Behaviour Consequences of Malnutrition in Early Childhood

C Vidya[a], H Rathna[b] and S. K. Tripathi[c]*
[a]*MEC Institutions, New town Yelahanka, Bangalore, India.*
[b]*Department of Extension Education, SMT. VHD College of Home Science ,Bangalore, India.*
[c]*National Institute of Public Cooperation and Child Development (NIPCCD), SRC, New Town Yelahanka, Bangalore, India.*
*drtripathi12@gmail.com

Abstract

During the last few decades the subject of growth and development of children has received serious attention; of academicians, policy makers and practitioners. Scholars of different disciplines, i.e. psychology, psychiatry, home science, pediatrics, education, social work and sociology have placed the child at focal point of their researches. These researches have aimed at understanding scientifically the determinants and detrimental factors, in the developmental processes of the child in early "seventies" (1974) with the promulgation of a National developing countries. Subsequently, in the year 1975 the Government introduced the integrated Child Development Scheme, which was aimed at providing services for the total care and development of children and women. The cause of children got further impetus with the United Nation's Assembly declaring 1979 as the International year of the child (IYC). Following 3 x 2 factorial design with three levels of nutritional status (normal, Grade I, Grade II) and both the sex, have been taken for the purpose of the present study. The age range of children was between 36 months to 72 months. The entire sample strictly matched on socio-economic status, general health and cultural setting. The study was confined to Bangalore, a cosmopolitan city in India. There were 30 subjects in each cell with a total of 100. Results have indicated the detrimental impact of malnutrition on aggression anxiety hyper activity and on the whole the total behavior of the child. In the present study the sample has been taken precisely according to the research design of the study, it can be stated that emotional disturbances (aggression & social behavior, anxiety & hyperactivity) are closely related with the nutritional status of the child. The cognitive depression and environmental deprivation may also produce behavioral problems among children (Tripathi, 1992). Once it is coupled with malnutrition it may manifest itself as aggression, anxiety and sometimes in the form of Hostility just to overcome the situational problems in everyday life. As a matter of fact, in a child suffering from malnutrition and physiological inability and this in turn in the form of poor motor reflexes and motor eye coordination make the child to be neglected by the family members and surroundings.

Keywords - Malnutrition, Behaviour problem, Age and gender

Introduction

During the last few decades the subject of growth and development of children has received serious attention; of academicians, policy makers and practitioners. Scholars of different disciplines, i.e., psychology, psychiatry, home science, pediatrics, education, social work and sociology have placed the child at focal point of their researches. These researches have aimed at understanding scientifically the determinants and detrimental factors, in the developmental processes of the child in early "seventies" (1974) with the promulgation of a National developing countries. Subsequently, in the year 1975 the Government introduced the integrated Child Development Scheme, which was aimed at providing services for the total care and development of children and women. The cause of children got further impetus with the United Nation's Assembly declaring 1979 as the International year of the child (IYC). Thereafter, policy makers, subject matter experts on child development and other continued to examine the state of knowledge in the field, so as to decide the priorities and make efforts more effective & concerned in order to ensure optimistic development of the children.

Malnutrition and Behavioral Problems

Galler *et al.,* (1985), examined maternal reports of the behaviors of 96 Barbadian school children with a history of malnutrition and 96 controls matched for age and sex. Index and control groups differed significantly on a composite of 7 behavioral factors (eg. Social skills, helpfulness) in that index subjects were identified as less well behaved than controls. They were also described as being less well behaved in comparison with their siblings. The behavioral patterns of the index children were partly attributable to poor socio economic circumstances and to reports by the present authors (1983, 84) impaired class room behavior and reduced IQ in the same subjects, which were associated only with the episode of early malnutrition without a significant contribution from socio economic and micro environmental factors in the home (Galler and Ramsey, 1985; Galler, 1984; Ramsey and Forde, 1986; Pollitt and Thomson, 1977; Richardson *et al.,* 1972).

Rahim and Cederblad, (1986) studied child behavior and health in a newly urbanized part of Khartoum, Sudan in 1980 on 245 children aged 3-15 years and compared to a previous study by the authors in the same area then rural, in 1965. This study showed an increase of behavior problems of boys aged 7-15. Levels of most behavior problems were below the facts from comparable studies from developed countries. Physical health and nutrition had improved between 1965 1980. Older children of new comers showed the highest frequencies of behavioral problems, while those belonging to the best third of their grades had fewer behavioral problems. Material anxiety/depression and Harsh corporal punishment were found to influence rates of behavior problems. School subjects (7-15 yrs) showed a strong connection between poor somatic health and higher rates of behavioral deviances (Galler, 1984; Cravioto, 1979).

Experimental Design and Method

Following 3 x 2 factorial design with three levels of nutritional status (normal, Grade I, Grade II) , and both the sex, have been taken for the purpose of the present study. The age range of children was between 36 months to 72 months. The entire sample strictly matched on socio-economic status, general health, and cultural setting. The study was confined to Bangalore, a cosmopolitan city in India. There were 30 subjects in each cell with a total of 100.

Procedure

About 300 children with in the age range of 3- 6 years were surveyed. There after their nutritional status was ascertained, using the subject selection technique for the manipulation of independent variable (D'Ameto, 1970) the nutritional status and sex. The 180 children were matched on a sex and socio economics status.

The parents of studied children were interviewed on behavioral problem questionnaire individually, to assess the manifested behaviour problem by their children suffering from different degree of nutritional status.

Results

Behaviour consequences of Malnutrition

The Behaviour problems in every day of life were measured, which has appeared in table 1. Overall behaviour problem was found to be increasing with deterioration in nutritional status. The striking finding was that mild malnutrition produced more behaviour problems against males but marked malnutrition was more detrimental for females.

Table 1: Mean & Standard Deviations of Behaviour problem according to Nutritional Status & Sex (n=30 in each cell).

Nutritional Status	Male	Female
Normal	13.87 ± 8.76	14.73 ± 8.46
Mild Malnutrition Grade I	21.03 ± 7.46	20.77 ± 6.77
Marked Malnutrition Grade II	23.80 ± 9.13	25.73 ± 10.75

The scores of behavioral problems were treated for 3 x 2, 2 way ANOVA in table-2 and the main effect (F= 22.47, df 2.174, P<.01) of nutritional status was found highly significant. An increasing trend for behavioral problem correspondent to deterioration in nutritional status in early childhood was found. The marked malnutrition was found to be producing more behavioral problems among females.

Table 2: Summary of 3 x 2, 2-way ANOVA for Behaviour Problems.

Source of variance	df	MS	F
A (Nutritional Status)	2	1680.63	22.47**
B (Sex)	1	32.09	0.48
A X B	2	18.15	0.24
Error	174	74.78	--

**P<.01

Malnutrition and Aggression

Subscale of Behavioral problem Questionnaire (BPQ) which was a measure of aggression is reported in table-3. It is evident from the table that, there were no sex differences in case of normal nutritional status. However nominal sex differences were found in case of mild to marked malnutrition but, males were found to be more aggressive as consequent reaction to their poor nutritional status.

Table 3: Mean & Standard Deviation of Aggression According to Nutritional Status & Sex (n = 30 in each cell).

Nutritional Status	Male	Female
Normal	9.13 ± 4.18	5.76 ± 4.03
Mild Malnutrition Grade I	8.37 ± 4.39	7.07 ± 4.37
Marked Malnutrition Grade II	10.30 ± 5.56	9.10 ± 4.99

The main effect (F= 12.75, d.f. 2.174, P<.01) nutritional status for emergence of aggression in children was found highly significant for aggression, no interaction effect was found for nutritional status and sex (Table-4) .Furthermore it was found that males are found to be highly prone to aggressive behavior corresponding to deterioration in their nutritional status as compared to females.

Table 4: Summary of 3 x 2, 2-way ANOVA for Aggression.

Source of variance	df	MS	F
A (Nutritional Status)	2	276.35	12.75**
B (Sex)	1	27.43	1.26
A X B	2	12.77	.59
Error	174	21.67	--

**P<.01

Malnutrition and Anxiety

Table 5 shows the mean and standard deviation of anxiety scores of the children of different nutritional status. The female children were found to be more anxious as compared to males but, malnutrition produced rather high anxiety in both males and females. More specifically, the marked malnourished female children were found highly anxious in comparison with the rest of the sub groups.

Table 5: Mean & Standard Deviation of Anxiety Levels According to Nutritional Status & Sex (n = 30 in each cell).

Nutritional Status	Male	Female
Normal	4.17 ± 3.36	5.13 ± 3.77
Mild Malnutrition Grade I	6.63 ± 3.52	8.32 ± 3.24
Marked Malnutrition Grade II	7.96 ± 2.91	9.33 ± 2.83

The level of anxiety was found significantly high in females, therefore the main effect (F = 22.87, d.f. 2.174, p<.01) of nutritional status and sex (F= 7.43, d.f 1.174, p<.01) was found highly significant in Table-6. Though females were found to be more anxious the increasing trend in anxiety level corresponding to deterioration in nutritional status was found more or less similar.

Table 6: Summary of 3 x 2, 2-way ANOVA for Anxiety Level.

Source of variance	df	MS	F
A (Nutritional Status)	2	254.45	22.87**
B (Sex)	1	82.69	7.43**
A X B	2	2.65	.23
Error	174	11.12	--

**P<.01

Malnutrition and Hyperactivity

As per hyperactive behavior is concerned it was more pronounced, however, level of malnutrition increased the hyperactive behavior, which was found maximum in females suffering from malnutrition.

Table 7: Mean & Standard Deviation of Hyperactivity according to Nutritional Status & Sex (n = 30 in each cell).

Nutritional Status	Male	Female
Normal	2.47 ± 1.96	2.33 ± 1.56
Mild Malnutrition Grade I	3.60 ± 2.12	3.53 ± 2.63
Marked Malnutrition Grade II	3.60 ± 2.15	4.16 ± 2.57

3 x 2, 2-way ANOVA table -8 revealed the main effect of nutritional status for inducing hyperactive behavior amongst children, it was females who became more hyperactive because of their poor nutritional status.

Table 8: Summary of 3 x 2, 2-way ANOVA for Hyperactivity.

Source of variance	df	MS	F
A (Nutritional Status)	2	36.62	7.43*
B (Sex)	1	.67	.13
A X B	2	2.24	.45
Error	174	4.93	--

**P<.05

Discussion

In the current available literature, the adverse effect of malnutrition of physical growth and mental development of children were well recognized (WHO, 1963; Nutrition Review, 1969; Cravioto, 1968; Champpakkam and Shreekanthaiah, 1968). The Physical and intellectual development as well as behavioral problems of malnourished children are a matter of great concern to behavioral scientists. Malnourished children constitute a disproportionately large group of total population as compared with similar disadvantage children of any developing societies.

Much has been said about the impact of malnutrition on cognitive development in early childhood stage; since malnutrition is detrimental to attention and memory, in other words, it may produce emotional disturbance because of inability to cope with environmental stimulation which may collectively produce aggression, anxiety and hyper activity have been considered in collective form as behavior problems in early childhood. Results have indicated the detrimental impact of malnutrition, on aggression anxiety, hyper activity and on the whole the total behavior of the child. In the present study, the sample has been taken precisely according to the research design of the study, it can be stated that, emotional disturbances (aggression & social behavior, anxiety & hyperactivity) are closely related with the nutritional status of the child. The cognitive depression and environmental deprivation may also produce behavioral problems among children (Tripathi, 1992). Once it is coupled with malnutrition it may manifest itself as aggression, anxiety and sometimes in the form of Hostility just to overcome the situational problems in everyday life. As a matter of fact, in a child suffering from malnutrition and physiological inability in turn in the form of poor motor reflexes and motor eye coordination, make the child to be neglected by the family members and surroundings. Such a negligence which may or may not deliberates the detrimental to child's coping ability with the environment and with the physiological limitations factors deterimental. Sometimes, just because of malnutrition and feeling of apathy, social isolation lethargy develops in the child because of Neuropsychological deficits in the child caused by malnutrition in the early formative years of life. (Keys *et al.,* 1950; Widdowson, 1985). Winick and Rosso, (1969) observed significant reduction in the brain weight, total DNA & RNA contents in infants who died of marasmus during the first years of life. The reduction of DNA decreases the number of both neurons and glia which is apparently responsible for motor reflexes in human being. In addition to that Winick, (1976) has found malnutrition in human is closely associated with impaired myliniation of Central Nervous system. Therefore it is clear that malnutrition in early childhood produces neurological deficits which manifest in the form of behaviour problems such as aggression, anxiety and hyperactivity, because, malnutrition is a cause of slow arousal and poor orientation towards any visual stimuli (Brazel *et al.*, 1977, Banet, 1984; Pollitt and Thompson, 1977).

In brief, it can be stated that malnutrition not only limits the childs interaction with its physical and social environment but also restricted the child through profound impact on cognition as well as behaviour functioning (Richardson *et al.,* 1972; Rosenzweig and Leiman, 1989; Rush, 1984; Spreen *et al.,* 1984; Shoemaker and Bloom, 1977; Reddy, 1981).

References

Barrett, D.E. 1984. Malnutrition and child behaviour: conceptualization, assessment and an empirical study of social-emotional functioning. In *Malnutrition and Behaviour: Critical Assessment of Key Issues*, Eds., J Brozek and B. Schurch, Lausanne, Switzerland: Nestle Foundation, pp. 280-306.

Brazelton, T. B., Tronck, Lechtig, A., Lasky, R. E., and Klein, R. E. 1977. The behavior of nutritionally deprived quatemalan infants. *Developmental Medical child Neurology,* 19, 364-372.

Cravioto, J. 1968. Nutritional Defeiciences and Mental Performance in Childhood. In *Environmental Influences*, Eds., Glass and David, *New York: Rockfeller University*, pp. 3.

Cravioto, J., Robles, B. 1965. Evolution of adoption and motor behaviour during Rehabilitation from kwarshiorkor. *American Journal of Orthopsychiatry*, 35, 449-464.

D'Amato, M.R. 1970. *Experimental Psychology* India McGraw Hill.

Dobbing, J. 1976. Vulnerable periods in brain growth and somatic growth. *The Biology of Human Fetal Growth*, 137-147.

Galler, J. R. 1984. Behavioral consequences of malnutrition in early life. *Nutrition and Behaviors*, 63-117.

Galler, J. R., Ramsey, F., Solimanomo, G. 1985. A follow up study of the Influence of early malnutrition on subsequent development : Fine motor skills in adolescence. *Pediatric Research,* 19, 524-527.

Galler, J.R., Ramsey, F. 1985. The influence of early malnutrition on subsequent behaviour development: The hole of the micro environment of the household. *Nutrition and behavior,* 2, 161-173.

Galler, J.R., Ramsey, F., Forde, V. 1986. A follow up study of the influence of early malnutrition on subsequent development: Intellectual performance during adolescence. *Nutrition and behavior*, 3, 211-222.

Gravioto, J. and Delicardie, E. R. 1972. Environmental correlated of server clinical Malnutrition and language development in survivors of Kwarshiorkor of marasumus. *Nutrition, the Nervours system and Behavior*, 73 - 94.

Keys, A., Brozek, J., Henschel, A., Mickelsen, O., Taylor, 1950. The biology of Human Starvation, Vol 1 & 2. *Minneapolis: University of Minnesota Pres.*

Pollitt, E., Thomson, C. 1977. Protein calorie malnutrition and behaviour: A view from psychology. In *Nutrition and the Brain*, Vol 2, Eds., R.J. Wurtman, and J.J. Wurtman, New York: Raven Press, pp 261-306.

Rahim S.I., Cederblad, M. 1986. Effects of rapid urbanization on child behaviour and health in a part of Khartoum, Sudan. *Psycho social influences on behavior, Social science and Medicine*, 22 (7) 723-730.

Reddy, V. 1981. Protein Energy Malnutrition : An overview. *Nutrition in Health and Disease and International Development,* 227-235.

Richardson, S. A., Birch, A. G., E., Yodey, K. 1972. The Behavior of children in school who were severaly malnourished in the first two years of life. *Journal of Health and social Behavior*, 13, 276-284.

Rosenzweig, M. R., lieman, A. L. 1989. Physiological Psychology. *New York: Random House*.

Rush, D. 1984. The behaviour consequences of protein energy deprivation and supplementation in early life. An epidemiological perspective. In *Nutrition and behaviour*, Eds., J.R. Galler, pp: 119-157.

Shoemaker, W.J., Bloom, F.E. 1977. Effects of undernutrition on brain morphology. In *Nutrition and the Brain*, Eds., R.J. Wurtman and J.J. Wurtman, New York Raven Press, pp: 147-192.

Spreen, O., Jupper, D., Risser, A., Jussko, L. A., Edgell, D. 1984. Human Development Neuropsychology. New York: *Offord University Press*.

Tripathi, S.K. 1992. Socio-Cultural correlates of malnutrition in early childhood and its behaviour consequences, *unpublished paper*, National Institute of Public Co-Operation and child development, SRC Bangalore.

Who. 1963. Basic Study No. 12: *Malnutrition and Diseases*, Geneva Switzerland.

Widdowson, E.M. 1985. Responses to deficits of dietary energy. In *Nutritional Adaptation in Man*, Eds., K Blaxter and J.C Waterlow, London: John Libby, pp: 97-104.

Winick, M. 1976. *Malnutrition and Brain Development*. New York: Oxford University press.

Winick, M., Rosso, P. 1969. The effects of severe early malnutrition on cellular growth of the human brain. *Paediatric Research,* 3, 181-184.