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Orphanage children of Jabalpur and their Nutritional Adequacy with a Special Reference to Hemoglobin status

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1.Abstract

An orphan is a child with no guardian or caretaker and has lost a mother, father, or both parents. They are usually vulnerable because their safety, growth, and well-being are compromised for various reasons. An orphanage is a child-care facility or place where these deprived or vulnerable children live. Orphanages seek to meet the needs of orphans who are vulnerable, weak, and trying hard to survive. The present study was conducted to determine nutritional adequacy and analyze the impact of lack of certain nutrition on the haemoglobin status of orphanage children in Jabalpur, Madhya Pradesh. All tests were conducted with permission on those children in these orphanages. Statistical Package of Social Sciences software was used to analyze the survey data of this study and conclude the findings. A staggering 51% of orphaned children aged 6-11 in Jabalpur were underweight, while 58% of 12-16-year-olds fell below the normal weight category. Most children's daily nutrient intake fell short of recommended levels, with 57% of younger and 56% of older children consuming inadequate calories. Additionally, 81% of younger and older children had insufficient carbohydrate intake, while all children had inadequate protein and fat intake. Critically low haemoglobin levels were also prevalent, affecting 92% of younger and older children. These deficiencies indicate poor nutrition, potentially leading to anaemia, and underscore the need for proper menu planning in orphanages to support these vulnerable children's optimal development and learning potential.

Keywords – Orphanage, Nutritional adequacy, Orphanage children, Haemoglobin status

2.Introduction

Childhood is crucial for overall growth and development in various aspects of life and personality. Nutrition and living arrangements are essential factors that influence the overall health status of children. However, the homeless and parentless children are deprived of their childhood rights.Orphan children are a vulnerable and neglected group in society and are more prone to malnutrition.Nutritional status is the body's condition in those respects influenced by the diet, the levels of nutrients in the body, and the ability of those levels to maintain normal metabolic integrity. (Reddy *et al.*, 2018).

According to an estimate, around 148 million children across the world are orphans, ranging from newborns to adolescents (Khan *et al.*, 2014). HIV/AIDS has orphaned many children. Meanwhile, other reasons are increasing the number of orphans, like natural disasters, conflicts, poverty, maternal mortality, endemic diseases, etc., which took a toll on the lives of several productive and healthy adults (Lindblade *et al.*, 2003). Organisations need to help and support them to become successful later in life. Loss of home, poor academic performance, poor social life, lack of physical activity, lack of self-esteem and self-confidence, child labour, and drug abuse are some of the common factors affecting the overall growth of orphan children.

According to Vaida (2013), nutrition status is significantly different among children living with parents and orphans in institutes or orphanages. Orphans are more likely to face “micronutrition deficiencies” than non-orphan children. Orphanages need to have proper nutrition status, which is significantly different from a healthy and sustainable environment for children for their overall growth and development. It is essential to provide nutritional education for these institutions. Adolescents and children are highly vulnerable and more prone to nutritional deficiencies. The average age group of these children falls from early childhood to adolescence in orphanages worldwide (Pysz *et al.*, 2015). Considering the above studies, it is found that there is a significant prevalence of malnutrition among orphan children. However, the majority of studies on orphans were conducted in different countries. This study filled the gap by focusing on Orphanage children by measuring their nutritional adequacy and the impact of deficiency of vital nutrients on their haemoglobin status. The present study aims to determine the nutritional adequacy and the effect of lack of nutrition on the haemoglobin status of orphanage children living in Jabalpur in Madhya Pradesh.

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3.Methodology

The present study assessed Nutritional adequacy with a special reference to the Hemoglobin status of Orphan children in the Jabalpur District of Madhya Pradesh State. A sample of 124 children was randomly selected from 3 to 4 orphanages, and data was collected using a self-developed questionnaire, including demographic profile and anthropometric measurements (Height, Weight, and BMI). Nutrition intake has been taken to understand their nutritional adequacy, and their nutrition intake and haemoglobin status have been checked to measure the impact. A 24-hour dietary questionnaire and daily intake of calories, protein, carbohydrates, and fat were used to determine these children's nutritional adequacy for anthropometric measurements like height and weight. BMI. Secondary data for the biochemical haemoglobin (g/dL) will be collected from the laboratory. SPSS software 22.0 was used to analyze the survey data for descriptive statistics.

4.1. Demographics

Table 4.1 shows the age-wise distribution of the children, revealing that 74 (60%) were orphans aged 6 to 11 and 50 (40%) were children aged 12 to 16.

Table 1 - Age Group (years)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	12 to 16	50	40.3	40.3	40.3
	6 to 11	74	59.7	59.7	100.0
	Total	124	100.0	100.0	

Figure 1 – Age Group of orphans (in years)

Table 2 –Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	81	65.3	65.3	65.3
	Male	43	34.7	34.7	100.0
	Total	124	100.0	100.0	

Table 4.2 depicts the sex-wise distribution of the study population. Findings indicated that 81 (65%) female and 43 (35%) male children participated in this study.

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Table 3 - Education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Primary	74	59.7	59.7	59.7
	Secondary	50	40.3	40.3	100.0
	Total	124	100.0	100.0	

The educational status of the orphans shown in table 4.3 shows that 74 (60%) were studying in primary school, and 50 (40%) were studying in secondary school.

4.2. Nutrition Adequacy of Orphanage Children

Table 4 – BMI of Orphans

Age Group	**Below 15 (Underweight)**	**15 to 85 (Normal)**	**Mean**	**Median**	**Total**
6 to 11 years	38 (51%)	36 (49%)	17.74	15.10	74
12 to 16 years	21 (42%)	29 (58%)			50

Research findings in table 4.4 demonstrated that around half (51%) of 6—to 11-year-old children
were underweight, and 58% of 12—to 16-year-old teens were found to have normal weight. The mean BMI for all age groups was 17.74, and the Median BMI was 15.1, indicating that over halfof children have a BMI above 15.1.

Table 5 – Caloric intake of orphans as per age group

Age Group	**No. of children**	**Daily Calorie intake (Kcal)**	**Mean**	**Median**
6 to 11 years	32 (43%)	below 1000	1135.45	1100.00
	41 (57%)	1000 to 1600		
12 to 16 years	22 (44%)	Below 1000		
	28 (56%)	1000 to 1600		

The recommended daily caloric intake for children varied by age. Younger children required 1000-1400 Kcal, while teens aged 12-16 needed 1800-2200 Kcal(Drewnowski*et al*., 2013). A table shows that 43% of children aged 6-11 years consumed less than 1000 Kcal per day, while 57% consumed 1000-1600 Kcal per day. Similarly, 44% of teens aged 12-16 years consumed less than 1000 Kcal per day, and 56% consumed 1000-1600 Kcal per day.The average caloric intake for orphanage children was 1135.45 Kcal, with a median of 1100 Kcal. This suggested that around half of the children consumed less than 1100 calories daily, indicating a potential calorie deficiency.

Table 6 – Daily Carbohydrate intake as per age group

Age Group	No. of children	Daily Carbohydrate intake (g/day)	Mean	Median
6 to 11 years	60 (81%)	Below 300	241.56	240
	14 (19%)	Above 300		
12 to 16 years	50 (100%)	Below 400		

The World Health Organization (WHO, 2023) recommended a daily carbohydrate intake of at least 350g for children aged 6-9 and 400g for children aged 10 and above. However, a study found that these recommendations were not met. 81% of orphans aged 6-11 consumed less than 300g of carbohydrates daily. Furthermore, all children aged 12-16 consumed less than 400g of carbohydrates per day. The average carbohydrate intake was 241.56g, with a median of 240g, indicating that more than 50% of children consumed less than 300g of carbohydrates daily (table 6).

Table 7 – Daily protein intake as per age group

Age Group	No. of children	Daily Protein intake (g/day)	Mean	Median
6 to 11 years	74	Below 30	13.97	14
12 to 16 years	50	Below 30		

According to the Indian Council of Medical Research (ICMR), children aged 6-11 require at least 32g of protein daily, while those aged 12-16 need 46g daily (Sayyed, 2021). However, table 7 revealed that orphanage children failed to meet these daily protein requirements. The average protein intake was 13.97g per day, with a median of 14g. Alarmingly, most children consumed less than 32g of protein per day, falling short of their nutritional needs.

Table 8 – Daily fat intake as per age group

Age Group	No. of children	Daily Protein intake (g/day)	Mean	Median
6 to 11 years	74	Below 30	32.13	30
12 to 16 years	50	Below 30		

According to Guardian (2007), children aged 6-10 require at least 76g of fat daily, while those aged 11-16 need 86g. Table 8 shows that orphanage children fell far short of these requirements. None of the children received more than 30g of fat per day. The average fat intake was 32.13g per day, with a median of 30g, indicating a significant deficit in their daily fat needs.

4.3. Hemoglobin Status and Impact of Lack of Nutrition

Table 9 – Hemoglobin Status of Children

Age Group	No. of children	Hemoglobin (g/dL)	Mean	Median
6 to 11 years	68 (92%)	Below 11.9	9.62	9.54
	6 (8%)	11.9 to 15.0		
12 to 16 years	50	Below 12.7		

According to Healthline (Nall, 2020), the normal haemoglobin range for children is 11.9-15.0 g/dL for ages 5-11 and 11.9-15.0 g/dL for girls and 12.7-17.7 g/dL for boys aged 11-18. However, table 9 revealed alarming results. A staggering 92% of children aged 6-11 had haemoglobin levels below 11.9 g/dL, while all orphans aged 12-16 had levels below 12.7 g/dL. The average haemoglobin level was 9.62 g/dL, with a median of 9.54 g/dL. It indicates a severe deficiency in haemoglobin levels among the children, likely due to poor diet and nutrition.

Table 10 One Sample Mean Differencein Hemoglobin, Daily Calorie, Protein and Fat Intake

	Mean Difference	t value
Hemoglobin status (g/dL)	9.62887	89.187
Daily Calorie (Kcal)	1135.452	50.005
Carbohydrate (gm/day)	241.565	65.486
Protein (gm/day)	13.968	32.554
Fat (g/day)	32.129	45.473

This study revealed a significant link between nutritional deficiencies and haemoglobin levels in children. The results showed a highly significant correlation ($p<0.005$). Specifically, the Sig. (2-tailed) value was 0.000, confirming the alternative hypothesis (H1). Present results suggest that the lack of nutrition has a profound impact on the haemoglobin status of children.

5.Summary and Conclusion

In this study, around half (51%) of orphanage children in Jabalpur were found underweight who are 6 to 11 years old and 58% of 12 to 16 years old children were found under normal weight category when it comes to BMI. There, 57% of children aged 6 to 11 years old had a daily caloric intake of 1000 to 1600 Kcal, while 43% had less than 1000 calories daily. On the other hand, 56% of 12 to 16-year-old children consumed 1000 to 1600 calories daily, while 44% consumed less than 1000 calories.

Regarding carbohydrate intake, 81% of 6 to 11-year-old orphans had less than 300g per day of carbohydrates, while all the orphans aged 12 to 16 years old had less than 400g of carbohydrates per day. Daily protein requirements were also unfulfilled. The orphaned children had less than 30g of protein per day. Similarly, when it comes to daily fat intake, all the children had less than 30g of fat per day. This deficiency of nutrients also affected their haemoglobin status. Around 92% of orphaned children aged 6 to 11 years had haemoglobin below 11.9g/dL, while all the orphaned children aged 12 to 16 years had haemoglobin levels below 12.7g/dL. The findings of this study suggest that the dietary needs of children in orphanages studied in Jabalpur were not fulfilled, and their nutrients were

lower than the "recommended daily average (RDA)" for all age groups, which might be due to improper menu planning in all orphanages.

Since most children's haemoglobin levels were found to be critically low, it could cause anaemia due to lack of red blood cells (RBCs), chronic kidney disease, lack of new RBCs produced by the bone marrow, etc. In addition, it is also a sign of poor nutrition. Orphans who didn't have the required nutrition indicated that they were not given a variety of food and their diet was inadequate. Optimum nutrition at an early age is the foundation of optimum development and growth of children's physical and mental health and also helps in their cognitive development. Nutrition is an essential indicator of mental growth and learning potential.

Especially in developing countries like India, orphan children often find it hard to survive without the care and support of parents or the family environment. Since orphanages are the last hope for children who don't have a family, the government must work on their institutional environment to develop the intellectual growth of millions of children in India. However, this study also had some limitations. All in all, this study concludes that the nutritional and health status of orphaned children in Jabalpur aged 6 to 16 years had high levels of malnutrition. Hence, this study adds foundation by providing new details to the existing studies on the nutrition of orphaned children so that institutions can realise the value of proper nutrition. Recentresearchwould help policymakers prepare healthy nutrition plans for those children to set the foundation for their optimum learning potential.

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