



Journal of Medical Sciences

ISSN 1682-4474

science
alert

ANSI*net*
an open access publisher
<http://ansinet.com>

JMS (ISSN 1682-4474) is an International, peer-reviewed scientific journal that publishes original article in experimental & clinical medicine and related disciplines such as molecular biology, biochemistry, genetics, biophysics, bio-and medical technology. JMS is issued eight times per year on paper and in electronic format.

For further information about this article or if you need reprints, please contact:

M.M.A. Khan Khattak
Department of Human Nutrition,
Kulliyyah of Allied Health
Sciences,
International Islamic University
Malaysia,
Jalan Sultan Ahmed Shah,
Bandar Indera Mahkota,
Kuantan 25200, Pahang,
Darul Makmur, Malaysia

Tel: +60-9-5716400/+2599,
+60-199287384
Fax: +60-9-5716776

Malnutrition and Associated Risk Factors in Pre-School Children (2-5 Years) in District Swabi (NWFP)-Pakistan

¹M.M.A. Khan Khattak and ²S. Ali

To assess the nutritional status and the associated risk factors in preschool age children in the District Swabi of the North West Frontier Province (NWFP)-Pakistan. The studies included 140 children (both boys and girls) and were assessed for nutritional status using correlation analysis for association of malnutrition with parent's income, family size and number of the child within the family, sex of the child and Z-score for stature/age, weight/age/stature and weight/stature. The results showed no significant differences between the sex, age for weight and height compared. The weight and height were lower than the third percentile in all cases and indicate that the children were stunted and under-weight. The mean z-score in every case (i.e., -score for age-height and age-weight, sex-height and sex-weight and height-weight) was significantly different. Furthermore, there was strong association of malnutrition with family size, income of the parents and child number in the family in rural areas. This study indicates that the children in this particular area on average are at the risk of malnutrition due to large family size and lower income.

Key words: Preschool children, nutritional status assessment, factors

INTRODUCTION

Malnutrition prevails everywhere around the world and both the developed and developing countries are suffering from malnourishment. The effect of malnutrition remains and brings devastation in the individual's, community and ultimately nation's standard of living. Among the malnourished most frequently women, children and elderly are observed to have malnutrition whereas among the children preschool age is an important stage of life where the nutrition plays an important role and has long lasting effects in the later years of life. Approximately, 70.0% of the world's malnourished children live in Asia, resulting in the region highest concentration of childhood malnutrition. About half of the preschool children are malnourished ranging from 16.0% in the People's Republic of China to 64.0% in Bangladesh. Prevalence of stunting and underweight are high especially in South Asia where one in every two preschool children is stunted. Besides protein-energy malnutrition, Asian children also suffer from micronutrient deficiency. Iron deficiency anaemia affects 40.0-50.0% of preschool and primary school children. Nearly half of all vitamin A deficiency and xerophthalmia in the world occurs in South and Southeast Asia, with large numbers of cases in India (35.3 million), Indonesia (12.6 million) and China (11.4 million) (Khor, 2004). In Pakistan the prevalence of malnutrition has been associated with many factors for example food availability, childcare practices, diarrhea, household size, income, childcare practices, mother education and poor sanitary conditions all affect the dietary intake of the preschool children and thus result in malnourishment (Iram and Butt 2006). In rural areas of southern Pakistan, sex of child, age of the child and father's occupation may be considered as an important risk factor (Khuwaja *et al.*, 2005) for stunting among school children aged 6-12 years (Raheela Mian *et al.*, 2002). In another study reports that the prevalence of malnutrition is higher among children from larger and poorer households/families in Pakistan (Hassan-Wasse, 2004). In most countries including Pakistan there is clear association between the factors like food habits sociocultural and government policies (Pelletier and Frongillo, 2003; Faqih and Qazaq, 1999), family economy (Mahgoub *et al.*, 2006), primary health care (Nnyepi, 2007), poor complementary feeding (Fawzi *et al.*, 1998), socioeconomic inequality (Van de Poel *et al.*, 2008), food consumption pattern (Cundiff and Harris, 2006), infections (Desai and Choudhry, 1993), worms (Hotez *et al.*, 2008; Awasthi *et al.*, 2008), behavior (Pelletier, 1994), inheritance, low nutrients intakes, etc are the main causes (Kikafunda *et al.*, 1998; Abdalla *et al.*, 2008).

District Swabi is one of the districts of North West Frontier Province (NWFP), established in 1988. The total population of this district at the time of survey was 1026804 and the total number of children less than 5 years of age in the district was 166034 (16.2%). Most of the area is rain-fed and only small land is under favorable weather conditions. The main crops are wheat, maize, tobacco, sugarcane and rice is grown in this district. Majority of the population is illiterate and earn livelihood by farming as tenants of landlords. Therefore, having subsistence type of farming and infert get limited shares from the produce having from the farming. Therefore, it was an effort to study the extent of malnourishment in this particular area NWFP.

MATERIALS AND METHODS

Location of the study: The present study was conducted in the District Swabi, North West Frontier Province (NWFP)-Pakistan in 2005.

Sample size, survey team and permission from the authorities: Sample was calculated by using EPI INFO 6.0 CDC EP-Info statistical software (version 6.0). At the time of survey the total reported population of the District according to District Census Report (Population Census Organization, 2000). The total sample size of this survey was 140 preschool children from urban and rural areas of the district. Population under 5 years 17% of the total population and therefore, the target population less than five years was 200000 using the expected frequency of 20% and acceptable waste 10% at a confidence interval 95%. The survey team was comprised of one researcher, four trained lady health workers, one helper to help the technical team members in the fieldwork. All the relevant authorities in the District Swabi were informed about the whole process of research activities and accordingly the authorities allowed the research team to conduct the survey.

Informed consent: The parents/guardians were informed about aim of the study and therefore with the consent of the information were collected on the preplanned questionnaires.

Age and anthropometric measurements: A questionnaire having all necessary information was filled in front of the mother/father/guardian of the child. Age, height and weight of the child were recorded to the nearest of month, height and weight were recorded to the nearest of

0.5 cm and 0.5 kg, respectively by using appropriate anthropometric tools. The age was either recorded from the registration of birth, immunization or any other authentic record available with the family. Weight and height was recorded with the help ZT-120 body-weight balance, Majiaqiao, Guangyi, Wuxi, Jiangsu, China Postal Code: 214011.

Inclusion criteria: All the children included must be within the age range of 2-5 years and permanent residents of the Distinct Swabi both rural and urban.

Exclusion criteria: Children below the age of 2 year or above the age of 5 years at the time of survey were excluded from the study. Those children whose parents are not permanent residents of the Distinct Swabi both in rural and urban areas were excluded from study. Furthermore, guest staying in the responding family were excluded as well. Those children whose parents refused to take part in the survey were also excluded from the study.

Classification of families based on income: From the questionnaires the parents of the children were grouped into four income groups i.e., Rs. 3000 or less than 3000 (Group I), 3001-3006 (Group II), 6001-9000 (Group III) and 9001 and above (Group IV).

Statistical analysis: The data was compiled on overall, sex-wise, urban and rural and the difference between prevalence of malnutrition was determined. The data was analyzed for weight (normal-weight and under-weight), stunting (stature) and wasting by calculating the Z-scores for the mentioned parameters and translating that to the corresponding percentages furthermore correlation was performed for the different variables. Analysis was conducted using EPI INFO 6.0 CDC EP-Info statistical software (version 6.0).

RESULTS

In this article the results reported are based on age, location (i.e., urban and rural), monthly income of the parents, height and body-weights.

Age: The age range of children was 24 to 60 months. The mean age for the entire subjects of the study for male was 38.70±10.5 months and for female was 42.20±10.20 months. The mean age for urban male and female children was 37.10±10.60 and 40.20±9.30 months, respectively. Whereas for rural male and female children the mean age was 40.10±10.40 and 44.50±10.80 months, respectively. The age range was 24-60 months (Table 1).

Children weight and height: The overall mean body weight for the male and female children was 38.70±10.50 and 42.20±10.20 kg, respectively. The weight of the urban children was less than the rural children but this difference was not statistically significant (Table 1). The mean height for the male and female children was 84.30±14.30 and 87.70±10.30 cm, respectively. There was no difference between the male and the female children heights. Similarly, there was no difference for the means in the urban and rural areas of the swabi district (Table 1).

Parents income and children weight: The income range of the parents was from Rs. 3000-more than 9000 and classified into four groups as mentioned earlier. Within the income-groups the income had no effect on the body-weight of the children. Based on income of the parents 45-50% children were normal-weight and 41- 50% were under-weight. There was a significant positive correlation ($r = 0.45$) with the income of the children parents on overall basis. Similarly, the normal-height children for the for the come groups ranged from 41-83% and stunted 17-59%. Similarly, within the income-groups the income had no effect on the children height. On overall basis the height had significant positive correlation ($r = 0.65$) with the income of the parents (Table 2).

Table 1: Anthropometric measurements of pre-school children in rural and urban areas of District Swabi (NWFP)-Pakistan

Sex	Total	Age (months)	Weight (kg)	Stature (cm)
Urban				
Male	30	37.10±10.60	10.90±2.40	82.40±8.70
Female	40	40.20±9.30	11.10±2.10	85.30±9.20
Rural				
Male	36	40.10±10.40	10.60±1.10	85.80±17.60
Female	34	44.50±10.80	11.50±2.50	90.60±10.90
Total				
Male	66	38.70±10.50	10.70±1.70	84.30±14.30
Female	74	42.20±10.20	11.30±2.30	87.70±10.30

Values are expressed as Mean±SD

Table 2: Malnutrition in relation to parent income in District Swabi (NWFP), Pakistan

Income group	Total	Normal/under-weight children			Normal/stunted children				
		Total	Normal (%)	Under-weight	Under-weight (%)	Total normal	Normal (%)	Total stunted	Stunted (%)
Less than 3000	49	29	59.18	20	40.82	25	51.02	24	48.98
3001-6000	54	25	46.30	29	53.70	22	40.74	32	59.26
6001-9000	31	14	45.16	17	54.84	14	45.16	17	54.84
>9000	06	03	50.00	03	50.00	05	83.33	01	16.67
Total	140	71	50.71	69	49.29	66	47.14	74	52.86

Table 3: Prevalence of underweight (WAZ <-2) in the children from urban and rural areas of Swabi District (NWFP) Pakistan

Sex	Total	Total normal	Normal (%)	Total under-weight	Under-weight (%)
Urban					
Male	30	11	37	19	63
Female	40	28	70	12	30
Rural					
Male	36	8	22.22	28	77.78
Female	34	24	70.58	10	29.42
Total	140	71	50.71	69	49.29

Table 4: Prevalence of Stunting (HAZ <-2) in the children from urban and rural areas of Swabi District (NWFP) Pakistan

Sex	Total	Total normal	Normal (%)	Total stunted	Stunted (%)
Urban					
Male	30	09	30.00	21	70.00
Female	40	18	45.00	22	55.00
Rural					
Male	36	19	52.78	17	47.22
Female	34	20	58.82	14	41.18
Total	140	66	47.14	74	52.86

Correlation analysis: The correlation analysis revealed that there was a significant effect of economic status, number of children in the family and order of the child within the family in the urban areas but was having no effect on overall basis and in the rural area.

Weight for age z score (WAZ-2): The prevalence of malnutrition in the preschool children age 2-5 years in the District Swabi was assessed through Z-score on the basis of the weight for age using ± 2 SD cutoff points. There were 51% normal and 49% underweight among the children surveyed. This indicates that 50% of the children in this area are suffering from malnutrition. When the prevalence was calculated on the basis of urban/rural areas it showed that in the urban area 63% male and 30.0% female children and in the rural area 78% male and 29% female children were underweight (Table 3).

Prevalence of stunting (HAZ<-2): The data for the height/stature was also analyzed and the data was translated into percentages of the total subjects for the urban and rural areas. In the district 53% of the children were stunted and 47 of the children were normal. When the data was calculated on the bases of urban/rural area, the prevalence of short stature/stunted children in the urban area for the male and female was 70 and 55%, respectively whereas in the rural areas 47 and 41%, respectively (Table 4).

DISCUSSION

As mentioned earlier, that the data was compiled and statistic was performed and comparison were made for body weight and height and

the association/correlation was studied in relation to parents income, family size, number of the child within the family, sex of the child and Z-score for stature/age, weight/age/stature and weight/stature. The results obtained in this study for the prevalence of malnutrition in the District Swabi, NWFP-Pakistan follow the same pattern as in the earlier surveys and studies reported for Pakistani population. The earlier surveys for example The Pakistan National Nutrition Survey conducted in 1985-87 and published in 1988 and Pakistan Demographic and Health Survey conducted in 1990/91 published in 1992 reports the nutritional status of preschool children of less than 60 months. These studies reports that the children were 50% stunted, 9% wasted while 40% underweight (National Institute of Population Studies, 1992). In the present study, in this particular area 52% of the children assessed were stunted and 49.29% under-weight. This means that the prevalence of malnourishment in this area follow the same pattern as reported in early studies. However, it is higher than the reports currently available online in WHO report State of the World children which shows State of the world's children (<http://www.unicef.org/sowc08/>). According to this report, 37% of the children are stunted and it appears that the national prevalence reported is underestimated. However, the present study sample size is smaller and cannot be extrapolated to the general population of Pakistan. On study conducted in Sindh province reports that on overall prevalence for stunting was 61% in the study population (Farid-ul-Hasnain and Sophie, 2010). This study prevalence is yet higher than ours. In the present study the extent of malnutrition is similar based on either comparison. The present study suggests that 49.3% of the children are malnourished whereas in the national survey it has been reported to be 48% as well. Generally, 50.71% of the total children were normal and 49.29 were underweight. In the indicator height 47.14% of the children were normal while 52.86% of the children were stunted (Table 1). Therefore, these prevalences of under-weight and stunting in the urban and rural area of this district indicate that children in this particular area are 50% malnourished. The body weights for most of the children were lower than the 3rd percentile for their respective ages as indicated in the Fig. 1. Similar trend of percentages was obtained when the comparison were made based on Z-score. According to earlier reports the extent of malnutrition in children less than five years of age was 48% based on low weight-for-age, 10% were seriously malnourished (very low weight-for-age), 46% were chronic malnourished (stunting: low height-for-age), 15% had acute malnourished (wasting: low weight-for-

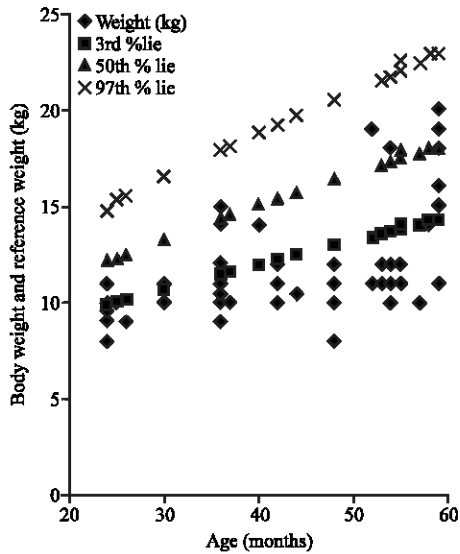


Fig. 1: Body weight compared to reference for height

height) and acute malnourishment rate 20% infants. Among the children 65% were anemic and 28% are severely anemic. In this study, correlation analysis association was found to be negative and significant with the correlates economic status, number of children in the family and order of the child within the family in the urban areas but was having no effect on overall basis and in the rural area. The earlier studies reports combined prevalence of malnutrition to the similar extent with exception reported elsewhere (Anderson, 1979). In this study, it has been proposed that weight for height appears to be the best single anthropometric indicator of current nutritional status of preschool children over 1 year of age and infant it is true since it take into consideration the current weight and height of the individuals (Anderson, 1979).

In present study, the preschool children assessed for malnutrition indicate that 50% of the preschool children suffering from malnourishment. The association of malnourishment with various factors has to be clearly investigated. However this study provides the baseline information to further probe the causing factors in this particular area and for necessary intervention. This study indicates that the children in this particular area on average are at the risk of malnutrition due to large family size and lower income.

ACKNOWLEDGMENTS

The author thankfully acknowledges the Provincial Health Services Academy (PHSA), Budni Road, Duran Pur, Peshawar, Pakistan who provided financial for carrying the survey work.

REFERENCES

Abdalla, F., J. Mutharia, N. Rimal O. Bilukha, L. Talley, T. Handzel and S. Bamrah, 2008. Malnutrition and macronutrients deficiencies among Bhutanese refugee children. *MMWR Morb. Mortal. Wkly. Rep.*, 57: 370-373.

Anderson, M.A., 1979. Comparison of anthropometric measures of nutritional status in preschool children in five developing countries. *Am. J. Clin. Nutr.*, 32: 2339-2345.

Awasthi, S., R. Peto, V.K. Pande, R.H. Fletcher, S. Read and D.A.P. Bundy, 2008. Effect of deworming on malnourished preschool children in India: An open-labeled, cluster-randomized trial. *PLoS Negl. Trop. Dis.*, 2: e223-e229.

Cundiff, D.K and W. Harris, 2006. Case Report: Case report of five siblings: Malnutrition? Rickets? DiGeorge syndrome? Development delay? *Nutr. J.*, 5: 1-8.

Desai, N. and V.P. Choudhry, 1993. Nutritional anaemia in protein energy malnutrition. *Indian Pediatr.*, 30: 1471-1483.

Faqih, A.M. and H.S. Qazaq, 1999. Development of iron deficiency anaemia at six months of age in Jordanian infants exclusively breast-fed for four to six months. *Food Nutr. Bull.*, 20: 422-428.

Farid-ul-Hasnain, S. and R. Sophie, 2010. Prevalence and risk factors for stunting among children under 5 years: A community based study from Jhangara town, Dadu Sindh. *J. Pak. Med. Assoc.*, 60: 41-44.

Fawzi, W.W., M.G. Herrera, A.P.A. Nestel and K.A. Mohamed, 1998. A longitudinal study of prolong breast-feeding in relation to child undernutrition. *Int. J. Epidemiol.*, 27: 255-260.

Hassan-Wasse, H., 2004. Food habits of the Egyptians: Newly emerging trends. *Eastern Mediter. Health J.*, 10: 898-915.

Iram, U. and M.S. Butt, 2006. Understanding the health and nutritional status of children in Pakistan: A study of the interaction of socioeconomic and environmental factors. *Int. J. Social Econ.*, 33: 111-131.

Khor, G.L., 2004. Update on the prevalence of malnutrition among children in Asia. *Nepal Med. Coll. J.*, 5: 113-122.

Khuwaja, S., B.J. Selwyn and S.M. Shah, 2005. Prevalence and correlates of stunting among primary school children in rural areas of Southern Pakistan. *J. Trop. Pediatr.*, 51: 72-77.

Kikafunda, J.K., A.F. Walker, D. Collett and J.T. Tumwine, 1998. Risk factors for early childhood malnutrition in Uganda. *Pediatrics*, 102: 45-53.

- Mahgoub, S.E.O., M. Nnyepi and T. Bandeke, 2006. Factors affecting prevalence of malnutrition among children under three years of age in Botswana. *Afr. J. Food Agric. Nutr. Dev.*, 6: 3-15.
- National Institute of Population Studies, 1992. Pakistan Demographic and Health Survey, 1990/1991. National Institute of Population Studies, Islamabad, Pakistan.
- Nnyepi, M.S., 2007. Household factors are strong indicators of children's nutritional status in children with access to primary health care in the greater Gaborone area. *Sci. Res. Essay*, 2: 55-61.
- Pelletier, D.L., 1994. The relationship between child anthropometry and mortality in developing countries: Implication for policy, programs and future research. *J. Nutr.*, 124: 2047-2080.
- Pelletier, D.L. and E.A. Frongillo, 2003. Changes in child survival are strongly associated with changes in malnutrition in developing countries. *J. Nutr.*, 133: 107-119.
- Raheela Mian, M.A., A. Mohammed, A. Paola Ferroni and U. Peter, 2002. The nutritional status of school-aged children in an urban squatter settlement in Pakistan. *Pak. J. Nutr.*, 1: 121-123.
- Van de Poel, E., R.A. Hosseinpoor, N. Speybroeck, T.V. Ourti and J. Vega, 2008. Socioeconomic inequality in malnutrition in developing countries. *Bull. World Health Org.*, 86: 241-320.