# FLAVORED LANSOPRAZOLE SUSPENSION (ChocoBase) IN PEDIATRIC GASTROESOPHAGEAL REFLUX DISEASE

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**Background:**

Pediatric gastroesophageal reflux disease (GERD) is difficult to treat for several reasons including:

1. Lack of recognition of GERD as an important clinical entity in children since most GER is non-pathologic.
2. Difficulty in making a definitive diagnosis.
1. Variable response to traditional agents (H-2 blockers) or lack of some previously available agents (cisapride).
4. Lack of a pediatric formulation of PPI.
5. Confusion regarding appropriate dosing in pediatrics.

An unflavored PPI suspension was developed at the University of Missouri for use in critically ill patients in 1990 known as simplified omeprazole suspension (SOS) and in 1995 simplified lansoprazole suspension (SLS).

ChocoBase was developed to flavor SOS and SLS and was then used in children suffering from manifestations of pediatric GERD.

Use of the ChocoBase/PPI suspension has become more common over the past three years in various sites around the United States. This study evaluates ChocoBase/Prevacid® suspension in pediatric GERD from three centers across the U.S.

**Purpose:**

Evaluate the use of ChocoBase/Prevacid® in children with difficult GERD and it's manifestations regarding:

1. Efficacy
2. Safety
3. Tolerability

**Study Design**

Multicenter evaluative study, "difficult" GERD patients

- Pediatric patients with GERD diagnosed by :
- Symptoms, clinical exam and history = Clinical Diagnosis
- Clinical + Laryngoscopy ± pH probe study = Definitive Diagnosis
- Pediatric patients who failed other treatment being evaluated for GERD after referral at:
  Pediatric Gastroenterology and Nutrition, Spokane WA
  S Fitts, MD, Pediatric Gastroenterology.
  Carolina ENT, Greenville SC
  D Parsons MD, ENT
  University of Missouri, Columbia MO
  M Bettag, MD ENT

All patients received ChocoBase/Prevacid®

- Dosing started at 2 mg/kg/day, titrated upward to symptom control
- All prescriptions were filled at the same pharmacies for each location.
- All data collected by outside reviewers.

Outcomes evaluations were performed at periodic intervals after treatment with ChocoBase/Prevacid® initiated.

**I. Efficacy Evaluation** (defined by evaluating change in GERD symptoms from baseline as documented by primary physician and guardian)

**Significant Improvement w/Resolution**: Significant clinical improvement as evidenced by complete resolution of symptoms related to GERD.

**Some improvement**: Clearly improvement in symptoms but not complete resolution of symptoms.

**No Change**: No discernable change from baseline.

**Worsened/Does not tolerate**: Patient symptoms get worse or patient does not tolerate.

**II. Safety Evaluation**

**Adverse Effects**:

Relationship to drug in question

Highly likely: those effects that develop on drug treatment then abate upon discontinuation and return upon rechallenge.

Probable: those effects that develop on drug treatment and abate upon dechallenge.

Possible: those effects that develop on drug treatment.

Severity of adverse effect

Life threatening: Requires hospitalization and could be reasonably expected to lead to death.

Severe: requires additional treatment to ameliorate adverse effect

Mild: causes discomfort that readily abates upon discontinuation of offending agent without additional treatment.

**III. Tolerability Evaluation** (overall measure of likely compliance)

Child took the medication readily and without difficulty.

Child refused medication sometimes.

Child completely refused the medication.

**RESULTS:**

Data were collected on 60 subjects selected from a larger group of patients at each of three sites:

| | |
|---|---|
| Spokane WA | n = 13 |
| Greenville SC | n = 21 |
| Columbia MO | n = 26 |

**60/60** patients had symptoms, clinical exam and history consistent with GERD.
**43/60** had a definitive diagnosis (e.g. clinical diagnosis + pH study, laryngoscopy)

**Demographics**
The age that GERD was identified ranged from birth to 14 years.
20 female and 40 male
The mean age that ChocoBase/Prevacid® was started was 21.5 months.

**Dosage Requirements**
The overall mean dose to get significant symptom control was 2.6 mg/kg.
Those patients under 1 yr of age required a disproportionately higher dosage.
Children less than 4 months required the highest dosage
**5** ± 1.9 mg/kg (mean ± s.d.)

**I. EFFICACY EVALUATION**

**Significant Improvement w/Resolution**:
***47/60 = 78%***
**Some improvement (still some symptoms)**:
***2/60 = 3%***
**No change**:
***7/60 = 12%***
**Did not tolerate or worsened**:
***1/60 = 2% (would not take medication)***

**II. SAFETY EVALUATION**

**Adverse Effects highly likely or probable:**
3 loose stools
2 resolved with continued dosing
1 required discontinuation (moderate)
No serious or life threatening adverse events.

**III. TOLERABILITY**

Child took the medication readily and without difficulty.
***56/60 (93%)***
Child refused medication sometimes.
***3/60 (5%)***
Child completely refused the medication.
***1/60 (2%)***

**OTHER FINDINGS**

45 of 60 children received once daily dosing
15 of 60 used twice daily dosing (most often those < 1 yr of age)

**DISCUSSION:**

Pediatric GERD is difficult to treat and is often associated with extraesophageal manifestations. Patients in this study had the following extraesophageal manifestations (in no order):

| | |
|---|---|
| 1. Sinusitis | 2. Otitis media |
| 3. Asthma | 4. Cough |
| 5. Apneic episodes | 6. Hoarseness |
| 7. Poor weight gain | 8. Inconsolable |
| 9. Vomiting | 10. Constipation |
| 11. Sleeping disturbances | 12. Others |

Most patients had three symptoms associated with their GERD. Mothers were most frequently involved in the care of the patient and reported significant family stress related to the GERD symptoms.

Doses required to resolve symptoms were in the range of 2 to 4 mg /kg/day in most children. These values are similar to those reported by Israel, D and Hassall, E in studies of omeprazole in children. Data also support that very young children need the highest doses (mg/kg) and this is consistent with the findings of this study.

**Conclusions**:

In children with "difficult" GERD and extraesophageal manifestations this study finds that:

1. 78% have a complete response to ChocoBase / Prevacid® when dosed at 2 to 4 mg/kg/day.
2. The youngest patients (those under 1 year of age) require larger doses on a mg/kg basis.
3. Symptom resolution is possible in most children in 2 to 4 weeks if dosed appropriately.
4. None of the patient worsened on treatment.
5. The frequency of adverse effects was very low and none were of a serious nature. If diarrhea develops it may abate with continued dosing.
6. Compliance was very high because:
   The dosing schedule of once or twice daily is easy to follow (even with daycare).
7. Most take the suspension readily and without difficulty.
   Cisapride or metoclopramide was dc'd in all but 6 of 60 patients after Chocobase/Prevacid® was initiated.