

INTESTINAL PARASITIC INFECTIONS, ANAEMIA AND UNDERNUTRITION AMONG TRIBAL ADOLESCENTS OF MADHYA PRADESH

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Abstract:

Research question: What is the prevalence of worm infection, anaemia and under nutrition among tribal adolescents?

Objective: To assess worm infection and nutritional status including anaemia among adolescents.

Study design: Cross-sectional.

Setting: Tribal. Gond tribal community in Kundam block of Jabalpur district, Madhya Pradesh.

Participants: Adolescent boys and girls aged 11-19 years from 27 villages of Kundam block.

Statistical analysis: Z test.

Results: High prevalence of undernutrition in terms of underweight (61.7%), stunting (51.7%) and wasting (32.8%) was observed. 82.3% adolescents were found anaemic. Intestinal parasitosis was observed in 59.5% adolescents. *Ancylostoma* sp. and *Hymenolepis nana* were the most common forms of parasitosis observed among them. There is a need to initiate intervention measures aimed at reducing the problem of worm infection, anaemia and undernutrition among adolescents especially in tribal areas.

Key Words: Worm infection, Anaemia, Nutritional status, Adolescents

Introduction:

Adolescence - a period of transition between childhood and adulthood is a significant period of human growth and maturation. Being a period of growth spurt, exceptionally rapid rate of growth occurs with unique changes during this phase of life. The health of adolescents attracted global attention in the past decade. Though the issues like sexually transmitted diseases, reproductive health etc. have been given due importance, limited work has been done on their nutritional status including anaemia and intestinal parasitic infections.

Intestinal parasitic infections are widely prevalent in many developing countries including India. Most of the population chronically affected with intestinal parasites live in the developing countries¹. These are particularly important in the adolescence as they cause or aggravate malnutrition including iron-deficiency anaemia². These infections, inspite of their considerable morbidity, are often ignored probably due to relatively low incidence of serious morbidity due to such infections. Adolescence being rapid growth period, is at risk of developing nutritional

deficiencies including anaemia. Presence and severity of intestinal parasitic infections among them increase their risk for these deficiencies.

This subject gains increased importance among the tribals who are already disadvantaged socio-economically and face a slow pace of growth. It is well known that the tribals lag behind nutritionally and have higher morbidity rates especially due to various infections. Scanty information exists on the health status of tribal adolescents especially on nutritional status and intestinal parasitic infections.

Material and Methods:

The study was carried out between April, 2000 to May, 2001 in 27 villages of Kundam block of Jabalpur district in Madhya Pradesh. Majority of the villages in the block are inhabited by the Gond tribal population (71.2%). Using PPS sampling technique, 818 adolescents were covered during the study. Anthropometric measurements in the form of weight and height were taken using standardised techniques by trained investigators. Nutritional status was assessed adopting standard deviation (SD) classification using NCHS reference data³. Haemoglobin estimation was

done using cyanmethaemoglobin method⁴. Anaemia levels were assessed adopting WHO recommended classification⁵. Stool samples were collected in screw capped, labelled plastic bottles which were distributed one day prior to the day of collection. Morning stool samples were collected and transported to the field laboratory established at block headquarter and were tested for the presence of ova and cysts of intestinal parasites within two hours using direct saline and iodine wet preparation method. Negative samples were re-examined by saturated salt/sugar flotation method and egg counting was done by McMaster technique on the same day⁶. Worm load grading in terms of eggs per gram (epg) was done as per WHO classification⁷. Baseline information on sanitary facilities, hygienic practices etc, was also collected.

Results:

High prevalence of undernutrition in terms of underweight, stunting and wasting was observed among adolescent boys and girls. More than half of the adolescents were found underweight (61.7%) and stunted (51.7%) Wasting was observed in 32.8% adolescents. Prevalence of undernutrition was found similar in both the sexes.

Table I: Prevalence of intestinal parasitosis among adolescents.

Stool samples	Boys	Girls	Total
Tested	413	370	783
Positive	255	211	466
Negative	158	159	317
% Positive	61.7	57.0	59.5

An overall prevalence rate of 59.5% of intestinal parasites was observed among them. Boys had marginally higher prevalence (61.7%) as compared to girls (57.0%). The difference was statistically not significant ($Z=1.34$; $p>0.05$). Infection with *Ancylostoma* sp and *Hymenolepis nana* were commonest forms of parasitosis observed among them. Single and mixed infection was observed in 81.8% and 18.2% respectively. Mean epg for various parasites ranged from 422.2 to 1097.8, girls had higher hookworm sp. load than boys.

Table II: Prevalence of anaemia among adolescent boys and girls.

Anaemia status	Boys (n=441)	Girls (n=377)	Total (n=818)
Mild	99(22.4)	92(24.4)	191(23.3)
Moderate	237(53.7)	219(58.1)	456(55.8)
Severe	11(2.5)	15(4.0)	26(3.2)
Total	347(78.6)	326(86.5)	673(82.3)

Figures in parentheses indicate percentages.

Table II shows prevalence of anaemia among adolescent boys and girls. An overall prevalence rate of 82.3% was observed among them. Girls had significantly higher prevalence (86.5%) than boys (78.6%) ($Z=3.00$; $p<0.05$). Moderate and severe anaemia was observed in 59% adolescents. The mean haemoglobin in hookworm infected adolescents (9.19 ± 1.48) was significantly lower than those in non-infected (10.10 ± 1.75) ($Z=6.60$; $p<0.05$). Prevalence of anaemia in hookworm infected adolescents was observed to be 88.3% as against 73.6% in non-infected adolescents. The difference was statistically significant ($Z=4.61$; $p<0.05$).

The environmental sanitation survey showed that all the villages had potable water supply in the form of bore wells fitted with hand pumps. Open-air defaecation was the rule in these villages. Majority of them either did not use footwear or used it occasionally. Most of them used either mud or plain water for washing hands after defaecation.

Discussion:

Adolescence, a period of growth spurt, is also a high-risk group for nutritional deficiency disorders. Presence of intestinal parasitic infections further hampers their growth. Present study showed high prevalence (59.5%) of intestinal parasites with mild to moderate worm load among them. Marginally high prevalence (61.7%) was observed among boys than in girls (57.0%). Study conducted in various parts of the country including tribal areas have also reported similar high prevalence of intestinal parasitosis among them^{8,9}. Hookworm was the most common intestinal parasite found among them. High

hookworm infection with mild to moderate load was also observed in a study conducted in Kenya among male road workers¹⁰.

High prevalence of anaemia (82.3%) was observed among them with 59% suffering from moderate to severe anaemia. High anaemia prevalence among adolescents was also observed by others¹¹⁻¹³. Significantly higher prevalence of anaemia in hookworm infected children shows association of hookworm and anaemia prevalence in adolescents. Similar association was also observed in other studies¹⁰⁻¹⁴. It was also seen in terms of mean haemoglobin as it was significantly lower in hookworm infected adolescents. High prevalence of hookworms among adolescents seems to be one of the important factors for the observed high prevalence of anaemia among them.

The present study revealed that undernutrition was a major health problem among tribal adolescents. A significant proportion of the adolescents were found underweight and stunted. Wasting was observed in nearly one third of the adolescents. High prevalence of under nutrition has also been reported from other areas^{11,13,14}. The poor nutritional status of adolescents, especially girls, has important implications in terms of physical work capacity and adverse reproductive outcomes³.

Genetic as well as environmental factors are known to influence growth and development during childhood as well as during the period of growth spurt in adolescence. Optimum environmental conditions are required for full expression of genetic potential. Indian tribal adolescents living in poor environmental conditions show high prevalence of worm infection and undernutrition. Majority of them are anaemic. Open-air defecation by almost all the community members results in high degree of soil contamination and the practice of not using footwear by majority of the adolescents in such an environment increases their risk of acquiring soil-transmitted infections. It seems that lack of personal hygiene; indiscriminate defecation and disposal of faecal matter are playing an important role in the observed high prevalence of parasitic infections among them.

The growth stunting potential of hookworm infection is well known. It can lead to or aggravate malnutrition and anaemia through decline in food intake and/or an increase in nutrient wastage¹⁶. This study has demonstrated that undernutrition and anaemia were widely prevalent in tribal adolescents of Madhya Pradesh along with high prevalence of helminthic infections particularly hookworm among them. Thus, considering their high-risk status, there is a need to initiate intervention measures aimed at this group in order to reduce the prevalence of under nutrition, anaemia and helminthic infections. This is particularly important in tribal children as serious efforts are being made by the Govt. for their overall development.

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A study of intestinal parasite infection in individuals in southern CÔte d'Ivoire utilizing PCR-temporal temperature gel electrophoresis (TTGE) and quantitative PCR demonstrated that TTGE profiles clustered into four significantly different groups, i.e., groups that are positive for *Giardia duodenalis*, positive for *Entamoeba* spp. and *Blastocystis hominis*, negative for protozoa, and positive for all three parasites.Â The development of murine models of parasitic protozoan infections has allowed for more-detailed immunophenotyping of the mammalian host response to changes in the microbiota and its influence on infectious disease (1, 75).