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The Gomez classification. Time for a change?

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The Gomez classification of nutritional status is well known and widely used. However, it has a considerable number of drawbacks and it is questionable whether it should continue to be used. The history of the classification, its value, and its disadvantages are examined and an alternative classification based on more recent reference values of weight-for-age is proposed.

The terms first, second, and third degree malnutrition have become familiar jargon not only among nutritionists but also among other people interested in nutrition. The terms refer to what has come to be known as the Gomez classification of nutritional status.

Gomez, a Mexican paediatrician, wrote in 1956: "When underfeeding is moderate or has acted for only a short time, the 'nutritional reserves' of the organism are only partially depleted, and malnutrition exhibits a mild clinical picture, where the body weight ranges between 76–90 percent of the theoretical average for the child's age. This we call first degree malnutrition. As the effect of underfeeding becomes more serious, the picture becomes more marked, resulting in second degree malnutrition. At this stage the weight is between 61–75 percent of the theoretical average for the age ... In third degree malnutrition, when the nutritional reserves are practically exhausted the maximum weight is never more than 60 percent of the average for the age" (*1*). According to Gomez, the main value of this classification was a prognostic one: "There are marked differences in mortality during the first 48 hrs. [of admission to the Hospital Infantil de México] between children with second and third degree malnutrition". When speaking of "theoretical" weight-for-age, Gomez was referring to his findings among Mexican children (*2*). These values are between 91% and 97% of the widely used "Boston" or "Harvard" references (*3*). Later, the Gomez classification was adapted using the "Harvard" references and became widely used throughout the world, not only to classify children admitted to hospital but also to classify malnutrition in communities. Today, in the English-speaking Caribbean there is hardly a child health clinic where some type of growth chart with three degrees of malnutrition is not available. The same applies to many other countries and regions.

Synonyms of first, second, and third degree are "mild", "moderate", and "severe" malnutrition.

DRAWBACKS OF THE GOMEZ CLASSIFICATION

The main use of the Gomez classification has been to standardize one particular set of reference values and to allow meaningful comparisons between populations and within populations at different times. It has also had the effect that health workers have become used to seeing malnutrition plotted in a chart form. But, in fact, any classification could have served those two purposes, and the Gomez one has several drawbacks:

1. The cut-off points are somewhat arbitrary and have little physiological or statistical justification.
2. It does not take into consideration overweight as a form of malnutrition.
3. There is misunderstanding between "reference" values and "standards" to aim at.
4. It has created in the minds of many confusion between the aims of reducing the prevalence of underweight in a community and eradicating malnutrition.

The last two points are not shortcomings of the classification itself but of the way in which it has been applied.

WEIGHT AS AN INDICATOR OF NUTRITIONAL STATUS

Is weight alone a good indicator of the nutritional status of a child? For an individual child a single weight measurement, in the absence of marked clinical signs, is of limited use. Field workers have had the

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experience of seeing children who by weight-for-age would be considered moderately or even severely malnourished but who were "the picture of health itself", with a good deposit of subcutaneous fat and who, by no stretch of imagination, could be considered undernourished at the time of examination. They were simply small children whose weight at birth had been low, either because they had suffered from intrauterine malnutrition, or because they were born prematurely, or because they were children of small parents (who tend to have small children). The size of a child at birth depends mainly on the nutritional status of the mother (*4–9*), her age, and how many pregnancies she has had (*10–13*). It is also related to the size of the mother (*10, 14–17*) and the size of the child at birth seems to determine, to some extent, the development of the child during the first few years of life (*17–25*). In some other cases, the children may be small because they had previously suffered a period of undernutrition and had failed to "catch up" in growth.

The importance of differentiating between acute and chronic malnutrition has been stressed repeatedly (*26–32*). Malnutrition of acute onset is thought to pose the more severe threat to life—either directly or by rendering the child more susceptible to the effects of various infections. A chronically malnourished child is thought to adapt to the condition (unless it is severe) partly by reducing its need for nutrients through growth failure. More serious than either is an acute exacerbation of a chronic condition.

To differentiate between acute and chronic malnutrition a single weight alone is not enough: an acute episode of malnutrition will reduce the weight of the child, but obviously it will not reduce the height that the child has already achieved; there is therefore a deficit in weight-for-height. If the undernutrition becomes chronic, linear growth will be affected: the child will be both short in stature and underweight for its age, but its body proportions, including weight-for-height, may be normal (*26*). The contrasting terms "wasting" for the first case and "stunting" for the second have been proposed (*30–32*).

The main advantage of the classification into wasted and stunted children is that, for nutrition intervention purposes, it divides populations into cases that should have priority and those who are growing normally, for whom intervention is less urgent (*31*). The main disadvantage of the classification is that measuring height (and particularly recumbent length in small children) is always a difficult and time-consuming procedure. Far more cooperation from the patients is needed in measuring height than in measuring weight; therefore, errors are more likely in height measurement than in weight.

In our opinion, for the child who regularly attends health clinics, the weight is a sufficiently adequate indicator of the nutritional status because, when measured at frequent intervals, it shows whether the child is putting on weight at a satisfactory rate or not, regardless of the "degree of malnutrition" in which the child happens to fall.

THE "HARVARD" OR "BOSTON" REFERENCE TABLES

The data in the Harvard reference tables of weight (as well as height)-for-age (*3*) derive from observations made on children in Boston from 1930 to 1956. The children were mostly from north European stock. These reference tables, as Jelliffe has pointed out, have the advantages of "having been carefully compiled longitudinally on a large series, of being widely available in the Nelson's *Textbook of paediatrics* [probably one of the most popular textbooks of paediatrics in the world], and of being used already by paediatricians in many countries" (*33*).

It is extremely important, however, to distinguish between *reference values* and *standard values* (*34, 35*). While it is desirable to have common reference tables to compare populations and to monitor secular nutritional trends, it is a completely different thing to take the values in the reference tables as the standards of growth at which populations must aim. It would be absurd (to take that point to the extreme) to use the Harvard reference tables as the standards of growth to which Pygmies, Watusi, and Eskimos should attempt to develop in their normal environment. It is possible, however, that given less marked discrepancies than those mentioned above, populations from widely different backgrounds could attain the same standard of growth if placed in the same environment. Available data seem to indicate (*36–49*) that given "the right standard of living" (adequate nutrient intake, relative freedom from infectious diseases, etc.), preschool-age children develop at the same rate as those observed by Stuart & Stevenson (*3*) in the children on whom the Harvard tables are based.

THE GOMEZ CUT-OFF POINTS

It should be borne in mind that Gomez, when drawing up his classification, was assessing the prognosis of malnutrition according to the weight on admission to a hospital in Mexico City in the early 1950s (*1*). Today those cut-off points are probably completely inapplicable for the purpose. To begin with, in the English-speaking Caribbean, for instance, the number of children admitted to hospital for malnutrition is too small to make meaningful distinctions between a child weighing, say, 58% of the

"standard" and another weighing 62%. However, it is important to know, for planning intervention measures, the percentage of the population within a certain age group that differs significantly from the mean and, for the individual child, its nutritional status when first examined and whether he or she continues to put on weight.

In a normally distributed population there will always be a certain number of individuals who differ from the mean. What seems most important to us at this time is to decide what point should be considered "the lower limit of normality" and what percentage of the population would be expected to be found below that point.

SOME SUGGESTED CHANGES

1. *Reference values.* To produce reliable growth charts in every country requires a considerable amount of time, planning, personnel, and expense (*32*); such expenditure seems to us hardly justified, even if a country can afford it, when work already done appears to indicate that children from widely varied ethnic backgrounds tend to develop at the same rate given a similar socioeconomic environment (*36–49*). If that is agreed upon, what set of reference tables to use becomes more a matter of expediency than of careful scientific judgement. Table 1 compares the median weight-for-age for boys of the Harvard, Tanner (*50*), and WHO (*51*) references. The differences are quite small and because of the detail, extensiveness, and potential universality of the growth chart presented by WHO, we would suggest its adoption. The differences from Harvard's and Tanner's tables are not so great as to make comparisons between past and future surveys meaningless.

2. *The lower limit of normality.* It seems logical to us to establish cut-off points in relation to how far they deviate from the average. Two standard deviations below the mean has been used frequently as the lower limit of normality. It corresponds to about the 3rd centile and to 80% of the median weight-for-age. We would therefore encourage the use, in the WHO tables, of 2 SD below and above the mean as the lower and upper limits of "normal" weight-for-age. At a national level a target could be, for instance, to reduce the percentage of those below (and above) the limit to approximately 3% of the population: this would take into account those children who are "naturally" small.

If for the purpose of priorities it is considered advisable to classify malnutrition further, then the 3rd SD could be used.

Table 1. Comparison between three reference values of weight-for-age for boys

Age (months)	Weight (kg)			Percentage of WHO reference	
	WHO	Harvard	Tanner	Harvard	Tanner
Birth	3.3	3 4	3.5	103 0	106.1
3	6.0	5.72	5.93	95.3	98.8
6	7.8	7.58	7.90	97.2	101 3
9	9.2	9.07	9.20	98.6	100.0
12	10 2	10.07	10 02	98.7	100.0
15	10.9	10 75	11.0	98.6	100.9
18	11.5	11 43	11.6	99.4	100.9
24	12 6	12.56	12.7	99.7	100 8
30	13.7	13 61	13.7	99 3	100.0
36	14 7	14.61	14 7	99.4	100.0
42	15.7	15.56	15.7	91 1	99.4
48	16.7	16.51	16 6	98.9	99.4
54	17.7	17.42	17.5	98 4	98.9
60	18.7	18.37	18.5	98.2	98.9

3. *What measurements to take.* A distinction has to be made between the child population of a country and the individual child, and furthermore between the child who is seen for the first time and one who is being followed up at regular intervals.

For the child who is seen for the first time, weight-for-height is likely to be much more useful than weight alone because, if the child is underweight, weight-for-height will tell whether the child is likely to be suffering from an acute or chronic episode of undernutrition and thus whether immediate intervention is required or whether intervention could be delayed.

If interventions are contemplated at a national level, weight-for-age could provide the first screening line. Those children who are more than 2 SD below the mean could then be assessed individually, their height measured, and priority given to those who are more than 2 SD below the mean of the weight-for-height.[a] If all that is needed is baseline nutritional data to evaluate long-term (or medium-term) nutritional plans, weight-for-age alone would be sufficient.

[a] Standard deviation values for weight-for-height are available on request from the Nutrition unit, World Health Organization, 1211 Geneva 27, Switzerland.

RÉSUMÉ

LA CLASSIFICATION DE GOMEZ—EST-CE LE MOMENT D'EN CHANGER?

Il y a plus de trente ans, Gomez a élaboré sa classification de la malnutrition, sur la base de la réponse au traitement hospitalier, en fonction du poids à l'admission exprimé en pourcentage d'une norme pour l'âge (poids théorique moyen pour l'âge considéré). A partir de ce concept, d'autres auteurs ont appliqué la classification aux valeurs de référence du poids pour l'âge provenant de Boston et ils l'ont utilisée pour le diagnostic de la malnutrition tant chez des enfants considérés individuellement que dans des groupes de population.

Cette classification s'est montrée utile, mais sa valeur pronostique est à présent douteuse; en outre, elle ne permet pas de distinguer entre la dénutrition aiguë et chronique, et ignore l'obésité comme forme de malnutrition.

Pour l'enfant considéré individuellement, une mesure unique du poids est insuffisante pour déterminer l'état nutritionnel du moment: la mesure de la taille est également nécessaire. A l'aide de ces deux paramètres, le diagnostic de la dénutrition aiguë ou chronique peut être fait et il est possible de décider si une intervention immédiate est nécessaire ou non. Pour apprécier comment un enfant évolue, des mesures successives du poids et la référence aux valeurs données du poids pour l'âge suffisent. Le poids pour l'âge convient également pour un dépistage préliminaire de la malnutrition dans des groupes de population. Ceux qui sont jugés atteints de malnutrition d'après ce paramètre peuvent faire l'objet d'une évaluation plus poussée sur une base individuelle.

Les chiffres de référence de Boston en ce qui concerne poids pour l'âge sont largement utilisés et il faut dire qu'il y a peu de différence entre les valeurs de référence les mieux connues; néanmoins les auteurs recommandent les tables publiées par l'OMS en raison de la grande taille de l'échantillon, de l'analyse détaillée, de la composition éthnique de l'échantillon et de l'universalité potentielle de ces valeurs de référence. Néanmoins, de telles valeurs ne constituent pas des normes de croissance auxquelles toutes les populations doivent viser.

Jusqu'à ce que l'on attribue une nouvelle valeur pronostique ou une "signification biologique" à un point différentiel donné, le choix de la "limite inférieure de la normalité", dans une table de référence du poids pour l'âge, doit être quelque peu arbitraire; ce qui est important cependant est de savoir de combien un individu donné s'écarte de la moyenne. On préconise de considérer que deux écarts types au-dessous de la moyenne constituent la limite au-dessous de laquelle la dénutrition doit être soupçonnée.

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51 *A growth chart for international use in maternal and child health centres,* Geneva, World Health Organization, 1978

CORRIGENDA

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Pages 776 – 777. In references 1, 28, 29, 36, 37, and 42, the name of the journal should read: *Journal of tropical pediatrics and environmental child health.*

In references 39 and 41, the name of the journal should read:
American journal of physical anthropology.

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International collaborative study on juvenile hypertension 1. Study procedures and screening data

Page 295, authors' names
delete: E. TÖRÖK,[1] I. GYÁRFÁS,[2] & M. CSUKÁS[3]
insert: INTERNATIONAL COLLABORATIVE GROUP[1]

Page 295. Replace the footnotes *, 1, 2, and 3 by a new footnote as follows:
[1] The names of the research centres and investigators involved in this study are listed in Annex 1 on page 304. This article was prepared on behalf of the International Collaborative Group by E. Török, I. Gyárfás, and M. Csukás. Requests for reprints should be addressed to Dr E. Török, Department of Cardiology, Hungarian Institute of Cardiology, H-1450 Budapest, P.O.B. 88, Hungary.