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Studies on Nutritional Status of Children Growth Analysis from Age of 0 up to 5 Years: A Survey

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ABSTRACT

Growth and development may occur if there are obstacles (or) interruptions in the process from intrauterine to adulthood. Deviations dap good at giving clinical manifestations of abnormalities in growth with or without development abnormalities. The purpose of the study to determine the effect of nutritional status on head growth in children 0-5 years. Study design is observational analytic with cross sectional Approach, Respondent were taken using simple random techniques. Population in this research all toddlers totally 327 children samples as this 77 children under five independent variables is nutritional status dependent variable of Head growth were observed results of this statistical analysis using simple linear regression result of the analysis showed the level of significance P value 0.000, thus HI is accepted which means that there is a influence between nutritional status and infant Head growth were observed in this research.

Keywords: Nutritional status; Clinical manifestations; Head growth; influential growth; Head circumference.

INTRODUCTION

Human growth is the process by which humans increase in size and develop maturity and function. Human growth is influenced by many factors, including age, gender, nutrition, granitic factors, environmental factors, hormones and biopsychosocial model that affect intrinsic and extrinsic strength. Head circumference, for example, is a function of genetic (biological) factors, eating habits (psychological) and the fulfillment nutritious food (social) in children (Soetjiningsih, 2018).[17]

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Deviations in growth and development can occur, if there are obstacles or disturbances in the process from intrauterine to adulthood (Yakoob, 2017). Deviations can give clinical manifestations of both abnormalities in growth with or without development abnormalities (Rahmi, 2019).[15]

Nationally, the prevalence of malnutrition under five is still quite high, namely 19.6%. The magnitude of the problem of under nutrition in toddlers which is still a public health problem is if the prevalence of wasting is >5%. Public health problems are considered serious when the prevalence of wasting is between 10.1% - 15.0% and is considered critical when the prevalence of wasting is above 15.0% (UNECR). Nationally the prevalence of wasting in toddlers is 19.6%, the number of toddlers with malnutrition in East Java is 11.2%. This means that the problem of malnutrition in Indonesia is still a serious public health problem (Hartanty, 2017).[4]

Based on the results preliminary study conducted by researchers in the (Hidayah, 2007) there were 3 toddlers who were experiencing malnutrition. The

results of interview conducted with village official said that the occurrence of malnutrition in toddlers was caused by a lack of willingness of the family to take the toddler to the health center to get treatment and after the toddler is malnourished, the family has the awareness to bring the toddler to the health center. (Aguayo *et al.,* 2016).[1]

At every age stage, from infants, children, adolescents, adults and the elderly, there will always be changes in growth and development. Some are in fast growth and some are in declining growth (Novella, 2011). Research purposes this is to determine the effect of nutritional status on head growth in children 0-5 years. (Lubyetal 2018).[9]

METHODLOGY

Research design used was analytical observational with a cross sectional approach. Respondents were taken using simple random sampling technique. The population in this study were all toddlers in totaling 327 children. A sample of 77 toddlers. The independent variable is nutritional status, the dependent variable is head growth. The results of the analysis using a simple linear regression statistical test. As the ethical consideration, the researchers use the informed consent, anonymity principle and confidentiality principle.

RESULTS AND DISCUSSION

Characteristics of Respondents

Table 1: The characteristics of the respondents in this study include age toddler, parents age, education, occupation, nutritional status children and growth head child

Characteristics	∑N	∑%
Age Child		
1 year	20	26
2 year	27	35
3 year	21	27
4 year	9	12
Parental age		
<25 years	19	25
25-30	24	31
31-35	22	28
>35	12	16
Education		
Junior High School	23	30
Senior High School	45	58
University	9	12
Profession		
Housewife	15	19
Private	38	49
Self employed	19	25
Civil Servant	5	7
Nutritional status		
Nutrition not enough	7	9.1
Nutrition good	67	87
Growth head		
Nutrition more (Excess)	3	3.9
Not enough	7	9.1
Corresponding	65	84.4
More	5	6.5
Total	**77**	**100**

a. Dependent Variable: head growth

Table 1 above from a total of 77 respondents toddlers aged 2 years, namely as many as 27 respondents (35%), parents of toddlers aged 20-35 years, namely as many as 24 respondents (31%), high school educated as many as 45 respondents (58%), working as private employee, namely as many as 38 respondents (49%), almost all toddlers aged 0-5 years in with good nutritional status, namely 67 respondents (87%) and appropriate **head growth, namely 65 respondents (84.4%)**

Table: 2 The results of data analysis carried out on 77 respondents showed a P value = 0.000, thus H1was accepted, which means that there is an influences between nutritional status and the growth of the heads of toddlers 0-5 years in the with an adjusted R Square value of 83.5, which means the growth of the heads of toddlers 0-5 years in 83.5% is influenced by nutritional status and 16.5% is influenced by other factors.

The results showed that 3 (3.9%) toddlers with excess nutrition, 67 (87%) toddlers with good and 9 (9.1%) toddlers with less nutrition out of a total of 77 toddlers 0-5 years.

A child development cannot be maximized without support or optimal growth. For example, a child who is malnourished will affect is mental and social development, therefore both of them must receive attention from both the government, society and parents (Nurliyana, 2016).[13]

According to Corkins, *et al.*, (2016)3 nutritional status is a state of health as a result of a balance between consumption, absorption of nutrients and their use in the body. In determining the nutritional status of children under five there must be a standard measure which is often called a reference.

The standard anthropometric measurement currently used in Indonesia is the WHO-NCHS.

Table 2. Shows the effect of nutritional status on head growth in children 0-5 years

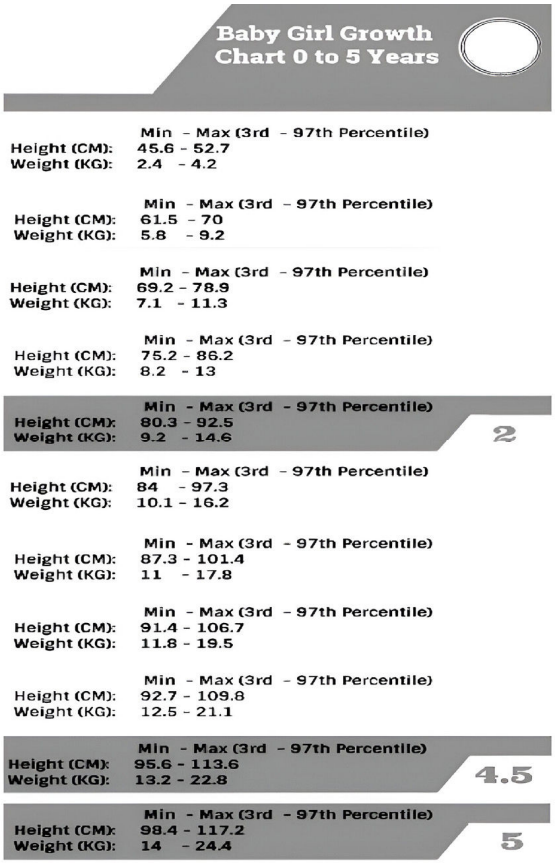
Coefficients						
Model	**Unstandardized Coefficients**		**Standardized Coefficients**	**Q**	**Sig**	**Adjusted R Square**
	B	**Std. Error**	**Betas**			
(Constant)	-1,005	.153		-6,575	.000	.835
Nutritional status	1011	051	.915	19,628	.000	

According to Harvard in Luby (2018), the classification of nutritional status can be divided into four namely excess nutrition, good nutrition, less nutrition and the last is malnutrition. According to Odung (2020) the factors that can affect the nutritional status of toddlers are the state of infection level.

Table 3 & 4:. Shows Boys Baby growth growth

BOYS		
Month/Age	**L/H (cm)**	**Wt/ (Kg)**
1 Month	49.9	3.3
1.5 Month	56.0	5.0
2.5 Month	60.0	5.5
3.5 Month	62.0	6.5
6 Month	67.0	7.9
7 Month	67.1	8.0
9 Month	72.0	8.9
10 Month	72.1	9.0
12 Month	75.7	9.6
13 Month	76.9	9.9
14 Month	78.0	10.1
15 Month	79.1	10.3
16-18 Month	80.2	10.5
18 Month	82.3	10.9
2 Years	87.8	12.2
4.5-5 Years	110.0	18.3

The results of the study also showed that there were 9 (9.1%) toddlers with malnutrition this was due to the lack of knowledge of parents in preparing food ingredients needed by toddlers and the lack of ability of parents to meet children's nutrition needs, this was proven based on the results of interview conducted researchers with parents whose children are malnourished say that they do not know the nutritional needs of children and in everyday life children only consume sober foods such as rice and vegetables and rarely consume eggs and meat, this is a toddler who consumes less foods nutrition needed by toddlers for further growth and development. In toddler with malnutrition (Laurson *et al*. 2017)8 of food consumption, cultural influences, food supply, affordability of health services, hygiene and environmental sanitation, number of members in the family, level of mother's knowledge and education.



Results of the study also showed that there were 3 (3.9%) toddlers with excess nutrition this was due to a lack of parental supervision in maintaining the child's diet, as evidenced by the 3 toddlers who had more nutrition consuming food more often, where parents only giving pocket money and children buying snacks they like and when researchers conducted a study 3 of these children

were consuming snacks where children consumed a lot uncontrolled snack foods, causing children to be overweight and in children with excess nutrition they would be at risk of developing several diseases that caused by excess nutrition (Alderman, 2018)2, (Yakob. 2017).20

Head growth of children 0-5 years

The results showed that 5 (6.5%) toddlers with more head growth, 65 (84.4%) toddlers with appropriate head growth and 7 (9.1%) with less head growth than a total of 77 toddlers aged 0-5 years.

Table 5: Shows Head Circumference for boys birth to 5 years

(Source WHO)

Head circumference-for-age Boys

Birth to 5 years (z-scores)

						Z-scores (head circumference in cm)						
Year: Month	**Month**	**L.**	**M**	**S**	**SD**	**-3 SD**	**-2 SD**	**-1 SD**	**Median**	**1 SD**	**2 SD**	**3 SD**
2: 1	25	1	48.3777	0.02825	1.3667	44.3	45.6	47.0	48.4	49.7	31_1	52.3
2: 2	26	1	48.4989	0.02830	1,3725	44.4	45,8	47,1	48.5	49.9	51,2	52.6
2: 3	27	1	48.6151	0.02834	1.3778	44,5	45.9	47.2	48,6	50.0	51,4	52.7
2: 4	28	1	48.7264	0.02838	1.3829	44.6	46.0	47.3	48.7	50.1	51.5	52.9
2: 5	19	1	48.8331	0.02842	1.3878	44.7	46.1	47.4	48.8	50.2	51.6	53.0
2: 6	30	1	48.9351	0.02847	1.3932	44,8	46.1	47,5	48,9	50.3	51.7	53.1
2: 7	31	1	49.0327	0.02851	1.3979	44,8	46.2	47.6	49.0	50.4	51.8	53.2
2: 8	32	1	49.1260	0.02855	1.4026	44.9	46.3	47.7	49.1	50.5	51.9	53.3
2: 9	33	1	49.2153	0.02859	1.4071	45.0	46.4	47.8	49.2	50.6	52,0	53.4
2:10	34	1	49.3007	0.02863	1.4115	45.1	46.5	47.9	49.3	50.7	52.1	53.5
2: 11	35	1	49.3826	0.02867	1.4158	45.1	46.6	48.0	49.4	50.8	52.2	53.6
3: 0	36	1	49.4612	0.02871	1.4200	45.2	46.6	48.0	49.5	50.9	52.3	53.7
3: 1	37	1	49.5367	0.02875	1.4242	45.3	46.7	48.1	49.5	5L0	52.4	53.8
3: 2	38	1	49.6093	0.02878	1.4278	45.3	46,8	48.2	49.6	51.0	52.5	53.9
3: 3	39	1	49.6791	0.02882	1.4318	45.4	46.8	48.2	49.7	51.1	52.5	54.0
3: 4	40	1	49.7465	0.02886	1.4357	45.4	46.9	48.3	49,7	51.2	52.6	54.1
3: 5	41	I	49.8116	0.02889	1.4391	45.5	46.9	48.4	49.8	51.3	52.7	54.1
3: 6	42	1	498745	0.02893	1.4429	45.5	47.0	48.4	49.9	51.3	52.8	54.2
3: 7	43	1	49_9354	0.02896	1.4461	45.6	47.0	43.5	49.9	51_4	518	54.3
3: 8	44	1	49.9942	0.02899	1.4493	45.6	47.1	48.5	50.0	51.4	52.9	54.3
3: 9	45	1	50.0512	0.02903	1.4530	45,7	47.1	48.6	50,1	51.5	53,0	54,4
3: 10	46	1	50.1064	0.02906	1.4561	45.7	47.2	48.7	50.1	51.6	53,0	54.5
3: 11	47	1	50.1598	0.02909	1.4592	45.8	47.2	48.7	50.2	51.6	53.1	54.5
4: 0	48	1	50.2115	0.02912	1.4622	45.8	47	48.7	50.2	51.7	53.1	54.6

Head circumference-for-age Boys

Birth to 5 years (z-scores)

						Z-scores (head circumference in cm)						
Year: Month	**Month**	**L**	**M**	**S**	**SD**	**-3 SD**	**-2 SD**	**-1 SD**	**Median**	**1 SD**	**2 SD**	**3 SD**
0: 0	0	1	34.4618	0.03686	1.2703	30.7	31.9	33.2	34.5	35.7	37.0	38.3
0: 1	1	1	37.2759	0.03133	1.1679	33.8	34.9	36.1	37.3	38.4	39.6	40.8
0; 2	2	1	39.1285	0.02997	1.1727	35.6	36.8	38.0	39.1	40.3	41.5	42.6
0: 3	3	1	40.5135	0.02918	1.1822	37.0	38.1	39.3	40.5	41.7	42.9	44.1
0: 4	4	1	41.6317	0.02868	1.1940	38.0	39.2	40.4	41.6	42.8	44.0	45.2
0: 5	5	1	42.5576	0.02837	1.2074	38.9	40.1	41.4	42.6	43.8	45.0	46.2

Table cont...

0: 6	6	6	43.3306	0.02817	1.2206	39.7	40.9	42.1	43.3	44.6	45.8	47.0
0: 7	7	7	43.9803	0.02804	1.2332	40.3	41.5	42.7	44.1	45.2	46.4	47.7
0: 8	8	8	44.5300	0.02796	1.2451	40.8	42.0	43.3	44.5	45.8	47.0	48.3
0: 9	9	9	44.9998	0.02792	1.2564	41.2	42.5	43.7	45.0	46.3	47.5	48.8
0:10	10	10	45.4051	0.02790	1.2668	41.6	42.9	44.1	45.4	46.7	47.9	49.2
0:11	11	11	45.7573	0.02789	1.2762	41.9	43.2	44.5	45.8	47.0	48.3	49.6
1: 0	0	12	46.0661	0.02789	1.2848	42.2	43.5	44.8	46.1	47.4	48.6	49.9
1: 1	1	13	46.3395	0.02789	1.2924	42.5	43.8	45.0	46.3	47.6	48.9	50.2
1: 2	14	14	46.5844	0.02791	1.3002	42.7	44.1	45.3	46.6	47.9	49.2	50.5
1: 3	25	15	46.8060	0.02792	1.3068	42.9	44.2	45.5	46.8	48,1	49.4	50.7
1: 4	4	16	47.0088	0.02795	1.3139	43.1	44.4	45.7	47.0	48.3	49.6	51.0
1: 5	5	17	47.1962	0.02797	1.3201	43.2	44.6	45.9	47.2	48.5	49.8	51.2
1:6	6	18	47.3711	0.02800	1.3264	43,4	44.7	46.0	47.4	48.7	50.0	51.4
1: 7	19	19	47.5157	0.02803	1.3324	43.5	44.9	46.2	47.5	48.9	50.2	51.5
1: 8	20	20	47.6919	0.02806	1.3382	43.7	45.0	46.4	47.7	49.0	50.4	51.7
1: 9	21	21	47.8408	0.02810	1.3443	43.8	45.2	46.5	47.8	49.2	50.5	51.9
1:10	22	22	47.9833	0.02813	1.3498	43.9	45.3	46.6	48.0	49.3	50.7	52.0
1:11	23	23	48.1201	0.02817	1.3555	44.1	45.4	46.8	48.1	49.5	50.8	52.2
2: 0	24	24	48.2515	0.02821	1.3612	44.2	45.5	46.9	48.3	49.6	51.0	52.3

Head circumference-for-age BOYS

Birth to 5 years (L.-scores)

							Z-scores (head circumference in ern)				
Year: Month	**Month**	**/1**		**SD**	**-3 SD**	**-2 SD**	**-1 SID**	**Median**	**1 SD**	**2 SD**	**³ 51)**
4: 1	49	50.2617	0.02915	1.4651	45.9	47.3	48.8	50.3	51.7	53.2	54.7
4: 2	50	50.3105	0.02918	1.4681	45.9	47.4	48.8	50.3	51.8	53.2	54.7
4: 3	51	50.3578	0.02921	1.47i0	45.9	47.4	48.9	50.4	51.8	53.3	54.8
4: 4	52	50.4039	0.02924	1.4738	46.0	47.5	48.9	50.4	51,9	53.4	54.8
4: 5	53	50.4488	0.02927	1.4766	46.0	47.5	49.0	50.4	51.9	53.4	54.9
4: 6	54	50.4926	0.02929	1.4789	46.1	47.5	49.0	50.5	52.0		54.9
4: 7	55	50.5354	0.02932	1.4817	46.1	47,6	49.1	50.5	52,0	53,5	55.0
4: 8	56	50.5772	0.02935	1.4544	46.1	47.6	49,1	50.6	52.1	53.5	55.0
4: 9	57	50.6183	0.02938	1.4872	46.2	47.6	49.1	50.6	52,1	53.6	55.1
4:10	58	50.6587	0.02940	1.4894	46.2	47.7	49.2	50.7	52.1	53.6	55.1
4:11	59	50.6984	0_02943	1.4921	46.2	47.7	49,2	50.7	52_2	53,7	55.2
5: 0	60	50.7375	0,02946	1.4947	46.3	47.7	49,2	50.7	52,2	53,7	55.2

Table 6: Head Circumference for Girls birth to 5 years

(Source WHO)

								Z-scores (head circumference in cm)				
Year: Month	**Month**	**I.**	**11**	**S**	**SD**	**-3 SD**	**-2 SD**	**-I**	**Median**	**1 SD**	**2 SD**	**3 SD**
2: 1	25		47.3204	0.02953	1.3974	43.1	44.5	45.9	47.3	48.7	50.1	51,5
2: 2	26		47.4536	0.02949	1.3994	43.3	44.7	46,1	47,5	48.9	50,3	51.7
2: 3	27		47.5817	0.02945	1.4013	43.4	44.8	46.2	47.6	49.0	50.4	51.8
2: 4	28		47.7045	0.02941	1.4030	43.5	44.9	46.3	47_7	49.1	50.5	51.9
2: 5	29		47.8219	0.02937	1,4045	43.6	45.0	46,4	47.8	49.2	50.6	52.0
2: 6	30		47.9340	0.02933	1.4059	43.7	45.1	46,5	47_9	49.3	50.7	52.2

Table cont...

2: 7	31	1	48.0410	0.02929	1.4071	43.8	45.2	46.6	48.0	49.4	50.9	52.3
2: 8	32	1	48.1432	0.02926	1.4087	43.9	45,3	46,7	48,1	49.6	51,0	52.4
2: 9	33	I	48.2408	0.02922	1.4096	44.0	45.4	46.8	48.2	49.7	51.1	52.5
2:10	34	1	48.3343	0.02919	1.4109	44.1	45.5	46.9	48.3	49.7	51.2	52.6
2:11	35	1	48.4239	0.02915	1.4116	44.2	45.6	47.0	484	49.8	51.2	52.7
3: 0	36	1	48.5099	0.02912	1.4126	44.3	45.7	47.1	48.5	49.9	51.3	52.7
3: 1	37	1	48.5926	0.02909	1.4136	4-4.4	45.8	47.2	48.6	50.0	51.4	52.8
3: 2	38	1	48.6722	0.02906	1.4144	44.4	45.8	47.3	48.7	50.1	51.5	52.9
3: 3	39	1	48.7489	0,02903	1,4152	44.5	45.9	47,3	48.7	50.2	51.6	53.0
3: 4	40	1	48.8228	0.02900	1.4159	4.4.6	46.0	47.4	48.8	50.2	51.7	53.1
3: 5	41	1	48.8941	0.02897	1.4165	44.6	46.1	47.5	48.9	50.3	51.7	53.1
3: 6	42	1	48.9629	0.02894	1.4170	44,7	46.1	47.5	49,0	50.4	51.8	512
3: 7	43	1	49.0294	0.02891	1.4174	44.8	46.2	47.6	49.0	50.4	51.9	53.3
3: 8	44	1	49.0937	0.02888	1.4178	4.4.8	46.3	47.7	49_1	50.5	51.9	53.3
3: 9	45	1	49,1560	0,02386	1,4186	44.9	46.3	47,7	49.2	50.6	52.0	53,4
3: 10	46	1	49.2164	0.02883	1.4189	45.0	46.4	47.8	49.2	50.6	52.1	53.5
3: 11	47	1	49.2751	0.02880	1.4191	45.0	46.4	47.9	49.3	50.7	52.1	53.5
4: 0	48	1	49.3321	0,02878	1,4198	45.1	465	47,9	49.3	50,8	52.2	53.6

Head circumference-for-age GIRLS

Birth to 5 years (z-scores)

			Z-scores (head circumference in cm)									
Year: Month	**Month**	**L**	**M**	**S**	**SD**	**-3 SD**	**-2 SD**	**-1 SD**	**Median**	**1 SD**	**2 SD**	**3 SD**
0: 0	0	1	33.8787	0.03496	1.1844	30.3	31.5	32.7	33.9	35.1	36.2	37.4
0:	1	1	36.5463	0.03210	1.1731	310	34.2	35.4	36.5	37.7	38.9	40.1
0: 2	2	1	38.2521	0.03168	1.2118	34.6	35.8	37.11	38.3	39.5	40.7	41.9
0: 3	3	1	39.5328	0.03140	1.2413	35.8	37.1	38.3	39.5	40.8	42.0	43.3
0: 4	4	1	40.5817	0.03119	1.2657	36.8	38.1	39.3	40.6	41.8	41.1	44.4
0: 5	5	1	41.4590	0.03102	1.2861	37.6	38.9	40.2	41.5	42.7	44.0	45.3
0: 6	6	1	42.1995	0.03087	1.3027	38.3	39.6	40.9	42.2	43.5	44.8	46.1
0: 7	7	1	42.8290	0.03075	1.3170	38.9	40.2	41.5	42.8	44.1	45.5	46.8
0: 8	8	1	43.3671	0.03063	1.3283	39.4	40.7	42.0	43.4	44.7	46.0	47.4
0: 9	9	1	43.8300	0.03053	1.3381	39.8	41.2	42.5	43.8	45.2	46.5	47.8
0:10	10	1	44.2319	0.03044	1.3464	40.2	41.5	42.9	44.2	45.6	46.9	48.3
0:11	11	1	44.5844	0.03035	1.3531	40.5	41.9	43.2	44.6	45.9	47.3	48.6
1: 0	12	1	44.8965	0.03027	1.3590	40.8	42.2	43.5	44.9	46.3	47.6	49.0
1: 1	13	1	45.1752	0.03019	1.3638	41,1	42.4	43.8	45.2	46.5	47.9	49.3
1: 2	14	1	45.4265	0.03012	1.3683	41,3	42.7	44.1	45.4	46.8	48.2	49.5
1: 3	15	1	45.6551	0.03006	1.3724	41.5	42.9	44.3	45.7	47.0	48.4	49.8
1: 4	16	1	45.8650	0.02999	13755	41.7	43.1	44.5	45.9	47.2	48.6	50.0
1: 5	17	1	46_0598	0.02993	1.3786	41.9	43.3	44.7	46.1	47.4	48.8	50.2
1: 6	18	1	46.2424	0.02987	1.3813	42. 1	43.5	44.9	46.2	47.6	49.0	50.4
1: 7	19	1	46.4152	0.02982	1.3841	42.3	43.6	45.0	46.4	47.8	49.2	50.6
1: 8	20	1	46.5801	0.02977	1.3867	42,4	43.8	45.2	46.6	48.0	49.4	50,7
1: 9	21	1	46.7384	0.02972	1.3891	42.6	44.0	45.3	46.7	48.1	49.5	50.9
1:10	22	1	46.8913	0.02967	1.3913	42.7	44.1	45.5	46.9	48.3	49.7	51.1
1:11	23	1	47.0391	0.02962	1.3933	42.9	44.3	45.6	47.0	48.4	49.8	51.2
2: 0	24	1	47.1822	0.02957	1.3952	43.11	44.4	45.8	47.2	48.6	50.0	51.4

						Z-scores (head circumference in cm)						
Year: Month	**Month**	**L**	**M**	**S**	**SD**	**-3SD**	**-2SD**	**-1SD**	**Median**	**1SD**	**2SD**	**3SD**
4: 1	49	1	49.3877	0.02875	1.4199	45.1	46.5	48.0	49.4	50.8	52.2	53.6
4: 2	50	1	49.4419	0.02873	1.4205	45.2	46.6	48.0	49.4	50.9	52.3	53.7
4: 3	51	1	49.4947	0.02870	1.4205	45.2	46.7	48.1	49.5	50.9	52.3	53.8
4: 4	52	1	49.5464	0.02868	1.4210	45.3	46.7	48.1	49.5	51.0	52.4	53.8
4: 5	53	1	49.5969	0.02865	1.4210	45.3	46.8	48.2	49.6	51.0	52.4	53.9
4: 6	54	1	49.6464	0.02863	1.4214	45.4	46.8	48.2	49.6	51.1	52.5	53.9
4: 7	55	1	49.6947	0.02861	1.4218	45.4	46.9	48.3	49.7	51.1	52.5	54.0
4: 8	56	1	49.7421	0.02859	1.4221	45.5	46.9	48.3	49.7	51.2	52.6	54.0
4: 9	57	1	49.7885	0.02856	1.4220	45.5	46.9	48.4	49.8	51.2	52.6	54.1
4: 10	58	1	49.8341	0.02854	1.4223	45.6	46.9	48.4	49.8	51.3	52.7	54.1
4: 11	59	1	49.8789	0.02852	1.4226	45.6	47.0	48.5	49.9	51.3	52.7	54.1
5: 0	60	1	49.9228	0.2850	1.4228	45.7	47.1	48.5	49.9	51.3	52.8	54.2

Head growth is very complex. Before the baby is born the growth centers in the head are already working actively. At birth the head makes up about a quarter of the total body height. In adults, the head makes up one – eighth of the total body height. Therefore between birth and maturity the body certainly grows more rapidly, both in proportion and size compared to the head. In most individuals, the general speed of body growth follows a pattern, although there are variations at different stages of the pattern (Netty H, 2011).[12]

Head growth is strongly influenced by genetic factors in addition to other factors, namely the environment, nutrition, degree of physical activity and health and disease (FKUI, 2008). Recent research state that the diversity in craniofacial morphology results from a complex interaction of environmental variables which include, namely muscle function, genetic factors, hormonal factors in the endocrine system, environmental factors and nutritional status (FKUI, 2008) (Salam *et al.*, 2015).[16]

Effect of nutritional status on head growth in children 0-5 years

The results of data analysis carried out on 77 respondents showed a P value = 0.000, thus H1was accepted, which means that there is an influences between nutritional status and the growth of the heads of toddlers 0-5 years in the with an adjusted R Square value of 83.5, which means the growth of the heads of toddlers 0-5 years in 83.5% is influenced by nutritional status and 16.5% is influenced by other factors. (U;fah, *et al.* 2018).[18]

Poor head growth had poor nutritional status, thus causing the child's head growth to be less that optimal and the results of the study also showed that there were 5 (6.5%) toddlers with more head growth. In toddlers with less and more head growth according to theory it can be caused by several factors such as muscle function, genetic factors, hormonal factors in the endocrine system, environmental factors and nutritional status. (Krishnansari, 2010).[6]

Nutritional status plays an important role in the growth and development of toddlers, where in toddlers with poor nutritional status it will cause slow growth and development of toddlers because the body does not have enough nutrients that the body needs. The state of malnutrition status will have a broad impact, including the ease with which children experience infections as well as impaired growth and development and impaired organ function. Likewise, toddlers with more nutritional status will have a risk of developing blood vessel disease, the risk of developing DM if this condition continues until the toddler grows into an adult (Zulaekah, 2014).21 Therefore it is necessary to maintain the nutritional status of toddlers so that they are maintained in good nutritional status, so that the growth and development of children can take place properly. The results of this study also show that almost all toddlers aged 0-5 years in good nutritional status have appropriate head growth. This shows that the better the nutritional status of toddlers, the child's head will grow according to its stages. However the results of the study also showed that there were 2 toddlers with good nutritional status who had more head growth on the endocrine system, environmental factors.

Krisnasari (2010) stated that providing good and correct nutrition such as consuming foods rich in protein, folic acid, minerals and nutrients from the beginning of pregnancy until the age of 5 years, then the size of the head, to be precise an increase

in brain volume greatly supports the development Medicine, Sebelas Maret University, Surakarta analyzes differences in nutritional status and child development. The same thing is also found in Pramusinta's research (2008) that the health status and stimulation of child development given to each parent of teenage age greatly influences children's development especially in gross motor skills. (Milluard, 2017).[11]

CONCLUSION

Nutritional status with 0-5 years toddlers growth head where the better the nutritional status of the toddler the better the growth of head balita, this is because with good nutrition status of toddlers eat body requirement of nutrition fulfilled, so growth of head of toddler good.

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