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Assessment of Gestational Age in Full-Term and Pre-Term African Newborn Infants

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Summary

Dawodu, A. H. and Effiong, C. E. (1977). *Nigerian Journal of Paediatrics*, 4 (1), 1. **Assessment of Gestational Age in Full-Term and Pre-Term African Newborn Infants.** A study of assessment of gestational ages in 100 full-term Nigerian and pre-term newborn infants by the Dubowitz scoring method has confirmed previous reports that this system is also reliable in the African neonate. The results of this study on 100 Nigerian infants delivered at the University College Hospital and Oluyoro Catholic Hospital, Ibadan, show a high correlation (0.90) between scored gestational ages and maternal dates. The Dubowitz scoring system, without modification, is therefore recommended for routine use in African infants during the first 48 hours.

ASSESSMENT of gestational age by a scoring system is now a routine practice in newborn nurseries in Europe and North Africa. This system is relatively new in Nigeria and is probably used in only a few Special-care Baby units in other developing countries. Both maternal history of the last menstrual period (LMP) and birthweight can be unreliable means of determining gestational age of infants at birth. This is even more so in the less sophisticated societies, where a majority of illiterate and semi-literate mothers may have no exact knowledge of their LMP and the mean birthweights are lower than in the developed countries (Effiong *et al.*, 1976). Yet it is in these less developed countries that the relationship of birthweight to gestational age is of the greatest value in distinguishing the pre-term from the small-for-dates low birthweight (LBW) infants. This knowledge will help in the anticipation of immediate postnatal problems which are essentially different in these two groups of LBW.

The Dubowitz objective scoring system (Dubowitz, Dubowitz, and Goldberg, 1970), which combines the use of 10 neurological criteria of Amiel-Tison (1968) and 11 external characteristics of Farr *et al.*, (1966), is currently the method of choice in most units. Brueton, Palit and Prosser (1973), in their study of 50 almost entirely full-term infants, have reported this system to be also reliable in the Nigerian new born. The present study was undertaken to further investigate the reliability of the Dubowitz scoring system on a larger number of Nigerian full-term and pre-term infants.

Materials and Methods

The infants in this study were delivered in the Maternity Units of the University College

Hospital (UCH) and the Oluyoro Catholic Hospital (OCH), Ibadan. While the 60 infants at UCH consisted of both term and pre-term neonates, those in OCH (40) were almost entirely delivered at term. Mothers of healthy neonates of maturity ranging from 29 to 43 weeks were interviewed soon after birth; at the UCH these interviews were conducted by a Paediatric resident and at the OCH by members of nursing staff, for menstrual history. In both hospitals, an infant was only admitted to the study if the date of LMP obtained at the interview agreed with that recorded at the time of booking at the antenatal clinic, and the menstrual cycle was found to be regularly 28 days. The infant was then assessed by one of the authors (AHD) at 12–48 hours of postnatal life using the parameters in Table I. Only one assessment was performed in each infant. Three hundred mothers were interviewed before 100 could be found who satisfied the set out criteria. The total score obtained in each case was converted into gestational age using the Dubowitz monogramme (Dubowitz, Dubowitz, and Goldberg, 1970).

TABLE I

**Neurological and External Criteria for Assessment of Gestational Age of Newborn Infants*

Neurological Criteria	*External Criteria*
Posture	Oedema
Square window	Skin texture
Dorsiflexion of foot	Skin colour
Arm recoil	Skin opacity
Leg recoil	Lanugo
Popliteal angle	Plantar creases
Heel to ear	Nipple formation
Scarf sign	Breast size
Head lag	Ear form
Ventral suspension	Ear firmness
	Genitals

* From Dubowitz *et al.* (1970).

Analysis of Data

Records of gestational ages by the scoring method and by maternal dates, which were kept independently, were compared statistically at the end of the study. Of the 100 (45 male and 55 female) neonates in the study, 93 were Yorubas and only 7 were from other ethnic groups in Southern Nigeria. There were 16 (8 pairs) twins and 84 single births. Thus, the 100 infants were products of 92 pregnancies. Twenty-one of these 100 infants were pre-term (29–36 weeks).

Results

The gestational ages by scoring and by dates in the 100 infants are shown in Table II. It can be seen that except in 4 infants (No. 9, 26, 27 and 100) there was close agreement of approximately $\pm$ 2 weeks between gestational ages obtained by scoring and those calculated by maternal dates. It is most likely that the maternal dates of LMP were unreliable in each of the 4 cases where the discrepancy between the score and the dates was 4 weeks or more. In each of the 3 deliveries (1 pair of twins), the age by scoring was higher than by dates and only one of these infants (No. 100) had special care required for small pre-term neonates. The relationship between the scored gestational age (X) and the gestational age by dates (Y) is shown in the Figure. The regression equation is: $Y = 0.955X + 1.3801$, the correlation coefficient (r) is 0.90 and the 95% confidence limits ± 2.63 weeks. When the analysis was based on the 96 infants whose mothers' dates were probably more accurate, r and the 95% confidence limits improved to 0.92 and $\pm$ 2.30 weeks respectively.

Comments

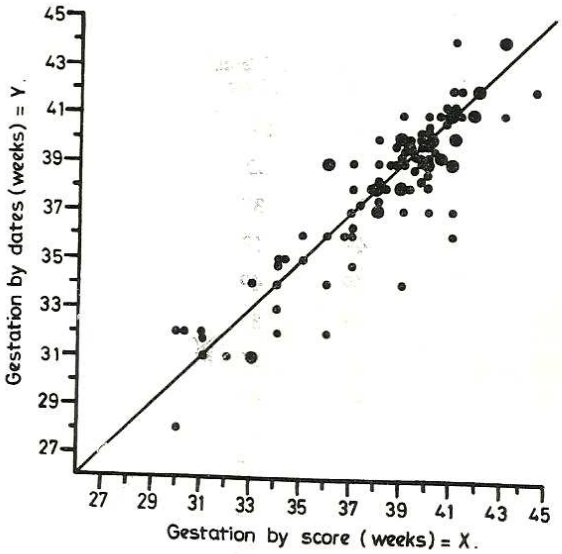
The results of the present study of 100 Nigerian infants show that the Dubowitz scoring system is reliable in African infants of all gestational ages during the first 48 hours of birth. The

TABLE II

Gestational Ages (in weeks) by Score and Dates in 100 Neonates

Serial No.	*Scored Age*	*Maternal Dates*	*Serial No.*	*Scored Age*	*Maternal Dates*	*Serial No.*	*Scored Age*	*Maternal Dates*
1	34	33	35	40	39	69	38	38
2	39	38	36	37	33	70	40	39
3	30	39	37	40	37	71	37	37
4	39	38	38	37	37	72	41	40
5	40	40	39	40	39	73	40	40
6	41	39	40	36	36	74	38	39
7	40	38	41+	36	39	75	33	34
8	39	39	42+	37	39	76	40	40
9*	39	34	43	41	41	77	41	40
10+	40	40	44	41	39	78	37	36
11+	40	40	45	39	39	79	36	34
12	43	43	46	40	40	80	38	38
13	39	40	47	39	39	81	37	35
14	38	40	48	35	35	82	41	41
15	39	40	49	42	42	83	40	39
16	41	43	50	38	38	84	40	39
17	39	38	51	39	39	85	40	40
18	40	39	52	34	34	86+	37	36
19	41	39	53	41	41	87+	37	36
20	40	41	54	39	39	88	35	36
21	38	38	55	42	41	89	31	32
22	39	39	56	41	42	90+	31	31
23	40	38	57	41	41	91+	32	31
24	41	39	58	40	39	92+	34	35
25	41	39	59	39	40	93+	34	35
26*+	36	32	60	33	31	94	30	28
27*+	36	32	61	39	38	95+	34	35
28	40	39	62	40	38	96+	34	32
29	38	38	63	41	42	97+	30	32
30	40	41	64	39	40	98+	30	32
31	39	40	65	40	40	99	31	32
32	38	38	66	38	37	100*	30	26
33	39	37	67	41	40			
34	39	41	68	40	39			

\+ = Twins
* = High discrepancy



Distribution of gestational age by scoring (X) against gestation by maternal dates (Y) in the 100 infants studied. Note: 1. The larger filled-circles represent more than one and frequently 3 or 4 infants. 2. There are many more points below than above the 450 line, suggesting a tendency to higher gestation age by score than by date.

correlation coefficient (r) between scored gestational ages and dates of 0.90 and 95% confidence limits of ± 2.63 weeks in the 100 Nigerian infants are not significantly different from the 0.95 and ± 2 weeks respectively reported by Dubowitz, Dubowitz and Golberg (1970) who correlated gestation by dates against actual score. The present results confirm reports by other workers in Africa (Brueton, Palit and Prosser, 1973; Singer, Blake and Wolfsderf, 1973; Jaroszewicz and Boyd, 1973; Malan and Higgs, 1975) that this system is reliable in African populations. The accuracy of this scoring method is further attested by the very close concordance of the scored ages of sets of twins in this study. In only 2 of the 8 pairs was there a difference of one week between the scored ages of the first and second twins. There is some evidence, however, that scored gestation ages in this study tended to be higher than reliable maternal dates. This is suggested by the scatter of many more points in the figure below the 45° line than above it. This tendency has also been observed by Dubowitz and his co-workers in a group of African infants in Cape Town (Dubowitz, V., personal communication).

Though Yoruba infants formed the majority in the study by Brueton and colleagues and almost entirely the population of the present one, there is no reason to doubt the efficacy of this system in other Nigerian ethnic groups. Within the first 48 hours of birth, skin pigmentation did not significantly obscure the vascular markings in these infants. Instead of "pale, only pink over the ears, lips, palms or soles" used by Dubowitz for skin colour, we scored "moderately dark, only pink over the lips, palms and soles" as substitutes in the Nigerian infants.

All the African studies on assessment of gestational age, including the present one, were undertaken during the first 12–48 hours of postnatal life. It is not possible, therefore, to predict the reliability of this system during the last 3 of the 5 days reported by Dubowitz, Dubowitz and Goldberg (1970). Though the fear that skin pigmentation might obscure vascular markings in African newborn infants has proved to be essentially unfounded, it is suggested that assessment by this system should be limited to the first 48 hours. Nothing will be lost by restricting the assessment to the first 48 hours in African infants since the clinical application of the information obtained is mainly useful during the first 24–72 hours.

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