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## Issues and non-issues in hypertension in the Nigerian population

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### Outline:

1. Current Operational Definition of Hypertension (HPN)
2. The three subsets of hypertension: What prevalence? What prognosis? What impact on current status and mode of management Need for comprehensive approach to prognosis of hypertension and its subsets.
3. Continuing revision downwards of the cut-off level for the definition of hypertension.
4. Utilising the tracking of early pathology of the haemodynamic consequences of hypertension - proteinuria and microalbuminuria - rather than late complications to determine the scientific cut-off level for damaging blood pressure.
5. Unrecordable diastolic: What is the prevalence? What prognosis if any?
6. Hypertension in the Paediatric/Adolescent cohort and Adult cohort; what is the National status of prevalence in both sectors?
7. Consider the nature's experiments in the human - coactation of the aorta, unilateral renal artery stenosis, pulmonary hypertension etc. Therefore
8. Prevention a feasible option; Do we have any choice? If only because of its role in the causation of end-stage-renal-failure (ESRF)
9. Community control of blood pressure is the priority way forward for Nigeria
10. Proposal for National Task Force on Continuing Studies and Preventive Strategies

### Introduction

The health priorities of any community can only be properly defined after reasonably accurate data collection. This underscores the importance of the recent exercise by the National Expert Committee on the Non-communicable Diseases (NCD) [1] in confronting the difficult epidemiological survey of systemic hypertension, diabetes mellitus, coronary heart disease, the haemoglobinopathies and anaemia. Because of some imponderables (universal in our environment) studies on G6PD deficiency had to be abandoned. We now have some foundation data on national scale on which to build. However, as a passing remark, I feel rather disappointed that albuminuria, if not microalbuminuria, could not be smuggled into the survey, considering the almost intimidating representation of nephrology on the committee. Perhaps, as compensation, systemic hypertension seems quite adequately covered. The following remarks seek to focus on some issues on the latter subject which deserve greater attention than hitherto accorded to them. A few (e.g., the revision downwards of the operational definition of hypertension) of them have been considered as non-issues by some of our respectable colleagues. My purpose is to persuade all concerned that all of them are important.

The first of these is the operational definition of systemic hypertension in adults. Whereas it might be an on-going debate in the medical world, we in this country should at least utilise what is the current definition.

In 1978, the WHO expert committee [2] defined hypertension as  $\geq 160/95$  mm Hg. The basic evidence for this recommendation stems from the incidence of target organ damage and the level of blood pressure that will presumably prevent such damage. In defining the severity of hypertension, only the diastolic subset was used. These recommendations clearly imply that the diastolic component of blood pressure was more important than the systolic. I believe that local opinion shares (at the submission, in 1999, of the report of the Expert Committee on Non-communicable Diseases in Nigeria to the Ministry of Health) the same trend and still regard the WHO (1978) criteria of  $\geq 160/95$  as operative. This position cannot be clearly supported by existing data in literature.

As more data accumulated over subsequent years, it became established that the so-called borderline category of systemic hypertension not only carries risks of these rather late complications including related deaths. [3, 4] but that the bulk ( $\cong 60 - 70\%$ ) of morbidity and mortality resulting therefrom reside in this category of the disease. Accordingly, in 1988, the 4<sup>th</sup> Joint National Committee on the Detection, Evaluation and Treatment of High Blood Pressure [5] recommended  $\geq 140/90$  mm Hg. Any systolic level below 140 mm Hg is to be regarded as normal, whereas diastolic between 85 and 90 mm Hg as high normal. used The fifth report of the same committee [6] has reaffirmed this and the term optimal blood pressure of 120/80 seems to have surfaced.

Since the Society of Actuaries report (7), based on about 5 million life insurance policies, many other studies have shown that the systolic subset is the more important (8-19). The more recent report by Sagie et al (4) on the natural history of borderline isolated systolic hypertension clearly indicate that even this range of isolated systolic blood pressure (140-159 mm Hg) carries definite cardiovascular risks. Indeed, as far back as 1985, Fisher (18) had suggested that measurement of the diastolic pressure as index of hypertension management should be abandoned. Our studies in a defined Saudi population [19] showed a distinct pattern for the three subsets of hypertension. Curiously enough, not only did the isolated systolic hypertension constitute over 50% of the hypertensive population, it showed the steepest gradient with advancing age while the diastolic actually seem to decline with age.

In general these trends were obvious in the paediatric, adolescent and adult population. Faced with the large and growing body of evidence in favour of the systolic subset, it seems difficult to decipher how and why "the diastolic gained the ascendancy". What is important for us now is to examine where we should stand in our local operations. We should note that the

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issue the systolic subset and its prognosis remains to be addressed in the local theatre.

As an essential first step, it is being suggested that in all prevalence studies on high blood pressure, the hypertensive population should be clearly classified into the three subsets, namely, isolated systolic, combined systolic/diastolic and isolated diastolic. This approach will enhance our insight into the possible prognostic importance of each subset. That over fifty per cent of both the adult as well as the paediatric/adolescent subjects with hypertension in a virtually untreated study population were found to have the isolated systolic subset [19; 26] may be pointing to some modification in our attitude to the subject.

That the isolated diastolic subset was found to be declining with advancing age in all the sectors of the population, if confirmed, clearly has significant implications on the results of studies which based assessment of management efficacy on only the levels of diastolic blood pressure. Some of the good results could be just part of the natural event. It is noteworthy that one of the early Framingham studies had noticed the phenomenon of diastolic blood pressure declining with age [14] and it is to be presumed that the isolated diastolic subset must have contributed to this observation. In addition to the documentation suggested, it will be useful to reanalyse the existing data where they have been properly stored.

The other important issue, obvious in the history of the subject, is the necessity to continually revise downwards, the cut-off point for the operational definition of hypertension because it has now been established that the bulk [3] of target organ damage and hypertension-related morbidity and mortality in the population occur in subjects with the so-called mild and borderline hypertension [6]. In our studies [20], we have found, by using predictive regression, correcting for age, that significant proteinuria probably occurs at blood pressure levels lower than the conventional  $140/90$ . A level of  $130/60$  mm Hg would seem to be the highest allowable. Although, further studies are needed to corroborate this, this level looks logical, if the bulk of hypertension related damage manifests just above this level i.e. the borderline zone. The reasonable presumption is that proteinuria (or better still, microalbuminuria) is a much earlier effect than all the clinical indices measured - LVH, CHD, stroke, raised serum creatinine, blood urea etc.

The issue that seems compelling is that, if the complications of elevated blood pressure are to be prevented, if these are more severe in the Black race and occurring at a lower level than in other races, its active management must begin at a lower level than the currently accepted borderline zone. The share size of the population involved will be intimidating but there lies the scientific truth and the challenge. I am sure that a small expert committee will sooner than later, produce viable solutions for our environment. Our current strategy of accepting the virtually discarded higher cut-off level ( $\geq 160/95$  mm Hg) presumably to reduce the size of the problem amounts to burying our ostrich head in the sand. Of course, all these presuppose that existing data in literature are applicable to the Nigerian milieu. I am also aware of the fact that should we use microalbuminuria as the early evidence of haemodynamically induced organ damage, further reduction towards the optimal level of  $120/80$  mm Hg will most likely be indicated. The work of Odutola and her colleagues [21] seems relevant in this context. They have shown that all their 35 patients (presumed Nigerians) who presented with mild hypertension showed significant hyperfiltration which is the recognised prelude to glomerulosclerosis. The clear indica-

tion is that active management to prevent this early change must begin before this level of severity.

The next issue that emerges seems to be how should operational definition of hypertension be determined? Should it be by tracking the late complications of high blood pressure or by tracking the early damage induced by blood pressure on the vascular tree? Whether the ultimate objective is to control the primary disease and its complications or to prevent both, the latter option would obviously seem to be the answer. Yet all over the medical world, intense efforts continue to be concentrated on the former. This approach to the subject may be justified in the pre-Framingham era of the disease but with the development of microalbuminuria dry chemistry test and the mass of epidemiological/clinical data available, it would, in the long run, be more cost effective to shift emphasis to tracking of early damage so that the most effective operational level of blood pressure can be defined for the primary prevention of the disease and its complications. As far as I know, this approach has not yet been tested but leading on this issue should not cost us a moment's sleep. Indeed, it should be embraced as a National focus that will entrench us in at least one leadership role. The fifth report of the Joint National Committee -JNC-5 (6) seems quite supportive. It has established the feasibility and effectiveness of community control of hypertension. Where should we stand at the national or regional level? Are we ready to lead or are we waiting, again, to be led?

One very important issue that should concern us relates to the application of all the above to the paediatric/adolescent cohort of our population. We cannot assume any meaningful leadership role in the primary or secondary prevention of hypertension and its sequelae without accurate data in the "foundation of the society". What do we have on the subject for now? In 1987, The Task Force on Blood Pressure in Children [22], in their second report, recommended definite cut-off points for hypertension in 3-year age cohort in the paediatric/adolescent age group of the population. Mild hypertension was based on  $\geq 95^{\text{th}}$  percentile of the mean blood pressure levels in the study population. Severe hypertension was based on the  $99^{\text{th}}$  percentile (Table 1).

Table 1

| Age group (yrs)      | 95 <sup>th</sup> ile | 99 <sup>th</sup> %ile (mm Hg) |
|----------------------|----------------------|-------------------------------|
| Infant - 2           | $\geq 112/74$        | 118/82                        |
| 3 - 5                | $\geq 116/76$        | 124/84                        |
| 6 - 9                | $\geq 122/78$        | 130/86                        |
| 10 - 12              | $\geq 126/82$        | 134/90                        |
| 13 - 15              | $\geq 136/86$        | 144/92                        |
| 16 - 18              | $\geq 142/92$        | 150/98                        |
| Adults ( $\geq 19$ ) | $\geq 140/90$        |                               |

Studies on the Nigerian scene has been few and far between [23-25]. None of them has comprehensively addressed the paediatric/adolescent population as a whole. The cut-off points in the various reports varied so much as to make comparison difficult. Before the second report of the Task Force (1987) one could understand the variations in the definition of hypertension and the attendant controversies. Studies after this date should at least refer to the recommendations, even if not used. Obika *et al* [25] conducted an excellent study in the urban, semi-urban and rural communities of Ilorin and its environs.

First, they studied 1-14 year age group in one year cohorts, thus including only a fraction (13-14 years) of the adolescent group. The reason for this is not quite clear. Secondly, although they mentioned the use of "≥ 95<sup>th</sup> percentile" plus "twice standard deviation" method, they used the figure ≥30/80 mm Hg to define hypertension for all age groups studied, thus leading to over and under diagnosis, depending on the age cohort. Thirdly, their readings were made to the nearest 5 mm Hg instead the 2 recommended in current literature. In the recent national survey of non-communicable diseases [1], the small terminal cohort of the adolescent aged group (15-18 years) was included. Instead of the Task Force recommendation of ≥142/92 mm Hg (for 16-18) ≥160/95 was used to calculate the prevalence of hypertension. The implications are obvious - under diagnosis. These remarks are not to detract from the excellence and value of these works. On the contrary, they are to encourage us to stand on the shoulders of our predecessors, so that the National view into the unknown can extend further. A very important observation is that, most probably, these data are available for reanalysis, making it possible to correct these minor but important deficiencies. It may be relevant to refer once more to our work in the population on blood pressure and proteinuria. We have found that most subjects with gross proteinuria were in the paediatric age group, especially the 6-12 year cohort [26]. That the overall prevalence of hypertension (using the Task Force definitions) for the group was 10.65% does not leave us room for complacency.

It is noted that in many reports, including our local publications, whenever the Korotkoff sound persists until the zero mark of the sphygmomanometer, the rule for recording the diastolic blood pressure is changed midstream from Korotkoff V to IV. Curiously enough, we find it comfortable to lump the two groups of diastolic blood pressure together for analysis. The issues are

- i.) what is the frequency of this phenomenon;
- ii.) what is its physiological or pathophysiological consequence;
- iii.) should we not just denote this as unrecordable diastolic blood pressure? Clearly, the true diastolic here (as denoted by Korotkoff V) lies below zero!. How far negative, we may one day decipher (is this an intermittent, transient or permanent phenomenon? We have found a frequency of 1.05% of unrecordable diastolic in defined population of nearly 6000 [26]. Surprisingly all but one were below 15 years and the remaining one 19 years. Though small, this group will contribute to the prevalence of isolated systolic hypertension and in as much as the latter may have prognostic significance, this phenomenon may influence the ultimate outcome of the disease.

There are many other contending issues in hypertension, with which most of you are familiar. We should mention, but not for detailed discussion here, the fundamental observation that successful drug treatment of hypertension, after adjusting for age and other risk factors was accompanied by significantly more complications (including deaths) than in the untreated group of patients with corresponding levels of blood pressure.[27-30] In particular, the observation that in spite of good control of hypertension, progression of renal damage remains unabated, especially in the black population [31] (need I remind us that we are black) deserves special attention. Alarming as this observation may seem, it should not be surprising if we accept the postulate that management/drug treatment was started rather late in the course of the disease at a higher cut-off

level of blood pressure. In general the medical opinion was and perhaps is still driven by the objective to avoid the anxiety generated by labelling subjects as hypertensive. The result of this "caution" was delay in making diagnosis, using higher cut-off levels, assuming that elevated systolic blood pressure, especially in the elderly was not a cardiovascular risk factor and to some extent, the assumption that the phenomenon of rising blood pressure with age is natural, justifying failure to diagnose or treat hypertension leading to such statements as "for your age of 60, blood pressure of 158/90 can be left alone."

To summarise, the issue of operational definition of hypertension remain unsettled. The pattern and prognostic impact of the three subsets of systemic hypertension including the effect of unrecordable diastolic blood pressure require attention. The corresponding issues in the paediatric/adolescent cohort of the population deserve a comprehensive approach. We must take into account the fact that about fifty per cent of our population are in this group, that more than in adults, any primary preventive measures are likely to be effective and that herein lies the foundation of any community. We have no information on the correlation of blood pressure with albuminuria. Or is this too simple to deserve our attention? It is disquieting that drug therapy while controlling the level of blood pressure does not always reduce the prevalence target organ complications leading, among others, to the ever expanding pool of ESRF [32].

In concluding, let us examine some of the natural human experiments [33] for guidance as to the best approach to these problems. Coarctation of the aorta, unilateral renal artery stenosis and pulmonary artery stenosis are conditions which had been imposed by nature very early in life. In all of them, the vascular tree distal to the stenosis remain preserved despite the severe consequences proximal to the lesion. Indeed, the ipsilateral kidney remains histologically and functionally normal, having been protected from the damaging effects of systemic hypertension induced by the stenosis. Pushing the lesson from nature further, is it not significant that if the hypertension had become self perpetuating, operative removal of the offending stenosis may not only fail to correct the hypertension but will also expose the ipsilateral hitherto normal kidney to the damaging effect of elevated blood pressure? I am not the greatest believer, but are we being guided by nature to the effect that if the vascular tree is protected very early all complications can be prevented but if we wait for the late complications, lowering of blood pressure level may be ineffective in preventing further damage. That in fact, the process of lowering the blood pressure, as currently practised (including relatively late commencement at higher than optimal cut-off levels of blood pressure), may predispose to some further damage. When we consider our circumstances and all the contending priorities, primary prevention seems to be our indicated option. Indeed, I do not think we have any choice and we should be prepared to assume a leadership role in this aspect.

The important implication of these remarks is that our best option is to embark on the community control blood pressure as a national focus. With this, the primary prevention of high blood pressure becomes relatively easy. and ipso facto, that of the target organ damage. Once in place, a National Community Programme on Blood Pressure Control should incorporate all relevant non-communicable diseases, in particular, diabetes mellitus and the so-called primary renal diseases. The pivot of such a programme will be Continuing Education of the Community simultaneously with data collection and research.

My proposal is that the Nigerian Hypertension Society (NHS) in collaboration with the Nigerian Association of

Nephrologist (NAN) should establish a National Task Force for Hypertension, Renal Diseases and Diabetes Mellitus to address the following:

- a) The Formulation of Preventive Strategies for the Prevention of Renal Diseases, Diabetes and Systemic Hypertension.
  - b) To identify appropriate population samples, with all the age cohorts adequately represented, which is statistically valid for the regions and the nation at large, and suitable for intensive comprehensive cross-sectional followed by longitudinal studies.
  - c) To establish by cross-sectional studies, the prevalence of microalbuminuria, macroalbuminuria and microhaematuria as evidence of early renal damage in the population and to follow the progression of same by longitudinal studies.
  - d) For the ease of operation of (c.), to organise the teaching self-urinalysis to the study population during the initial cross-sectional survey and the subsequent longitudinal follow-up.
  - e) To establish the 25<sup>th</sup>, 50<sup>th</sup>, 75<sup>th</sup>, 90<sup>th</sup>, 95<sup>th</sup> and 99<sup>th</sup> percentile of mean blood pressure for the adult and in particular, the paediatric/adolescent age group of the population and based on the findings determine whether or not the Task Force (1987) percentiles and the currently available cut-off levels for hypertension are appropriate for the nation.
  - f) To determine for the nation, the prevalence of hypertension based on all the accepted cut-off points ( $>160/95$ ;  $\geq 160/95$ ;  $>140/90$ ;  $\geq 140/90$ ) as well as the proposed  $\geq 130/60$  mm Hg. In addition, any reasonable level based on our Task Force continuing research will be used as indicated.
  - g) To determine the prevalence and pattern of the three subsets of hypertension (isolated systolic, combined systolic/diastolic and isolated diastolic hypertension) for the Nigerian population and by longitudinal observations on their sequelae attempt to determine the prognostic significance of each subset.
  - h) To determine the prevalence of unrecordable diastolic blood pressure and as in (g) attempt to define, if any, its prognosis by longitudinal studies.
  - i) Using the findings from supervised self-urinalysis, determine the probable level of blood pressure at which the earliest target organ damage occurs (tracking early damage) and examine the same against the currently accepted or proposed level as well as the percentiles compiled by the Task Force (1987).
  - j) To examine the feasibility of "post oral glucose load" glycosuria during supervised self-urinalysis as a method for early detection of diabetes mellitus and compare the findings with those of fasting and post glucose load blood sugar.
  - k) By (j.) determine the prevalence of both types of diabetes in the population.
  - l) To monitor, on a continual basis (in longitudinal manner), levels of blood pressure, prevalence of diabetes mellitus and
  - m) carefully define the incidence of hypertension, its target organ or treatment complications as well as
  - n) the incidence of the various complications (as much as feasible, in their early stages) of diabetes mellitus especially nephropathy and retinopathy.
- o). To educate, on a continual basis, by direct interaction and through the mass media-television and radio-the chosen samples and the population in general on the advantages of self-urinalysis; importance of primary prevention of systemic hypertension by regular checking (by self preferable) of blood pressure reduction of salt intake; reduction of calorie intake to the optimum; regular exercise; and the increase intake of potassium; importance of tenacious compliance with prescribed therapy.
  - p). To organise appropriate studies to elucidate various problems that may be unearthed by all the above and others that may come up from time to time on the prescribed subjects of interest e. g. to determine the influence of ambient temperature and humidity with the attendant sweat-induced electrolyte loss on levels of blood pressure and hypertension in the Nigerian.
  - q). To study in depth the effects of multiparity on HPN and other cardiovascular pathologies.
  - r). To organise other studies - clinical and experimental - aimed at preventing renal damage and/or retarding its progression.
  - s). To organise in a comprehensive fashion, community control of blood pressure and established hypertension.
  - t). To organise on a continual basis regular discussion groups, symposia and conferences (local and international) aimed at fostering the objective of reducing the load of systemic hypertension; diabetes mellitus and of ESRF on the Nation's resources. These should be without prejudice to the normal scientific activities of the sponsoring national associations.
  - u). In carrying out these objectives, our Task Force, may collaborate with other organisations in and outside the country.
  - v). To prosecute these activities, our Task Force will organise funds for its activities from various organisations and governmental agencies both locally and from outside the country.
  - w). To start with, it is suggested that the Task Force should be based in one (or more) of the departments of Community Medicine in our universities.

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