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Assessment of Body Mass (Weight Loss/Gain) in a 14 Day Clinical and Parasitological Responses to Supervised Antimalarial Drug Combination Therapies in Abakaliki, Ebonyi State

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ABSTRACT

Malaria has considerable potential for adversely influencing host nutrition. It can restrict food intake through anorexia while causing vomiting or diarrhea, it may interfere with the absorption of ingested food. This survey was however conducted to ascertain the impact of the *Plasmodium falciparum* malaria attack on the weight potentials of the sufferers treated with Diaminopyrimidines (Pyrimethamine) and Sulphonamides (Sulfadoxine) Out of 243 patients studied in Abakaliki, the age groups 10-19 (48.6%), 20-29 (30.0%), 30-39 (12.8%), 40-49 (5.8%), and 50-59 (2.9%) showed average weight loss/gain of ± 1.4, ±0.3, ± 0.6, and± 0.2 respectively for both males, and females. The corresponding weight loss/gain between D0-D7 showed 10 ≤ 20: D0-D2 (-0.1), D2-D7 (+0.7), 21≤ 30: D0-D2 (- 0.3), D2-D7 (+ 0.2); 31 ≤ 40: D0-D2 (0.0), D2-D7 (+0.2);41 ≤ 50: D0-D2 (- 0.1), D2-D7 (- 0.1),51≤ 60: D0-D2 (0.0), D2-D7 (+ 0.2).The result of increased catabolism of proteins and associated weight loss in severe malaria attack should be regained by nutritional sufficiency.

Original Research Article

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1. INTRODUCTION

Malaria is a disease due to blood infection caused by Protozoa parasites of the genus *Plasmodium* (*P.*) which is transmitted through the bite of infected female Anopheles mosquito (Ani *et al.,* 2015). The global incidence of malaria was estimated to be nearly 120 million clinical cases each year with nearly 300 million carrying the parasite (WHO, 2014). As presence of the parasite in the body builds up to the asexual erythrocyte Schizontal stage, the accompanying increase in body temperature induces urinary excretion of nitrogen increases predisposing to negative nitrogen balance (Vaughan *et al.*, 2017). The result of this increased synthesis and catabolism of proteins is the loss of body tissue which becomes apparent when infections are severe and prolonged hence affecting the body mass (Najm *et al.*, 2012). This further compromises host integrity by enhancing susceptibility to other infective pathogens, thus, deteriorates nutritional status due to increasing metabolic stress.

The increased risk of malaria parasitaemia in pregnant women and especially in primagravidae in areas of high malaria endemicity, compared with that of non-pregnant women was well described by Michael *et al*. (2013) and Peter *et al*. (2013).

According to Chukwuocha *et al*. (2012), maternal anaemia may also have a direct effect on placental functions, causing low birth weight (LBW). The birth weight deficits in association with placental malaria are also influenced

by parity being most marked in first-born children and also placental malaria is also associated with the birth of infants weighing less than 2.5kg (WHO, 2015).

Nonetheless, how placental malaria depresses infant birth weight is not fully understood. It may retard foetal nutrition by adversely influencing maternal nutrition or by diminishing the physiological efficiency of the placenta, thus causing the birth of a full term but underweight child. Alternatively, it may induce early labour and expulsion of the foetus before the latter has gained its optimal birth weight. Baby Center (2016), noted in West Africa skin fold thickness and weight for height to be lower in parturient women in association with placental infections and considered these differences indicative that malaria adversely influence nutrition thus affecting the general body mass of the sufferer. To this end, this study was undertaken to ascertain the effect of the malaria parasite infection on the body weight of the sufferers within fourteen days clinical and parasitological responses to supervised malaria treatment.

3 MATERIALS AND METHODS

The assessment methodology of this investigation was based on the fourteen (14) day clinical and parasitological response to supervised malaria treatment as structured by WHO (1990) and modified in 1991 by Centre for Disease Control (CDC). Standard treatment of potency tested Pyrimethamine and Sulphonamide drugs formulation (Fansidar and Maloxine) per kg of body weight were administered orally on day zero ("DO") blood films, body mass and over all clinical evaluation were conducted as shown below:

3.1 Blood Sample Collection

Venous blood was collected by venepuncture from randomly selected patients at the then Federal Medical Centre Abakaliki, Ebonyi state. Three milliliters (3ml) of blood was collected from each randomly selected patient and was dispensed into an Ethylene Diamine Tetra-acetic Acid (EDTA) bottle, gently and properly mixed and transported to the Haematology section of the hospital's laboratory.

3.2 Laboratory Analysis

Thick blood films were prepared, stained and examined following the method described by Cheessbrough (2005). Thick films were made and labeled on a clean glass slide as recommended by the World Health Organization (WHO) for *Plasmodium falciparum* species detection. The thick smears were then stained with 10% Giemsa stain for 10 minutes and then observed microscopically using oil immersion objective (Cheesbrough, 2005).

3.3 The two choice of drugs formulation for the study viz

Fansidar and Maloxine were administered orally, three tablets as a dose treatment as recommended by the manufacturer. The drugs were only given when the patient tested positive to malaria infections, while malaria negative persons were excluded from the study.

3.4 Evaluation

To successfully evaluate adverse drugs effects associated with drug therapy the following considerations were on each encounter with the patient:

3.4.1 Vomit: patients were observed at least 30 minutes after each treatment. At least each subsequent visit, the patient was asked whether he/she has vomited since the last visit? If the drugs was vomited or spit out, the estimated lost portion of the dose was readministered when vomiting tendency continued in some patients, they were excluded from the study.

3.4.2 Pruritus: pruritus for the purpose of the study was itching which occurs after the administration of the anti-malarial drugs under study and which was not attributed to another medical condition or were evaluated and decisions made on whether to continue with drugs under study and possible anti-histamine to apply. Anti-histamine drugs of choice for the study were piriton and phenergen (promethazine).

3.4.3 Diarrhoea: Diarrhoea for the purpose of the study was defined as passage of more than three unformed stools in 24 hours period. The patients were asked at each day of activity about the occurrence of this condition during the previous 48 hours.

3.5 Activity and follow up Analysis.

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The Assessment protocol of the research was based on the 14 day clinical and parasitological responses to supervised therapies as was developed by WHO (5,6) in 1990 modified by CDC (7,8) in 1991.

Standard therapy consisted of potency tested fansidar and maloxine base per Kg of body weight administered orally on "Day O" (DO), Blood Flims Temperature, weight and overall clinical evaluations were conducted as shown below:

Activity	Days						
Blood film Taken	0	1	2	3	7	14	Rmks
	×	-	×	*	×	×	
Weight Recorded	×	×	×	*	×	×	
Drug administered	×	-	-	-	-	-	
Assessment of patient's health.	×	×	×	*	×	×	

Legend: (×) = Perform activity (-) = No activity

(*) = Optional

Source: WHO (1990); CDC (1991)

4. RESULTS AND DISCUSSION

Table 1 shows average weight record for male & female fansidar patients (in kg) of respective age groups. Out of 243 sampled, age groups 10 - 19 (48.6%), 20 - 29 (30.0%), 30 - 39 (12.8%), 40 - 49 (5.8%), 50 - 59 (2.9%) showed Average weight loss/gain of ± 1.4, ± 0.3, ± 0.3, ± 0.6 and ± 0.2, respectively.

Table 1: Weight measurement in fansidar, male/female patients.

			Average weight record				Weight loss/gain		
Age groups	**Pop.**	**%**	**D0**	**D2**	**D7**	**D14**	**D0-D2**	**D2-D7**	**D7-D14**
10 – 19	118	48.6%	58.0	57.9	58.6	60.0	- 0.1	+ 0.7	± 1.4
20 – 29	73	30.0%	62.2	62.5	62.5	62.8	- 0.3	+ 0.2	± 0.3
30 – 39	31	12.8%	63.0	63.0	63.2	63.5	- 0.0	+ 0.2	± 0.3
40 – 49	14	5.8%	70.7	70.6	70.5	71.1	- 0.1	- 0.1	± 0.6
50 – 59	07	2.9%	70.2	70.2	70.4	70.6	0.0	+ 0.2	± 0.2
	243	100							

Table 2: Shows average weight record for male fansidar patients (kg) out of 15 (57.4%) sampled; age groups 10 - 19 (43.3%), 20 - 29 (29.3%), 30 - 39 (18.7%), 40 - 49 (5.3%), 50 - 59 (2.7%) showed Average weight loss/gain of ± 0.5, ± 0.5, ± 0.3, ± 0.3 and ± 0.3, respectively.

Table 2: Weight measurement in male fansidar patients

			Average weight record				Approximate weight loss/gain		
Age groups	**Pop.**	**%**	**D0**	**D2**	**D7**	**D14**	**D0-D2**	**D2-D7**	**D7-D14**
10 – 19	65	43.3%	53.6	53.6	54.0	54.5	0	+ 0.4	± 0.5
20 – 29	44	29.3%	57.2	57.4	57.5	58.0	+ 0.2	+ 0.1	± 0.5
30 – 39	28	18.7%	63.2	63.4	63.8	64.1	+ 0.2	+ 0.4	± 0.3
40 – 49	08	5.3%	72.5	72.6	72.3	72.6	+ 0.1	+ 0.3	± 0.3
50 – 59	04	2.7%	69.7	69.8	70.1	70.4	+ 0.1	+ 0.3	± 0.3
60 – 69	01	0.7%	-	-	-	-	-	-	-
	150								

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Table 3: Shows average weight record for female fansidar patients (kg) out of 112 (42.6%) sampled, age groups 10 - 19 (48.2%), 20 - 29 (35.7%), 30 - 39 (7.1%), 40 - 49 (7.1%), 60 - 69 (1.8%) showed Average weight loss/gain of ± 1.8, ± 0.1, ± 0.6, ± 0.1 and ± 0.9, respectively.

Table 3: Weight measurement in female fansidar patients

			Average weight Record				Approximate weight loss/gain		
Age groups	**Pop.**	**%**	**D0**	**D2**	**D7**	**D14**	**D0-D2**	**D2-D7**	**D7-D14**
10 – 19	54	48.2%	57.0	56.7	56.9	58.7	- 0.3	+ 0.2	± 1.8
20 – 29	40	35.7%	59.4	59.2	59.5	59.6	- 0.2	+ 0.3	± 0.1
30 – 39	08	7.1%	70.4	70.5	71.0	71.6	- 0.1	+ 0.7	± 0.6
40 – 49	08	7.1%	73.1	73.1	43.2	73.3	- 0	+ 0.1	± 0.1
50 – 59	0	0.0%	-	-	-	-	-	-	-
60 – 69	2	1.8%	68.0	67.2	68.1	69.0	- 0.8	+ 0.9	± 0.9
	112								

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Table 4: shows average weight record for male and female maloxine patients (in kg) of respective age groups. Out 266 sampled, age groups 10 – 19 (31.6%), 20 – 29 (35.7%), 30 – 39 (22,9%),40 – 49 (6.8%),50 – 59 (1.9%); 60 – 69 (1.1%) showed Average weight loss/gain of ± 1.7, ± 0.1, ±3.7, ±0.4, ±0.6 and ±0.4 respectively.

Table 4: Weight measurement in maloxine male/female patients (in Kg)

			Average Weigh Record				Weight Loss/gain			
Age Groups	**Pop.**	**%**	**D0**	**D2**	**D7**	**D14**	**D2- D0**	**D7 - D2**	**D14- D7**	
10-19	84	31.6%	52.2	51.4	50.3	52.9	-0.8	+1.6	+2.6	± 1.7
20-29	95	35.7%	49.1	48.1	49.2	49.2	-1.0	-1.1	0.0	± 0.1
30-39	61	22.9%	65.5	61.4	61.5	61.8	-4.1	-0.1	+0.3	± 3.7
40-49	18	6.8%	73.6	73.0	73.7	74.0	-0.3	+0.7	+0.3	± 0.4
50-59	05	1.9%	75.0	74.6	75.2	75.6	-0.4	+0.6	+0.4	± 0.6
60-69	03	1.1%	80.2	80.8	80.3	79.8	+0.6	-0.5	-0.5	± 0.4
	266	100%								

Table 5 shows average weight record for maloxine patients (kg) Out of 156 sampled, age groups 10 – 19 (22.4%), 20 – 29 (40.4%), 30 – 3 9 (26.3%),40 -49 (7.1%), 50 – 59 (2.6%); 60-69 (1.3%) showed average weight loss/gain of ± 0.2, ± 0.2, ± 0.0, ± 0.5, ±0.9, and ± 0.8 respectively.

Table 5: Weight measurement in male maloxine patients (In kg).

			Average Weight Record				**Approximate weight loss/gain**		
Age Groups	**Pop.**	**%**	**D0**	**D2**	**D7**	**D14**	**D2-D0**	**D7-D2**	**D14-D7**
10 – 19	35	22.4%	46.9	46.7	47.0	49.2	-0.2	+0.3	± 0.2
20 – 29	63	40.4%	50.0	48.8	50.4	50.6	-1.2	+1.6	± 0.2
30 – 39	41	26.3%	69.7	69.4	69.5	69.5	-0.3	+0.1	0.0
40 – 49	11	7.1%	66.3	66.0	66.6	67.1	-0.3	+0.6	± 0.5
50 -59	04	2.6%	76.3	76.0	76.0	76.9	-0.3	0.0	± 0.9
60 – 69	02	1.3%	72.0	71.8	71.0	71.8	-0.2	-0.8	± 0.8
	156	100							

Table 6 shows average weight record for female maloxine patients (kg) out of 110 sampled, age groups 10 - 19 (44.5%), 20 (29.1%), 30 - 39 (18.1%), 40 - 49 (6.4%), 50 - 59 (0.9%) and 60 - 69 (0.9%) showed average weight loss/gain of ± 0.6, ± 0.5, ± 1.0 ± 0.2 ± 0.4 and ± 1.0 respectively.

Table 6: Weight measurement in female maloxine patients (in kg.)

			Average Weight Record				Approximate Weight loss/gain		
Age groups	**Pop.**	**%**	**D0**	**D2**	**D7**	**D14**	**D2-D0**	**D7-D2**	**D14-D7**
10 – 19	49	44.5%	52.8	52.2	52.6	53.2	- 0.6	+ 0.4	± 0.6
20 – 29	32	29.1%	51.8	51.1	51.4	51.9	- 0.7	+ 0.3	± 0.5
30 – 39	20	18.1%	64.1	63.9	64.4	65.4	- 0.2	+ 0.5	± 1.0
40 – 49	07	6.4%	62.4	62.0	62.4	62.6	- 0.2	+ 0.4	± 0.2
50 – 59	01	0.9%	75.0	74.6	75.2	75.6	- 0.4	+ 0.6	± 0.4
60 – 69	01	0.9%	64.5	64.5	64.6	65.6	0.0	+ 0.1	± 0.0
	110	100%							

Table 7 shows comparative assessment of weight measurement on Fansidar/maloxine patients of respective age groups. Age group 10 -19 had for fansidar a weight loss/gain of ± 1.3 against ± 0.1 of maloxine patients; 20-29: ± 0.1 against ± 0.1; 30-39: ±0.3 against ± 3.6; 40- 49:± 0.5 against ±0.1. 50 -59: ± 0.2 against ± 0.2.

Table 7: Comparative assessment of weight measurement on fansidar and maloxine patients

Age Groups	Weight record for Fansidar patients (kg)	Weight loss or Gain	Weight record for Maloxine patients	Weight loss or Gain
10 – 19	58.6	+1.3	5.17	± 0.1
20 – 29	50.7	+0.1	48.9	± 0.1
30 – 39	63.2	+0.3	62.6	± 3.6
40 – 49	70.7	+0.5	73.6	± 0.1
50 – 59	70.4	+0.2	75.1	± 0.2
60 – 69				

This study has shown that malaria disease can adversely influence nutrition thus affecting the general body mass (weight) of the patients. Weight loss due to malaria attack was recorded in this study (Table 1) as patients treated with Fansidar showed weight loss of 0.1kg to 0.3kg within day zero ("DO") and day 2 ("D2") of drug treatment which they regained by 0.2kg to 1.4kg at "D7" to "D14".

In the maloxine treated patients (Table 4), "D2-D0" weight loss gave 0.6kg to 1.0kg difference as against weight gain of "D14-D7" which gave 0.3kg to 2.6kg. These findings agree with that of Chukwuocha *et al* (2012), Michael *et al* (2013), Brabin and Piper (1997), WHO, (2015) and Baby Centre (2016), where their respective findings concurred to the fact that malaria infection induces weight loss in patients which is regained as parasites cleared from the blood stream followed by nutritional sufficiency.

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