



Clinical Profiling of a Chicken Based Formula in an Indian Children's Hospital

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Authors' contributions

This work was carried out in collaboration among between authors. Both authors read and approved the final manuscript.

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ABSTRACT

Aims: To compare nutritional status of chronic ill children before and after using chicken-based formula (CBF).

Design: A retrospective, case note based, observational study of the use of CBF in various clinical indications were noted and results critically analysed.

Study Design: In this study, out patients aged 1 to 36 months who were prescribed CBF from 2018-2020 were included. The indications for using the formula and the outcomes were noted. All subjects, consumed the prescribed formula for a minimum of six months. The pre and post - therapy nutritional status were assessed. The collected data was analysed using SPSS Version 20.

Methodology: Children between the ages 1 to 36 months who presented with chronic diarrhoea in whom CBF was prescribed either as primary source of nutrition or an nutritional adjunct were included in the study. Children who were allergic to the CBF or any of its ingredients were excluded from the study.

Results: 34 children were prescribed CBF for various indications including Cow's milk protein allergy (n=18, 52%), underweight (n=8, 23.5%), Chronic Diarrhoea (n=8, 23.5%). The age range was 0-6 months n=13 (38.2%), 6-12 months n=14 (41.2%) and 12-36 months=7 (20.6%). The nutritional assessment prior to commencing feeds showed 52.9% (n=18) were underweight, 44.1%

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(n=15) were well nourished and 2.9% (n=1) was overweight. Post feeding nutritional status showed-20.58% (n= 7) remained underweight, 76.4% (n=26) were well nourished and 2.9 % (n= 1) overweight. Weight gain was significant in selected subjects (<.001).Pearson correlation indicates that there was significant positive correlation between CBF and weight gain.

Conclusions: Growth parameters of infants fed with CBF matches with infants who are not fed on CBF. CBF can be used as an alternative in the absence of equivalent therapeutic feeds. It may be used for indications such as secondary lactose intolerance, celiac disease, malnutrition and alternative to hypo-allergenic formula (as a cheaper and cost effective formula) and as an adjuvant in malnutrition.

Keywords: Chicken based formula; chronic diarrhoea; cow's milk protein allergy; hypoallergenic formula.

1. INTRODUCTION

The quest for an alternative formula which is cost effective, easily acceptable and indigenous is always needed for multiple clinical conditions like Cow's milk protein allergy, malnutrition, post-enteritis syndrome and chronic diarrhoea.

The treatment and management of Cows milk protein allergy/intolerance is effectively eliminating the "trigger" and using treatment strategies such as elimination of Cows milk and its products in the mother and continuing to breast feed and in some cases using formulas such as partially hydrolysed formula or amino acid formula. The cost of these therapies are very high and considering the duration of the therapy one has to consider an alternative such as chicken based formula.

The chicken based formula in India was formulated for the growing yet never ending needs of Indian children who need an affordable formula without the backbreaking costs of an hypoallergenic formula or an amino acid based formula with a long-term financial burden until the child "grows out of the formula". The formula claims to contain 10% pre-cooked and pre-digested chicken protein and the claims to be gluten free, lactose free and soy free.

The nutritional profile meets the demand of infants and children with increased demands and malnutrition (acute and chronic).

Our tertiary children's hospital is one of the largest in the country with a wide panorama of paediatric gastrointestinal pathology. One of our major case load is paediatric diarrhoea with its wide array of aetiologies ranging from secondary lactose intolerance to idiopathic chronic diarrhoeas [1].

2. METHODOLOGY

Enteral nutritional therapy aims to maintain or restore the nutritional status of individuals who fail to maintain a sufficient oral intake, despite having a fully or partially functioning gastrointestinal tract. Its administration is related to the reduction of infectious complications and maintenance of the integrity of intestinal flora [1]. This remains our main core therapy and goes with the anecdote "*when there is a gut use it*".

The cost of the therapy has been a major hurdle in the nutritional management of these children as they are financially burdening and the duration of these therapies tend to be very long.

We envisaged to do a prospective cross-sectional profiling of the use of Chicken based formula (CBF) in our patients and look at the potential outcomes in the follow up period.

Chicken based formula (CBF) is used as an alternative in the absence of equivalent therapeutic feeds. Chicken based formula shows tolerance in managing cow's milk allergy in infants [2].

The feeds were diluted as per manufacturer's instructions as recommended on the pack and all children were fed orally (per os, nasogastric tube, gastrostomy-percutaneous endoscopic gastrostomy and surgical gastrostomy) Complementary diet varied individually as per the child's clinical condition, clinical diagnosis, nutritional status and calorie requirements.

2.1 Inclusion Criteria

- Child with chronic diarrhea

- Cows milk protein allergy
- Secondary lactose intolerance
- Celiac disease

2.2 Exclusion Criteria

- Child known to have allergy to Chicken
- Allergic to any of the ingredients in the CBF

The formulae used has a composition of Fat 8 g, Protein 10 g, Carbohydrate 65 g, Vitamin A 143 mcg, Vitamin D3 8 mcg, Vitamin E 7 mcg, Vitamin C 30 g, Vitamin B1 200 mcg, Vitamin B2 250 mcg, Vitamin B6 140 mcg, Vitamin B12 0.6 mcg, Niacinamide 1 mg, Folic acid 21 mcg, Calcium d-pantothenate 1.75 mg, Sodium 166 mg, Potassium 318 mg, Calcium 270 mg, Magnesium 28 mg, Manganese 34 mcg, Iron 2 mg, Zinc 1 mg, Copper 190 mcg, Phosphorus 125 mg, Iodine 31 mcg, Chloride 530 mg/100 g. [3].

Dilution was made according to the manufacturer's instructions i.e. 1 spoon in 70 ml water.

3. RESULTS

Our aims of the study were to review the therapeutic use of a chicken-based formula (CBF) Neogain® in a tertiary care children's hospital and to assess the pre and post nutritional status.

A total of 34 children were prescribed CBF for various indications [4,5]. Our target group primarily was Out-patients aged 1 to 36 months. Various parameters were noted and analysed using SPSS Version 20.

The following were the indications that was noted in our cohort out of the total 34 children. Cow's milk protein allergy (n=18), Underweight (n=8) Chronic Diarrhea (n=8). The age categories are outlined as below 0 to 6 months there were 13 children (n=13), 6-12 months (n=14) there were 14 children and 12-36 months there were 8 (n=8) children.

Their nutritional status was assessed using the WHO growth chart and the analysis revealed the following (pre nutritional intervention) that their

status underweight (n=18), well nourished (n=15) and overweight (n=1).

Once the clinical decision is made to commence CBF in consultation with the clinical nutritionist, a nutritional plan was devised and recommended to the parents and informed verbal consent was obtained.

These children were followed up by both the clinician and the dietician for a minimum period of 6 (six) months for both clinical response and improvement in anthropometry.

Since most of our patients come from remote locations, we considered checking their weight as a surrogate for overall improvement in well-being since there can be a significant inter observer variation in the height or length and measurement of head circumference. The accurate access to anthropometry may not be available to all our children in the cohort due to variability or non-availability of resources. Social status was not assessed in individual cases. Distance demography was variable, as our cohort was Pan-India and since ours is a tertiary centre our case load was variable. Average cost varied on the duration of therapy example, for a 3-month therapy the cost varied between -INR 12000 TO 24000 (\$160-\$320).

Weight monitoring during the course of therapy was done every 4 (four) weeks to avoid errors and we encouraged the use of the same weighing scale for routine checks and the child was to be weighed naked, to avoid any possible errors to maintain accuracy.

Our follow up post 6 (six) months of commencing therapy showed the nutritional status to had changed to six (n= 6) children to Underweight from n= 6, Well-nourished were 28 patients (n=28).

Our statistical analysis showed, weight gain was significant in selected subjects ($p < .001$). Pearson correlation indicates that there was significant positive correlation between CBF and weight gain.

3.1 Statistical Analysis

During the study period, 34 children (77% male and 23% female) were prescribed CBF for various indications including Cow's milk protein allergy 52%, Underweight 23%, Chronic Diarrhoea 23%. The age group of the subject

were 0-6 months 38%, 6-12 months 41% and 12-36 months 20%.Edits done as per reviewer comments-percentages changed.

From the Table 2, it is evident that there is statistical significant increase in mean score of height and BMI after diet intervention with CBF.

Table 1 indicates there is an increase in mean height from 72.06 ± 10.38 to 73.24 ± 9.7, weight 7.79 ± 2.3 to 8.73 ± 2.6 and BMI from 14.65 ± 2.0 to 16.09 ± 1.89.

The nutritional assessment prior to commencing feeds showed 52.9% were underweight, and post therapy showed underweight reduced to 20.58% .(Fig. 2).

Table 1. Comparison of mean anthropometric score of selected subject (pre and post therapy)

Subject-	Total N=34	Mean	Std. Deviation	Std. Error Mean
Pair 1	HEIGHT - Pre-Therapy	72.065	10.3876	1.7815
	HEIGHT - Post –Therapy	73.274	9.7258	1.6680
Pair 2	WEIGHT - Pre-Therapy	7.791	2.3821	.4085
	WEIGHT - Post –Therapy	8.73	2.6043	.4466
Pair 3	BMI - Pre-Therapy	14.659	2.0430	.3504
	BMI - Post -Therapy	16.091	1.8949	.3250

Table 2. Comparison of mean score of pre and post therapy

Table 2		Paired Differences			95% Confidence Interval of the Difference		Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	
Pair 1	HEIGHT - Pre-Therapy Post - Therapy	-1.2088	1.1540	.1979	-1.6115	-.8062	.000
Pair 2	WEIGHT - Pre-Therapy – Post -Therapy	-.9435	.7077	.1214	-1.1905	-.6966	.000
Pair 3	BMI - Pre-Therapy - Post - Therapy	-1.4324	1.4210	.2437	-1.9282	-.9365	.000

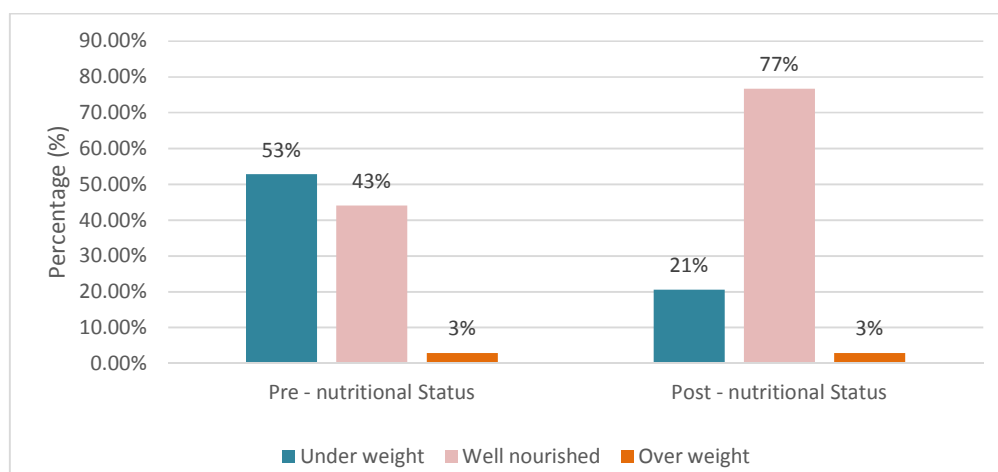


Image 1. Nutritional status

Charts changed as per reviewer comments Pearson correlation indicates that there was significant positive correlation ($P \leq 0.05$) between CBF and nutritional status

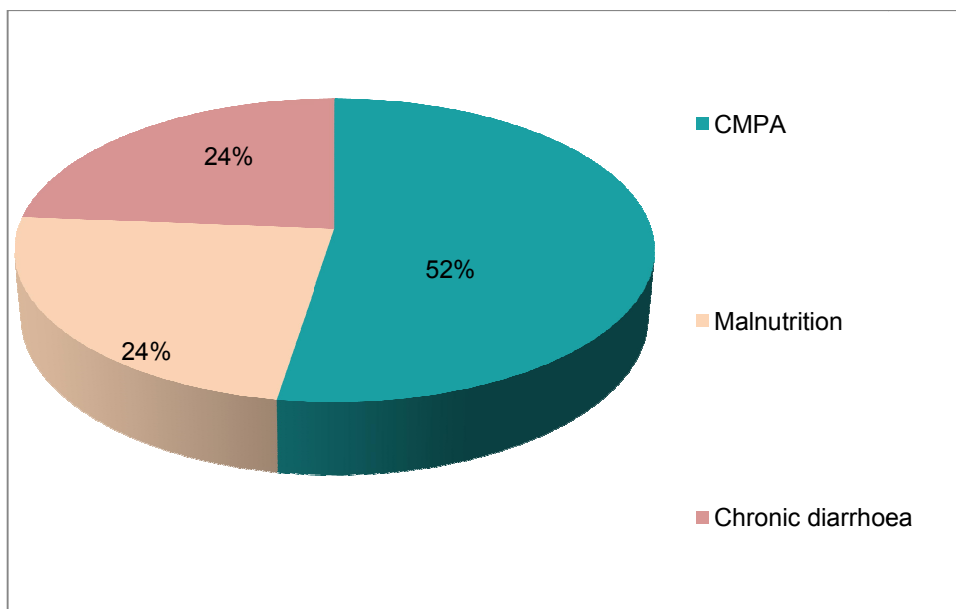


Fig. 1. Pie chart showing malnutrition, CMPA and chronic diarrhea ratio

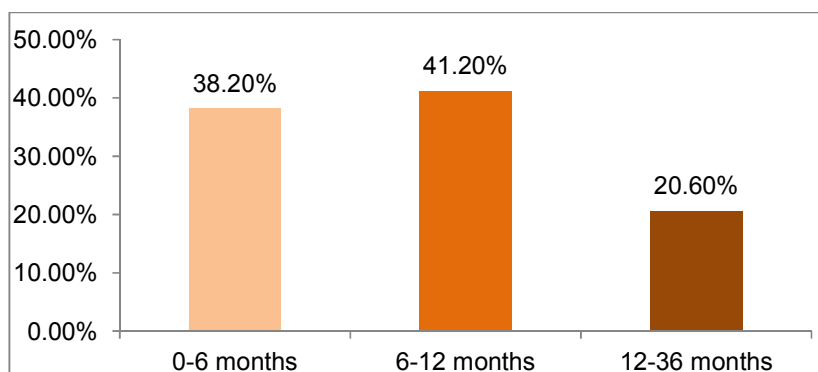


Fig. 2. Age wise distribution

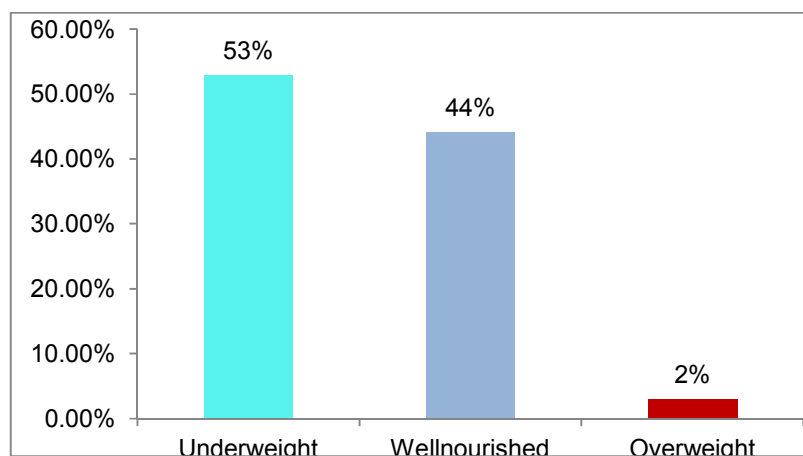


Fig. 3. Weight wise variation

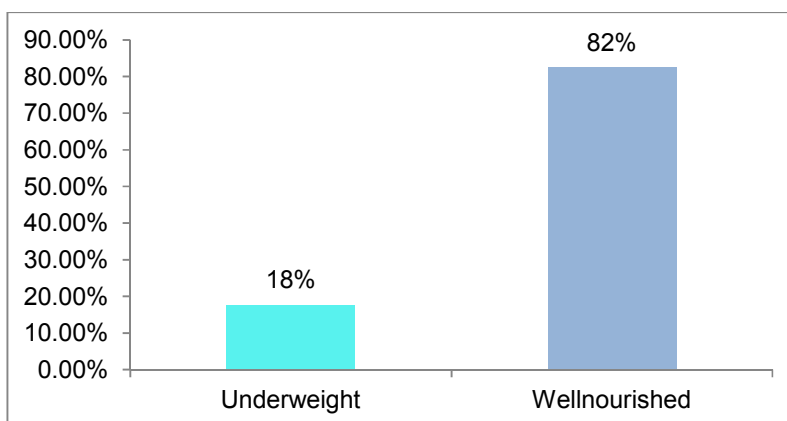


Fig. 4. Percentage of variation

Table 3. Intervention of weight

Intervention	Underweight(%)	Well nourished(%)	Overweight(%)
Pre Therapy	52.90	44.10	2.90
Post Therapy	17.60	82.30	-

CONCLUSION

Our study shows favorable outcomes in our cohort, although a small group, we found that there are multiple indications where CBF can be used [5,6] and as an alternative in the absence of equivalent therapeutic feeds.

Chicken based formula may be used in indications such as secondary lactose intolerance, acute and chronic malnutrition, Celiac disease and as an alternative to hypo allergenic formula and as an adjunct and adjuvant in malnutrition.

DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

CONSENT

Parental informed consent was obtained before commencing this formula.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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