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**ORIGINAL ARTICLE**

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# Head Circumference Features of Under One Year Old Children at Dr. Pirngadi Hospital Medan

*by*

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## Abstract

*A descriptive cross sectional study to have normal values of the head circumference of under one year old children in Dr. Pirngadi Hospital Medan had been done during January to February 1990. The sample size determined based on formula, was 356 (178 boys and 178 girls). Each sex group was devided proportionally by age in months. Only children with good nutritional status and middle to high socio economic level were included in this study.*

*The mean value of the head circumference is still in the range of the mean of Nellhaus standard. The Nellhaus standard can be used as a standard of head circumference of under one year old children at Dr. Pirngadi Hospital Medan.*

## Introduction

A healthy child normally shows satisfactory growth and development, which will be achieved by giving adequate physicobio-psychosocial environment [1.2].

The examination of the head circumference is a routine procedure in the subdivision of child Neurology to detect skull disorders [3]. The head circumference is the mirror of brain volume [3,4,5]. The growth begins at the $10-18^{th}$ week gestation and continues to childhood period. The speed of growth is greatest during the first year of life. In general, the circumference increases 1 centimeter every 2 months for the remaining 6 month of the first year. The speed of growth decreases rapidly during the second year of life and decreases drastically in the third year [4,5,6].

The head circumference varies by sex and is influenced by physicobio-psychosocial factors [1].

According to Sugeng et al, (1982) at primary school children in Yogyakarta there was a significant correlation between the head circumference and nutritional status [7].

Until now the reference of the head circumference standard that can be used any where is still lacking and the standard of the head circumference for Indonesian children is not available yet.

The purpose of this study is to determine the features of the head circumference of normal under one year old children at Dr. Pirngadi Hospital Medan.

## Materials and methods

This is a descriptive observational study which was carried out through cross sectional by the study population consisted of newborn infants at the neonatal ward Dr. Pirngadi Hospital and children below one year of age at the well Baby Clinics Dr. Pirngadi Hospital Medan during January to February 1990.

The sample size was 178 of both sex groups. The sample size was determined based on the formula    $n = [\underline{z \; \alpha \; x \; d}]^2$, with an estimation of standard $\beta$ deviation of head circumference = 1.3 cm, confidence rate = 95%, bound error = 0.2 cm and drop out rate 10%.

Each sex group was devided proportionally by age in months based on the first visit at the Well Baby Clinics Dr. Pirngadi Hospital Medan [8].

Data used in this study were,
1. Name and sex
2. Age
3. Nutritional status
4. Ethnic group
5. Parent's education
6. Parent's occupation
7. Parent's socioeconomic level
8. Head circumference

Children who had malnutrition, disorders of the head such as microcephaly and macrocephaly and who come from low socioeconomic level were excluded from this study.

The nutritional status was assesed using Road to Health Chart. The socioeconomic level was defined by the modification of scoring system of socioeconomic level of Bistok Saing (1977).

The head circumference was measured with a steel tape scale, Sword Fish Brand, 2 meters lenght with a sensitifity up to 1 milimeter.

The steel tape scale was applied firmly over the glabella and supra orbital ridges anteriorly and that part of the occiput.

The measurement was taken twice for each child by different investigators, and the mean result was analyzed in age and sex groups and compared with Nellhous head circumference standard.

## Results

Thirteen (7.30%) boys (10 with malnutrition and 3 with low socioeconomic level) and 13 (7.30%) girls (6 with malnutrition and 5 with low socioeconomic level) were exluded from this study.

The age and sex distribution of 165 boys and 165 girls can be seen in Table I.

The 330 children in this study consisted of 230 (69.70%) Batak children and 100 (30.30%) Melayu, Minangkabau, Jawa and Aceh children.

The fathers of 172 children (52.12%) were senior high school graduates and the mothers of 136 children (41.21%) were yunior high school graduates.

The fathers of 204 children (61.80%) were civil servants and mayority of the mothers were house wives.

In this study 72.73% of the parents were of middle socioeconomic level and 27.27% of high socioeconomic level.

Table I. *Distribution by age and sex*

| Age (month) | Sex | | | | | % |
| | Boy | | Girls | | Total | |
| | Number | % | Number | % | | |
|---|---|---|---|---|---|---|
| 0 - | 44 | 13.34 | 44 | 13.34 | 88 | 26.68 |
| 1 - | 22 | 6.67 | 22 | 6.67 | 44 | 13.34 |
| 2 - | 17 | 5.15 | 17 | 5.15 | 34 | 10.30 |
| 3 - | 17 | 5.15 | 17 | 5.15 | 34 | 10.30 |
| 4 - | 16 | 4.85 | 16 | 4.85 | 32 | 9.70 |
| 5 - | 16 | 4.85 | 16 | 4.85 | 32 | 9.70 |
| 6 - | 7 | 2.12 | 7 | 2.12 | 14 | 4.24 |
| 7 - | 7 | 2.12 | 7 | 2.12 | 14 | 4.24 |
| 8 - | 7 | 2.12 | 7 | 2.12 | 14 | 4.24 |
| 9 - | 4 | 1.21 | 4 | 1.21 | 8 | 2.42 |
| 10 - | 4 | 1.21 | 4 | 1.21 | 8 | 2.42 |
| 11 - | 4 | 1.21 | 4 | 1.21 | 8 | 2.42 |
| Total | 165 | 50.00 | 165 | 50.00 | 330 | 100.00 |

Table II. *Head Circumference by age and sex*

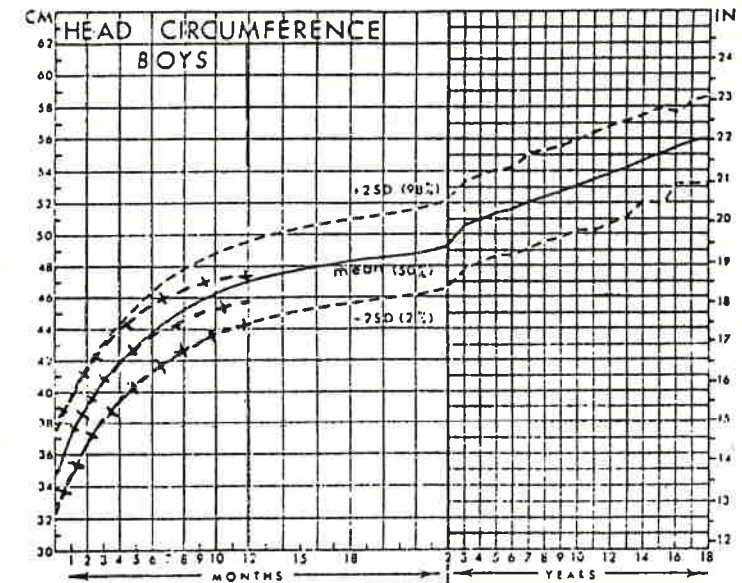| Age (months) | Head Circumference (cm) | | | |
| | Boy | | Girl | |
| | Mean | SD | Mean | SD |
|---|---|---|---|---|
| 0 - | 34.5 | 1.5 | 34.2 | 1.3 |
| 1 - | 38.4 | 1.0 | 37.3 | 0.9 |
| 2 - | 39.1 | 1.2 | 38.7 | 0.8 |
| 3 - | 40.6 | 0.8 | 40.0 | 1.3 |
| 4 - | 41.3 | 0.8 | 40.7 | 0.9 |
| 5 - | 42.5 | 1.0 | 41.5 | 1.0 |
| 6 - | 42.8 | 0.8 | 42.0 | 0.6 |
| 7 - | 43.6 | 0.8 | 42.6 | 0.7 |
| 8 - | 44.2 | 0.4 | 42.6 | 0.7 |
| 9 - | 44.1 | 0.7 | 43.1 | 0.7 |
| 10 - | 44.1 | 0.7 | 43.8 | 0.9 |
| 11 - 12 | 45.2 | 0.7 | 43.9 | 0.5 |



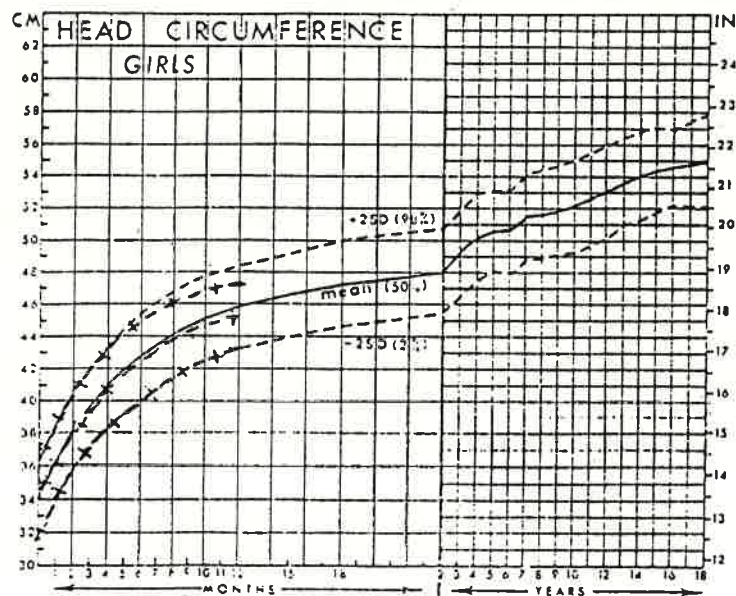Fig. 1. *Comparison of mean boys head circumference with Nellhaus standard*

Fig. 2. *Comparison of mean girl head circuference with Nellhaus standard*

## Discussion

The growth of children is affected by physicobio-psychosocial factors such as education, occupation and income of parents, living environment and nutritional status [1].

Normal anthropometry features can be found in children with good physico-bio-psychosocial factors.

To get a confident results as expected in this study we only included children with good nutritional status and of middle to high socioeconomic levels.

Comparison of the head circumference of the children in this study with the Nellhaus standard (Fig. 1 and 2) showed that the mean ± 2 SD for either boys or girls were still in the limits of the mean ± 2 SD Nellhaus standard.

The results of Saing et al study (1976) showed that the anthropometry measurement of the newborn infants with high socioeconomic level at Dr. Pirngadi Hospital and PTP-IX Hospital Medan were 88-99% of Jellife standard [9].

Arsyad et al. (1983) in their study of pre-elementary school children in Medan, found that the head circumference of those 5 and 6 years old children were still in the limits of the mean of Nellhaus Standard [3].

## Conclusion

The Nellhaus standard can be used as the head circumference standard for under one year old children at Dr. Pirngadi Medan.

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