, 9 women) aged 29 ± 6 years (range, 24 to 39 years) gave their consent to participate in the study and were enrolled.

All the subjects investigated were Moslems and did not consume alcohol.

Experimental Procedure All participants underwent measurement of basal and 24-h ambulatory blood pressure and of venous compliance. Blood was withdrawn and 24-h urine was collected for measurement of plasma renin activity and plasma and urinary electrolytes (sodium and potassium). All these measurements were repeated 6 months later.

Blood Pressure Measurement Basal pressure values were measured in the sitting position by a physician on two occasions at a 1-day interval, using a mercury sphygmomanometer according to the recommendations of the American Society of Hypertension.[11] The diastolic pressure was considered at Korotkoff phase 5 and the systolic pressure at phase 1. The mean values of the two office measurements were used in the analysis.

Twenty-four-hour blood pressure was monitored with a portable automatic noninvasive device (ICR-90207; SpaceLabs, Redmond, WA)[12] programmed to take measurements every 20 min. Each time a pressure value was recorded, the subject was requested to keep the arm as motionless as possible to prevent artifactual readings. During the monitoring period all the subjects attended their usual work or outside activities, having lunch between noon and 1 PM and dinner between 7 and 8 PM.

Measurement of Venous Compliance Arm venous compliance was measured using venous plethysmography (Periflow, Janssen, Belgium), at 9 AM in a quiet room at 25–28°C. The cuff was inflated cyclically to 20, 40, 60, and 80 mm Hg and deflated when a plateau had been established. The change in forearm volume was measured at the end of the plateau that was established at each level of occlusion pressure. Data were expressed as pressure–volume relationships (ie, percent change in forearm volume [ml/100 ml arm volume] versus occlusion pressure). Compliance was calculated as the slope of the pressure–volume relationship.

Laboratory Determination of Urinary Electrolytes Urinary sodium and potassium were estimated using an ion-sensitive electrode (Instrumentation Beckmann Astra, Beckmann Instruments, Brea, CA). Urinary creatinine was measured using the Jaffe rate-calorimetry method (Instrumentation Beckmann Astra). The accuracy of the 24-h urine collection was checked by comparing the observed creatinine clearance with the estimated creatinine clearance obtained by applying the Cockcroft and Gault formula; this computes creatinine clearance using serum creatinine, age, and body weight.[13] When estimated values of creatinine clearance fell outside the range of ±30% of the observed values,[14] 24-h urine collection was repeated.

Statistical Analysis Values are reported as mean ± SD. Values were compared using ANOVA and Student's *t* test for paired data with body weight as covariate. The 24-h blood pressure curves were compared by multivariate ANOVA for repeated measurements (MANOVA). All tests were performed by SPSS (SPSS Inc., Chicago, IL).

RESULTS

After a 6-month stay in Florence, all the blacks were employed and no significant changes in body weight, smoking habits, or alcohol intake were observed.

Basal pressure had significantly increased for both systolic blood pressure (from 113.3 ± 8.1 mm Hg to 124.1 ± 8.6 mm Hg, $P < .05$) and diastolic blood pressure values (from 69.6 ± 6.5 mm Hg to 83.7 ± 7.8 mm Hg, $P < .01$) in all the subjects. At the 6-month examination eight individuals, all normotensives on their arrival in Florence, had basal diastolic pressure values of >90 mm Hg (Table 1).

Ambulatory blood pressure monitoring showed a significant increase in 24-h mean systolic and diastolic blood pressures (Table 1) in all subjects investigated, with a significant increase for both systolic and diastolic pressure in the daytime and for systolic pressure alone at nighttime (Table 1). A significant increase in the 24-h heart rate was observed at the same

TABLE 1. MEAN VARIABLES IN SOMALIAN IMMIGRANTS ON ARRIVAL IN FLORENCE AND AFTER 6 MONTHS

Variables	Baseline	6 Months	*P* Value
Body weight (kg)	64.5 ± 9.5	65.2 ± 8.2	NS
Cigarette smokers (n)	3	4	NS
Anovulant drug users (n)	4	5	NS
Currently employed (n)	—	25	.001
Systolic pressure (mm Hg)			
Basal	113.3 ± 8.1	124.1 ± 8.6	.05
24-h	111.5 ± 7.5	120.2 ± 4.7	.004
Daytime	115.3 ± 8.9	124.3 ± 5.0	.009
Nighttime	103.7 ± 6.5	111.8 ± 5.4	.005
Diastolic pressure (mm Hg)			
Basal	69.6 ± 6.5	83.7 ± 7.8	.01
24-h	69.2 ± 6.1	75.4 ± 4.5	.01
Daytime	73.1 ± 8.1	80.8 ± 4.6	.01
Nighttime	61.7 ± 4.3	65.1 ± 4.8	.09
Heart rate			
Basal	79.1 ± 8.9	81.2 ± 7.8	.19
24-h	78.3 ± 9.7	85.7 ± 5.2	.002
Daytime	78.4 ± 11.5	88.9 ± 4.3	.01
Nighttime	78.1 ± 9.6	79.2 ± 7.9	.59
Venous compliance (mL/100 mL/mm Hg × 10^{-2})	4.1 ± 0.29	3.2 ± 0.4	.010
Plasma			
Renin activity (ng/mL/h)	1.79 ± 1.2	0.86 ± 0.63	.05
Cholesterol (mg/dL)	114 ± 18	184 ± 26	.01
Na (mEq/L)	140 ± 1.7	142 ± 2.8	.11
K (mEq/L)	4.16 ± 0.18	4.11 ± 0.26	.41
Urine			
Na (mEq/day)	97 ± 16	165 ± 33	.001
K (mEq/day)	48 ± 15	55 ± 8	.160

time. During the night the heart rate remained unchanged (Table 1).

Venous compliance was 4.1 ± 0.29 × 10^{-2} mL/100 mL/mm Hg on arrival in Florence and 3.2 ± 0.4 × 10^{-2} mL/100 mL/mm Hg ($P < .01$) at the 6-month follow-up (Table 1).

Contemporaneously with these pressure and venous distensibility changes an increase in urinary sodium excretion and a reduction in plasma renin activity were also observed. Daily urinary sodium increased from 97 ± 16 mEq/day to 165 ± 33 mEq/day ($P < .001$) with a significant linear relationship between the increase in urinary sodium excretion and the increase in 24-h mean blood pressure ($r = 0.49$, $P < .01$). Plasma renin activity was reduced from 1.79 ± 1.2 ng/mL/h to 0.86 ± 0.63 ng/mL/h ($P < .05$) (Table 1). The daily potassium excretion did not significantly change (from 48 ± 15 mEq/day to 55 ± 8 mEq/day, $P = .16$).

DISCUSSION

This longitudinal study shows an increase in 24-h ambulatory blood pressure in immigrant blacks after a 6-month stay in Italy. The causes seem to lie in the Western diet sodium intake, which is higher than the native one[15] as other social factors (low income; poor health care facilities) were kept to a minimum.

The high incidence of cardiac and cerebrovascular complications of hypertension in blacks was reported to be closely related to socioeconomic factors.[5,6] Immigrants often have low income and lack health care facilities, and consequently, experience poor control of hypertension. Nevertheless, in the United States, members of other ethnic groups, including Hispanics, Asians, and Native Americans, have a similar prevalence of hypertension to white Americans.[15] Therefore, other factors are probably involved. In fact, although all the subjects investigated in the present study had a job and were economically independent at follow-up, and no increase in smoking habits or in alcohol intake was observed, nonetheless, 30% became hypertensive after a 6-month stay in Florence.

The second relevant aspect is the nutritional diet, which could reflect a close link between genetic and environmental factors. An increased incidence of sodium sensitivity has been previously reported in blacks[2,15] and this might explain the different racial incidence of hypertension.[3,4] A recent study ques-

tioned this hypothesis, reporting that blacks and whites had similar blood pressure values at similar levels of daily sodium excretion.[16] However, the study was a cross-sectional one, investigating only blacks born in the United States; therefore, the true effect of diet changes in blacks, such as those occurring in immigrants, was not assessed.[16]

Several studies concerning black migration from rural to urban areas, both in Africa and in Western countries, have shown that urbanization is closely related to blood pressure increase.[17,18] However, most of these studies were transversal and compared the migrant population to nonmigrant controls. Only three prospective studies were performed, on blacks immigrating to New Zealand,[7] Kenya,[8] and Israel,[9] and these studies showed the relevance of changes in dietetic habits. The first study[7] described the migration of Tokelau islanders to New Zealand and showed only a minor blood pressure increase associated with only a slight increase in sodium intake. In the second study,[8] performed on migrants from a remote Kenyan low-blood pressure community to an urban center, the greater blood pressure increase was associated with an increase in sodium intake, in body weight, in smoking, and in alcohol intake. In Ethiopian immigrants to Israel, Goldbourt et al[9] reported that other factors, such as initial blood pressure values, gender, age, and weight gain, significantly affected blood pressure at the 1-year follow-up.

The present longitudinal study, performed in a homogeneous population of black normotensive subjects, where other confusing factors, such as changes in body weight, smoking, and alcohol intake were ruled out, shows for the first time the effects of immigration from Africa to a European country on 24-h ambulatory pressure. Although an increase in plasma cholesterol was in fact observed, no significant weight gain was found. The primary role played by the increased sodium intake, with the consequent increase in volemia, is evident. Acute volume expansion was found to induce an increase in peripheral venous tone.[19] The increased peripheral venous tone observed in our study at the 6-month follow-up might promote a progressive central shift in circulating volume and a consequent heart rate increase observed during daytime. Thus, an increased tone on peripheral vessels is detectable besides increased volemia. These two mechanisms do not seem to operate simultaneously throughout the 24-h period, because at nighttime a dissociation occurs between heart rate (which is reduced) and systolic pressure (which remains higher than baseline).

However, whatever the operating mechanism may be, the environmental factors, negatively affecting the health of black immigrants should be combatted not only by implementing systems to improve welfare facilities, and in particular blood pressure control, but also by routinely recommending a reduction in sodium intake.

REFERENCES

1. Saunders E: Hypertension in African-Americans. Circulation 1991;83:1465–1467.
2. Kaplan NM: Ethnic aspects of hypertension. Lancet 1994;344:450–452.
3. Luft FC, Grim CE, Higgins JT, Weinberger MH: Differences in response to sodium administration in normotensive white and black subjects. J Lab Clin Med 1977;90:555–561.
4. Falkner B: Differences in blacks and whites with essential hypertension: biochemistry and endocrine. Hypertension 1990;15:681–686.
5. Sorlie P, Rogot E, Anderson R, et al: Black-white mortality differences by family income. Lancet 1992;340: 346–350.
6. Shea S, Misra D, Ehrlich MH, et al: Predisposing factors for severe uncontrolled, hypertension in an inner-city minority population. N Engl J Med 1992;327:776–781.
7. Beaglehole R, Salmond CE, Hooper A, et al: Blood pressure and social interaction in Tokelauan migrants in New Zealand. J Chron Dis 1977;30:803–812.
8. Poulter N, Khaw KT, Hopwood BEC, et al: Salt and blood pressure changes due to urbanization—a longitudinal study. J Hypertens 1985;3(suppl 3):375–377.
9. Goldbourt U, Khoury M, Landau E, et al: Blood pressure in Ethiopian immigrants: relationship to age and anthropometric factors, and changes during their first year in Israel. Isr J Med Sci 1991;27:264–267.
10. Moore TJ, Malarick C, Olmedo A, Klein RC: Salt restriction lowers resting blood pressure but not 24-h ambulatory blood pressure. Am J Hypertens 1991;4: 410–415.
11. American Society of Hypertension: Recommendations for routine blood pressure measurement by indirect cuff sphygmomanometry. Am J Hypertens 1992;5: 207–209.
12. O'Brien E, Mee F, Atkins N, O'Malley K: Accuracy of the Spacelabs 90207 determined by the British Hypertension Society Protocol. J Hypertens 1991;9:573–574.
13. Cockcroft DW, Gault MH: Prediction of creatinine clearance from serum creatinine. Nephron 1976;16:31–41.
14. Robertshaw M, Lai KN, Swaminathan R: Prediction of creatinine clearance from plasma creatinine: comparison of five formulae. Br J Clin Pharmacol 1989;28:275–280.
15. Muntzel M, Drueke T: A comprehensive review of the salt and blood pressure relationship. Am J Hypertens 1992;5:1S–42S.

16. Madhavan S, Alderman MH: Ethnicity and the relationship of sodium intake to blood pressure. J Hypertens 1994;12:97–103.

17. Bursztyn M, Raz I: Blood pressure, glucose, insulin and lipids of young Ethiopian recent immigrants to Israel and in those resident for two years. J Hypertens 1993;11:455–459.

18. Sever PS, Peart WS, Gordon D, Beighton P: Blood pressure and its correlates in urban and tribal Africa. Lancet 1980;i:60–64.

19. Borghi C, Bosch S, Costa FC, Ambrosioni E: Pattern of peripheral venous response to volume expansion in borderline systemic hypertension. Am J Cardiol 1990; 66:597–602.