

## DATA TO CRITICAL BODY MASS OF A FOETUS

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*Abstract: There is still no clear answer to the question whether and to what a degree acceleration of development concerns also the foetal life of man. Assuming hypothesis on diachronic enlargement of newborns' body mass, verification has been undertaken on two generations, born in 1960 and in 1970 in Poznan. Differences in body mass of investigated generations of newborns have been analysed from the point of view of three aspects: (1) as one group (for each sex)  $X_{1970} - X_{1960}$ ; as three groups differentiated on the basis of gestational age (as born before, in, after term); (3) in subsequent weeks of gestational (chronological) age. Results of the work make it possible to formulate the hypothesis of critical body mass of a foetus limits the date of childbirth.*

*Key words: Critical body mass; Foetus.*

### Introduction

The aim of the present work is to verify the hypothesis on increase of the body weight of the new-borns and an attempt at an answer to the question: whether and to what a degree acceleration of development concerns also the foetal life of man.

### Material and Methods

The material for the present work is two generations of new-borns: all alive and able to live now-borns in the years 1960 and 1970 were submitted to retrospective analysis. This took place in the First Clinic of Gyneacology and Obstetrics, University Medical School in Poznan. Altogether there were collected data of 3620 new-borns born in the year 1960 and 4206 new-borns born in 1970. The collected material has two fundamental advantages: (1) it is highly representative as far as numbers are concerned, and (2) it is homogeneous with respect to birth-place of subjects as well as that of residence of their parents. It seems that both are indispensable conditions for reaching a goal of the present work.

The developmental status of the investigated generations of new-borns was evaluated on the basis of their gestational age and body weight. In order to capture trends in the biological development of new-borns both features were submitted to comparative analysis between the investigated generations. Gestational age of investigated new-borns was calculated in full weeks from the first day of the last menstruation period. Arithmetic means of gestational age of the investigated new-borns of both sexes are presented in Table 1. It appeared that the mean gestational age of newborns after ten years was lower and the difference for both sexes is statistically significant. In the course of analysis the investigated new-borns were grouped onto categories of gestational age commonly applied in obstetrics and paediatrics:

- (1)  $\leq 37$  weeks – new-borns born before term (preterm babies),
- (2) 38–42 weeks – new-borns born in term (term babies),
- (3)  $43 \leq$  weeks – new-borns born after term (posterm babies).

**Table 1. Gestational age of all new-borns (weeks)**

Sex	1960		1970		$\alpha$
	$\bar{x}$	s	$\bar{x}$	s	
Male	40.01	1.13	39.61	0.94	0.00
Female	40.05	1.08	39.61	0.95	0.00

The mean gestational age of new-borns born prematurely increased after ten years: the difference is very significant for male new-borns and significant on level  $\alpha = 0.05$  for female new-borns. Meanwhile the mean gestational age of new-borns born in term and those born too late was significantly lowered (Table 2).

**Table 2. Arithmetic means of chronological age in classes of gestational age (weeks)**

Gestational age (week)	sex	1960		1970		$\alpha$
		$\bar{x}$	s	$\bar{x}$	s	
$\leq 37$	male	35.53	1.67	35.98	1.41	0.00
	female	35.68	1.76	35.86	1.49	0.05
38 - 42	male	40.07	1.19	39.69	0.95	0.00
	female	40.12	1.17	39.69	0.94	0.00
43 $\leq$	male	43.16	0.52	43.00	0.00	0.05
	female	43.50	1.15	43.25	0.63	0.04

When analysing the body weight each of the investigated generations of new-borns were considered from the point of view of three aspects:

- (1) As one group – disregarding the time of birth (chronological age);
- (2) As three groups differentiated on the basis of gestational age (three obstetrical categories of gestational age);
- (3) The developmental status in the subsequent weeks of gestational age was also investigated.

### Results

No significant differences were observed on the body weight between the generations of new-borns of both sexes as a whole (Table 3). A different picture was obtained when categories of gestational age of investigated new-borns were taken into consideration (Table 4). It appeared that body weight in new-borns of both sexes born prematurely has very significantly increased in the course of the analysed decade. During the same period of time the mean body weight of new-borns born in term did not undergo any change whereas the body weight of male new-borns born too late decreased, and that of female new-borns increased. Both the decrease and increase were very significant.

**Table 3. Body weight of all examined new-borns (g)**

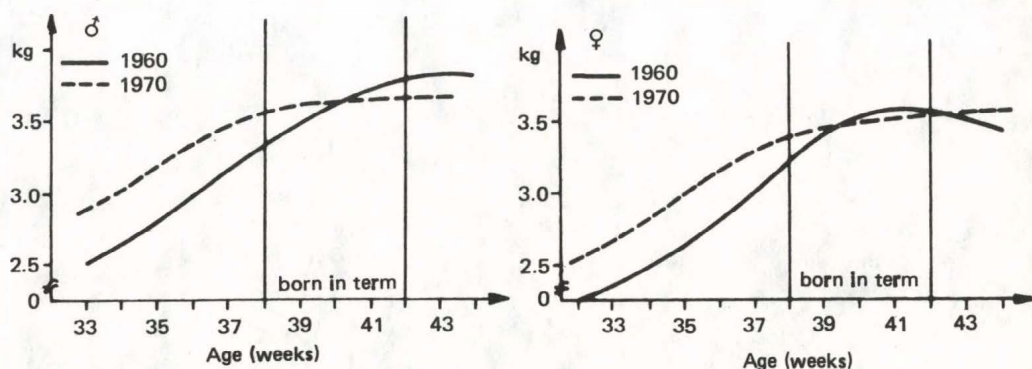
Sex	1960		1970		$\alpha$
	$\bar{x}$	s	$\bar{x}$	s	
Male	3533.1	536.1	3518.0	509.2	0.09
Female	3374.1	509.9	3369.6	487.2	0.14

**Table 4. Body weight of new-borns divided into classes of gestational age (g)**

Gestational age (week)	sex	1960		1970		$\alpha$
		$\bar{x}$	s	$\bar{x}$	s	
$\leq 37$	male	2984.9	551.3	3329.4	569.4	0.00
	female	2779.3	531.8	3136.9	522.6	0.05
38 - 42	male	3580.8	496.5	3566.1	481.1	0.10
	female	3434.4	463.7	3426.9	463.4	0.16
43 $\leq$	male	3726.7	489.1	3631.0	473.6	0.00
	female	3546.6	482.3	3592.6	400.7	0.00

Similar results were obtained when the body weight of new-borns born from the first pregnancies of their mothers was investigated and that of new-borns born by mothers whose each pregnancy ended with the birth of an alive new-born.

From the biological point of view development is a function of time. That is why the investigated phenomenon may be evaluated in the fullest possible way when we analyse body weight in groups of chronological age (in case of investigated new-borns: weeks of gestational age). A comparative specification of arithmetic means of body weight in new-borns born in the subsequent weeks of life for both generations were presented graphically in Fig. 1. The differences in body weight between both generations of new-borns until the 39th week of life are very distinct; in the later weeks this divergence practically disappears. It seems that there may be only one interpretation of this last analysis: body weight is submitted to the process of acceleration, but to a certain moment. It points to the existence of a threshold in the increase of body weight of a new-born. Such a limitation may be various features of mother's organism in whose uterus the foetus develops.



**Fig. 1: Birth weight (means) of male and female new-borns in function of their gestational age**

## Conclusions

The here presented results make it possible to formulate the following *conclusions*: In the ten-year period the length of time of the pregnancies ended before term prolonged a little bit and the newborns were born with a heavier body weight. Length of time of the pregnancies ended in term became shorter but body mass of the new-borns did not change. Body mass of the foetus is submitted to the process of acceleration only to a limited period of gestation age (here until the 39th week).

Based on the above-mentioned conclusions, it seems to exist a critical body mass of the foetus which limits the term of birth, apart from all other factors hitherto known.

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