

CASUAL AND BASAL BLOOD PRESSURES II.—IN ESSENTIAL HYPERTENSION

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The casual and basal blood pressures were determined in 27 Egyptian patients with essential hypertension, using the method described in the previous paper. Consideration has been given to the practical value of such measurements and to their bearing on the functional pathology of essential hypertension.

RESULTS AND DISCUSSION

In half-hour periods of observation it was noted that physical and mental rest and habituation to the presence of the observer and his sphygmomanometer led to falls of blood pressure in essential hypertension greater than those which occur in health (Fig. 1 and 2). Thus in half-hour periods the average fall of systolic pressure in 14 healthy Egyptian subjects was 15 mm. of mercury, but in 13 Egyptian patients with essential hypertension (average systolic blood pressure about 200 mm.) the average fall of systolic pressure was 36 mm. The diastolic blood pressure in essential hypertension also exhibited a fall which was greater than that encountered in healthy subjects, being 18.5, as against 6.5 mm. in health.

In both hypertensive and healthy subjects further decreases in pressure could be obtained



FIG. 1.—Effect of rest and emotional desensitization on the systolic blood pressure in essential hypertension (Egyptian nationals). (A) Casual blood pressures of 13 subjects with essential hypertension. (B) Lowest pressures of the same subjects during the next three minutes. (C) Lowest level maintained for three consecutive readings during half an hour. (D) Level attained after 2-4 hours. Details of the procedure followed during this period are set out under "Method."

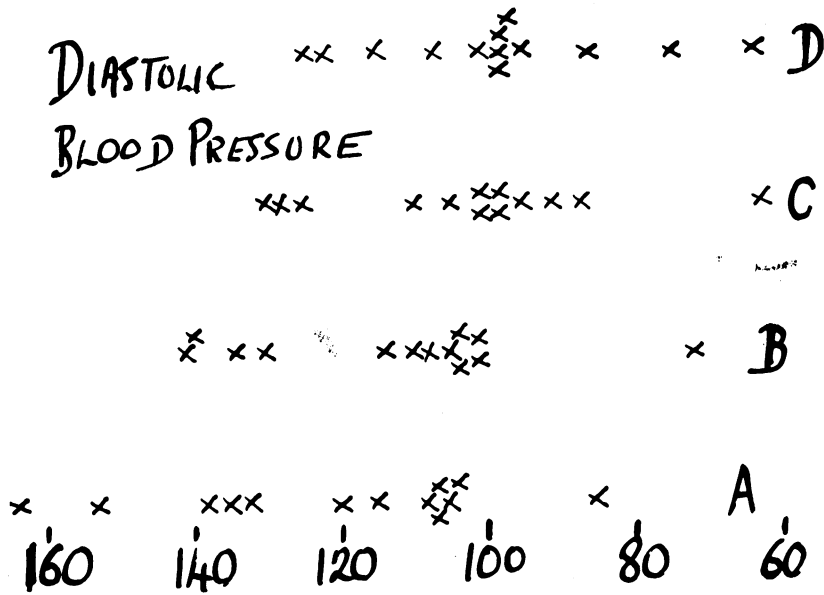


FIG. 2.—Effect of rest and emotional desensitization on the diastolic blood pressure in essential hypertension (Egyptian nationals). (A), (B), (C), and (D) as in Fig. 1.

by extending the period of rest to between 2 and 4 hours. In 27 patients with essential hypertension (including the 13 mentioned above) the average casual systolic pressure was 195 and the average pressure after 2–4 hours rest and habituation to the process of blood pressure measurement was 151. The average casual diastolic pressure was 116 and the average basal diastolic pressure 95. The systolic pressure fell to 77 per cent of its initial level and the diastolic pressure to 82 per cent. It would appear that in essential hypertension a period of about two hours rest and habituation to the process of blood pressure measurement is required before basal readings of the blood pressure are obtained.

In the course of our measurements patients occasionally fell asleep. In sleep of short duration the blood pressure did not fall appreciably below the basal level recorded with the subject awake. This observation and comparison of our basal blood pressure readings with those recorded during sleep by various authors (Brooks and Carroll, 1912; Müller, 1921), suggest that we are probably justified in describing the measurements we have made as basal pressures, since the blood pressure taken with the patient awake does not differ greatly from the blood pressure during the first few minutes of sleep.

The basal blood pressure cannot be guessed from knowledge of the casual blood pressure. In two patients each with casual systolic blood pressures of 195 mm. the basal blood pressures after two hours were 160 and 130 mm. One exceptional patient (European) had a casual systolic pressure of 290 with a basal systolic pressure of 130. It seems probable that the basal blood pressure is a fair indication of the resistance to contractions of the left ventricle during the hours of sleep, and that, in general, the work of the heart will be less for the lower basal pressure. The basal blood pressure may, therefore, be of assistance in determining prognosis.

It is common knowledge that in patients with essential hypertension the blood pressure usually falls appreciably during the stay in hospital. Physical rest in hospital is accompanied by familiarity with and emotional desensitization to procedures such as blood pressure measurement. Nevertheless, the lowest readings of the systolic pressure recorded casually in the wards are much higher than the blood pressure which may be attained in half an hour by the method we have used.

Much of the difference between casual and basal blood pressure is of mental origin, as is indicated by the following observations. In four patients with essential hypertension the

blood pressure was reduced to its basal value by rest and habitation to the presence of an observer, called observer 1, using the method described in the previous paper. Observer 2 then entered the room, conversed with the patient, and measured the blood pressure. The visit of observer 2 corresponds to an ordinary contact between doctor and patient; although a basal level of the blood pressure had been secured by observer 1, the pressure did not remain basal in the presence of observer 2. The blood pressure readings obtained by observer 2 were in all cases nearer to the casual than to the basal blood pressure. It was immaterial in this investigation which of the authors played the part of observer 2. Similar observations have been made on healthy subjects but with less striking pressure differences. It appears therefore that in health and essential hypertension the difference between the levels of the basal and casual blood pressures depends to an appreciable degree upon the mental processes of the patient. Probably the difference is due to the stimulation of vasomotor nerves, but might be explained by the liberation of a vasoconstrictor substance. If, however, the liberation of a vasoconstrictor substance is responsible for the degree to which the casual blood pressure is higher than the basal blood pressure, then the substance is unlikely to be either adrenaline or posterior pituitary hormone, since amounts of these sufficient to influence the blood pressure appreciably cause striking pallor.

Fishberg (1939) refers to an interesting case of hypertension resulting from an emotional state, described by Mueller (1922), in which elimination of some domestic friction led to a fall in the systolic blood pressure from 280 mm. to 150 and finally to 130 mm. In the course of our investigation we had three experiences that indicated how adverse emotion may make it impossible to obtain a true basal level of the blood pressure. During this investigation, one of our collaborators arranged to administer a general anæsthetic to some of our patients with essential hypertension, partly with a view to determining their suitability for surgical treatment and partly to discover whether the blood pressure during anæsthesia was appreciably lower than that observed under basal conditions. (It was not much lower.) One such patient, when first seen, had a casual pressure of 220 and a basal pressure of 153. On the next day, however, his casual pressure was 264 and the basal pressure was 223. Between the first and second observations this patient had learnt from others in the ward that it was probably our intention to administer an anæsthetic and he had expressed his unwillingness. The man was then informed that no anæsthetic would be given and no more elaborate investigations would be made than those he had experienced already. On the afternoon of the same day, a further study of the casual and basal pressures was made, and it was found that both of these had returned to the original levels. Two other experiences of this kind have been encountered, where fear of anæsthesia made it impossible to obtain a true basal pressure and where the removal of the known cause led to a considerable fall in both the casual and basal pressure. It would appear not unlikely that some of the blood pressure decrease following surgical treatment of hypertension is due to a lessening of emotional tone when the operation is over.

A further example of the effect of emotion is seen in the examination of recruits for military service. A consecutive series of 20 men whose blood pressures were found elevated at the routine examination for military service were referred for a second examination. On re-examination under quiet conditions and with the measurements taken repeatedly for about three minutes much lower blood pressures were obtained (Fig. 3). It is of interest that the apex beat was outside the mid-clavicular line in five instances and in two of these the blood pressures at the second examination were below 145 systolic and under 70 diastolic. Evans and Loughlan (1939), in a comprehensive paper on the drug treatment of hyperpiesia, indicate clearly the manner in which blood pressure changes of emotional origin have led in the past to unsatisfactory evaluations of the effects of drugs.

In clinical practice "essential" hypertension refers to elevation of the casual blood pressure. As an average, about half of the elevation above normal of the casual blood pressure, in essential hypertension, represents an increase that depends upon the response of the patient

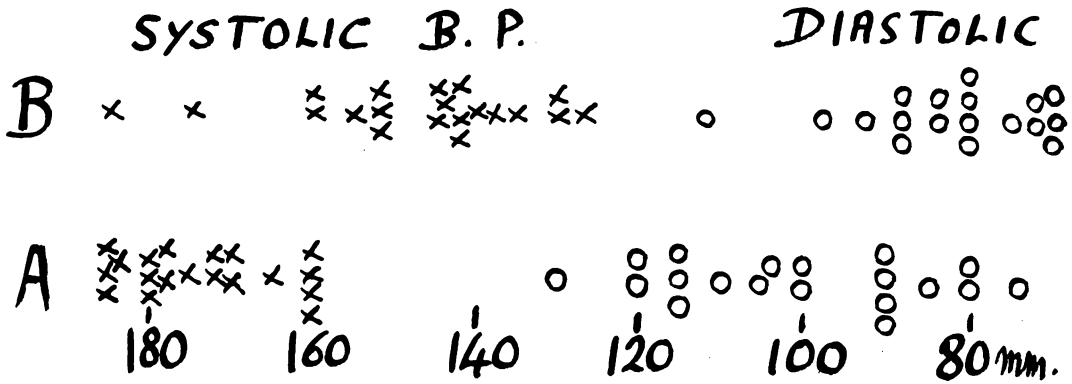


FIG. 3.—Systolic and diastolic blood pressure of recruits with high pressure taken under two different conditions (New Zealand nationals). (A) Systolic and diastolic blood pressures as measured during routine examination of 20 hypertensive recruits. (B) Systolic and diastolic blood pressures of the same men at a re-examination under quiet conditions where 2 or 3 minutes were allowed for the blood pressure to settle.

to mental, emotional, and physical activity in that as an average the blood pressure falls half the way towards normal when the influence of such factors is removed in a relatively short time, by sleep or by a process of physical rest combined with deliberate emotional desensitization. The part played by such factors in determining the degree of elevation of the casual above the basal blood pressure varies in different patients, so that the level of the casual blood pressure does not provide an estimate of the probable basal pressure.

The lability of the blood pressure in a case of essential hypertension may be judged by the degree of difference between the casual and basal pressures. In Fig. 4 it is seen that the patients with the more labile blood pressures are in general those with higher casual blood pressures, but their basal blood pressures are no higher than those of essential hypertension

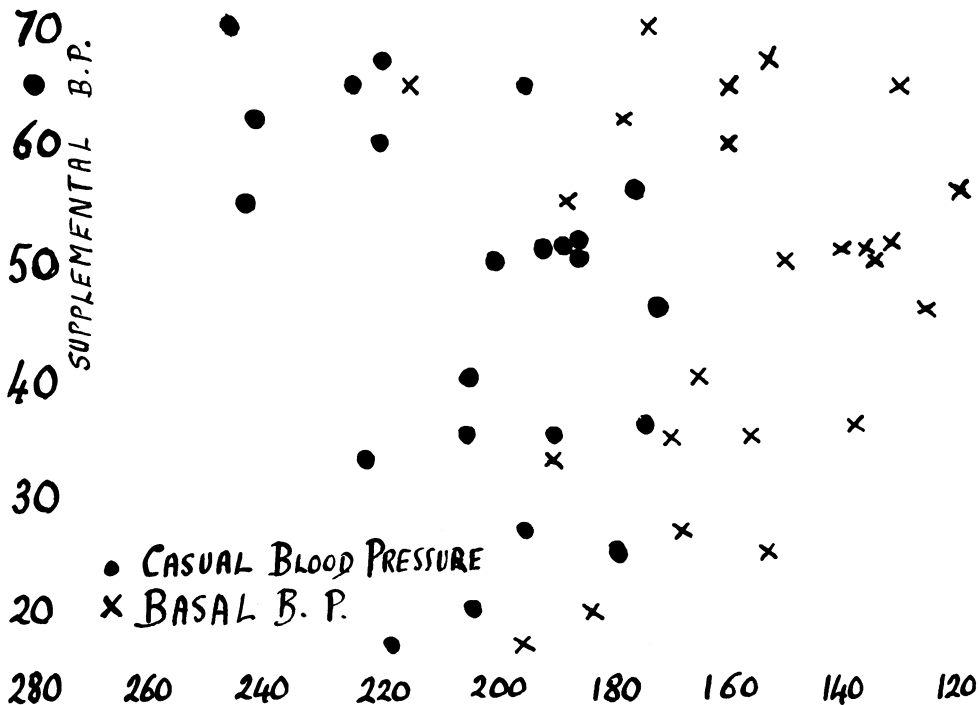


FIG. 4.—Relationship between supplemental (casual minus basal) pressure and the heights of the casual and basal systolic blood pressures. The distribution of points suggests that a rise in the supplemental pressure tends to be associated with a rise in the casual blood pressure but not so much in the basal blood pressure.

patients with less labile pressures.* Thus, if we compare subjects where the differences between the casual and basal blood pressures are between 50 and 70 mm. of mercury with those where the difference lies between 20 and 40, we find that the average of the basal blood pressures does not differ in the two groups whereas the casual pressure is much higher in the 50 to 70 mm. group than in the 10 to 20 mm. group. Hence it would appear that the basal blood pressure is not much influenced by the lability of the blood pressure. It has been shown already (Alam and Smirk, 1938) that the level of the *resting* blood pressure in health shows no correlation with the sensitivity of the subject to blood pressure raising reflexes. Probably the relative importance of the amount of emotional activity and the degree of increased susceptibility to blood pressure raising reflexes, in determining the level of the casual blood pressure, varies from case to case.

It seems desirable to regard the casual blood pressure as made up of two parts, namely, the relatively stable basal blood pressure and a variable "supplemental" pressure. The supplemental pressure is that part of the casual blood pressure which is elevated as the result of the patient's physical, mental, and emotional activity, chiefly the latter, the elevation of the basal blood pressure requires some other explanation.

SUMMARY

In essential hypertension considerable differences exist between the casual blood pressure (i.e. as ordinarily measured) and the basal blood pressure. In a group of 27 patients with essential hypertension, the average casual blood pressure was 195/116 and the average basal pressure was 151/95.

The extent to which the relatively variable casual blood pressure rises above the basal pressure may be termed the supplemental pressure.

The supplemental pressure is that part of the casual blood pressure that represents the response of the cardiovascular system to physical, mental, and emotional stimuli. With rest and habituation to the presence of the observer and his sphygmomanometer, or with sleep, the supplemental pressure falls to, or nearly to, zero.

In Egyptian patients with essential hypertension, both the basal and supplemental pressures are elevated. As an average one-half of the elevation of the casual blood pressure in these cases of essential hypertension is due to elevation of the supplemental pressure which is of a removable nature and due to the effect upon a susceptible individual of his physical, mental, and emotional environment.

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* The suggestion that the height of the casual blood pressure depends mainly on the supplemental pressure, and that the basal blood pressure remained relatively stable did not appear to me to be borne out by Fig. 4. It seemed rather that as the casual pressure increased both the supplemental and the basal pressures increased in proportion. This seems to be confirmed by analysis of the figures. If all the cases are arranged in five groups according to the height of the casual systolic pressure the results are as follows:

<i>casual</i>	<i>basal</i>	<i>supplemental</i>	<i>percentage</i>
246	183	63	25
220	170	50	23
202	165	37	19
195	150	45	23
179	136	43	24

There is a steady decrease in the basal pressure and somewhat similar decrease in the supplemental pressure, the latter forming a fairly steady percentage of the casual pressure in each of the five groups, the figures being 25, 23, 19, 23, and 24 per cent.—Editor.