REVIEW ARTICLE

Sudden Blindness in Children Passing Roundworm Per Oral

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ABSTRACT

Background: *Ascaris lumbricoides* infestation is the most prevalent parasitic infection among the children in tropical and developing countries but the incidence of sudden blindness after passing the worm per oral is undocumented. The lag period depends on the prodromes. Investigations reveal mere raised eosinophilic count and decreased hemoglobin with normal CT scan and CSF examination. **Materials:** Ten cases of sudden blindness investigated and treated at various centers without any positive response attending our center after 30-45 days of incidence from January 2018 to March 2019, were selected. **Methods:** Selected patients' parents were interrogated for the course of disease, treatment taken and their response. Patients were clinically examined, investigated for basic bioparameters, vision and were treated with the prescribed regime-containing pyridoxine, methylcobalamin, nicotinamide, pantothenic acid and herbal neurovitalizer composite. **Results:** All patients had progressive vision gain and attained complete vision after 6 months therapy without any adversity and residual effect or any alteration in hepatorenal profile. **Conclusion:** Sudden blindness in children after passing roundworm or with history of roundworm must be suspected for photoreceptor blockade by roundworm toxin and be treated with pyridoxine and herbal neurovitalizer to assure complete recovery.

Keywords: *Ascaris lumbricoides*, CT scan, cerebrospinal fluid, photoreceptor, neurovitalizer, recovery

Prevalence of intestinal worm infection has been found to be nearly 49.35% and *Ascaris lumbricoides* as the most common parasitic infection (46.85%) in an Indian study. Soil-transmitted helminth infections form the most important group of intestinal worms affecting 2 billion people worldwide causing considerable morbidity.

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A. lumbricoides remain the most prevalent parasitic infection despite therapeutic response to albendazole and mebendazole, but eradication is difficult due to recurrent infection.

Considering the changing effect of worm infestation, the Government of India (GoI) has launched a program to combat worm infestation, i.e., National deworming day for children of age group 1-19 years biannually.

As per the World Health Organization (WHO), >836 million children are at risk of parasitic manifestation worldwide and 214 million children are of age group 1-14 years. In addition, evidence of disproportionate worm infestation and self-drug use resulting in resistance to available deworming agent and presently a combination of parasitocide i.e., albendazole and ivermectin, is in consideration. As these agents only act on adult worm, not on cyst or ova, its recurrent dose must be prescribed as on 45th day every ovum develops to active adult roundworm.

MATERIALS AND METHODS

Materials

Ten children attending the Center for Critical Care with complaints of sudden blindness after passing

roundworm per oral having treated at various hospitals without any positive response and advised brain surgery were included in the study. Ophthalmological examination and CT brain showed no evident pathology except blood showing high eosinophilic count. Table 1 summarizes the clinical presentation of the study patients.

Methods

All the patients presenting with sudden blindness and associated history of passing roundworm per oral and treated at various hospitals without any vision improvement in spite of medication and no pathology detected on various investigations like CT brain, retinal examination and various hematological examinations, were interrogated, examined thoroughly and investigated for basic hematological, hepatic and renal profile.

All the selected patients were administered the following irrespective of age and presentation:

- Intravenous (IV) mannitol 10% with glycerine and 10% in therapeutic dose.
- Injection methylcobalamin, nicotinamide, pyridoxine and pantothenic acid with betamethasone, 1 mL IV every 4th day very slow.
- Syrup Herbal neuroenergizer 2.5-5 mL every 8 hours.
- Susp albendazole 400 mg *plus* ivermectin 3 mg at bedtime for 5 days.
- Bland and simple high carbohydrate diet.

Herbal neurovitalizer constitutes:

Each 5 mL–

- *Acorus calamus* 100 mg
- *Herpestis monnieria* 100 mg
- *Convolvulus pluricaulis* 100 mg
- *Nardostachys jatamansi* 100 mg
- *Cassia angustifolia* 100 mg

Patients' parents were instructed to daily ascertain visual response by finger counting or light reflex, and were also suggested to mark any adversity or new emerging manifestation and report immediately.

Patients were routinely examined every week to ascertain response to the therapy and safety profile. At the end of therapy, patients were examined by ophthalmologist for vision and visual acuity.

OBSERVATION AND RESULTS

Selected patients were in the age group 6-14 years (Table 2) and among them, 4 were male and 6 female (Fig. 1). They approached for medical care within the lag

Table 1. Clinical Presentation of Study Patients

Patient	Age/Sex	Clinical presentation	Lag period
A	10/F	History of passing roundworm per oral, loose motions, vomiting, fever, loss of vision both sides	3 days
B	9/M	Loose motions, vomiting, pain in abdomen, itching over the body, loss of vision both sides, passage of roundworm per oral	2 days
C	12/M	Vomiting, pain in abdomen, fever urticarial rash over the extremity, passage of roundworm per oral, loss of vision both sides	4 days
D	6/M	Vomiting, loose motions, involuntary body movement, urticarial rash, passing roundworm per oral, sudden blindness	2 days
E	13/F	Loose motions, urticarial rash, fever, shivering, nausea, pain in abdomen, passage of roundworm per oral, sudden blindness	3 days
F	12/F	Loose motions of white color, dark urine, intense itching with rash, fever, vomit of roundworm, abdominal pain, loss of vision	5 days
G	8/F	Agonizing pain in abdomen, loose motion, vomiting, urticarial rash, passage of roundworm per oral, loss of vision	4 days
H	8/M	Nausea, vomiting, urticarial rash, passage of roundworm per oral, loss of vision	5 days
I	6/F	Vomiting, loss of appetite, urticarial rash, passage of roundworm, loss of vision	4 days
J	14/F	Fever, pain in abdomen, vomiting, headache, urticarial rash, passage of roundworm both from mouth and stool	1 day

period of 3-5 days at appropriate center. Investigations included CT scan, ophthalmological examination to assess vision and retina status, which were within normal limits in all cases, except for raised eosinophilic count. Common presentation of the patients included sudden loss of vision, passage of roundworm per oral and lag period of blindness and passage of worm was 24-72 hours (Table 3).

Patients were treated with many neurotropics and topical eye drops without any positive response.

Majority of the patients attended our center after 30-45 days of the onset of blindness. Patients presenting with associated central nervous system (CNS) manifestation like involuntary movement and headache had very short lag period of 1 or 2 days.

At our center, hematological examination show raised eosinophil count with other normal parameters, i.e., hepatic and renal. All patients showed visual improvement by 8th day of therapy and complete visual recovery by 6th month of therapy without any visual debility. Optometry confirmed the vision in all patients as 6/6 in both eyes (Tables 4 & 5 and Fig. 2).

Table 2. Distribution of Patients

Age group (years)	Number of patients		
	Male	Female	Total
6-8	2	2	4
8-10	1	1	2
10-12	-	-	-
12-14	1	3	4

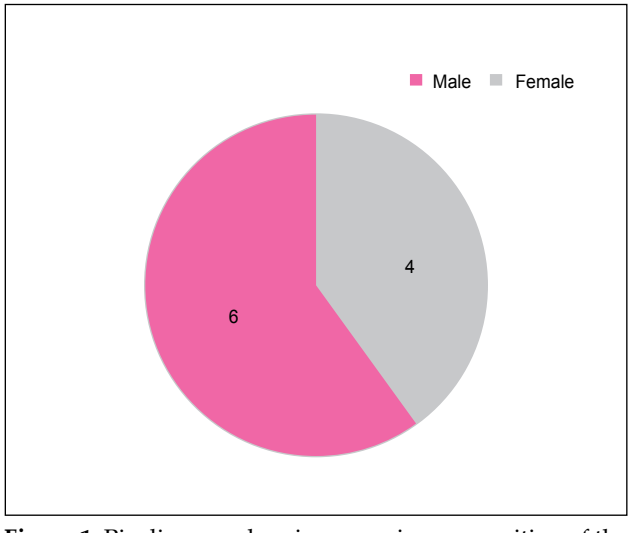

Figure 1. Pie diagram showing sex-wise composition of the patients.

Table 3. Presentation of the Patients

Sudden blindness
Passing worm per oral
Nausea and vomiting
Fever
Lag period of onset of blindness and passing the worm per oral: 24-72 hours
Blurring of vision
Sign of avitaminosis/xerosis/Bitot's spot

Table 4. Bioparameter Status at Various Stages

Basic bioparameters	Number of patients		
	A	B	C
Hematological			
Absolute eosinophil count			
<200/cc	-	-	8
200-300/cc	3	4	2
300-400/cc	6	6	0
400-500/cc	1	0	0
TLC			
<6000/cc	1	0	0
6000-7000/cc	8	10	10
>7000/cc	1	0	0
Hemoglobin percent			
<10 gm%	5	3	0
>10 gm%	5	7	10
Diabetic profile			
Blood sugar			
Fasting			
<100 mg%	9	10	10
>100 mg%	1	0	0
Postprandial			
<150 mg%	10	10	10
>150 mg%	0	0	0
Hepatic profile			
SGOT			
<30 IU	7	8	10
>30 IU	3	2	0
SGPT			
<30 IU	7	8	10
>30 IU	3	2	0
Alkaline phosphatase			
<140 mg%	10	10	10
>140 mg%	0	0	0

Table 4. Bioparameter Status at Various Stages

Basic bioparameters	Number of patients		
	A	B	C
Renal profile			
Blood urea			
<26 mg%	10	10	10
>26 mg%	0	0	0
Serum creatinine			
<1.5 mg%	10	10	10
>1.5 mg%	0	0	0
CT scan			
Altered	None	None	None
Unaltered	10	10	10
Vision			
Status of eye	Normal	Normal	Normal
PL			
Absent	10	10	0
Present	0	0	10
PR			
Absent	2	0	0
Present	8	10	10
Vision	Absent	Absent	Normal

A = At first center of treatment; B = At our center on admission; C = On completion of treatment.

Table 5. Outcome of the Study

Particulars	Number of patients
Perception of light	10
Finger counting	10
Blurred vision	None
Clear near vision	10
Clear distant vision	10
Completely normal vision	10
Safety profile	
Hematological	Improved in all
Hepatic profile	Normal in all
Renal profile	Normal in all

No adversity or sequel was noted in any case or any evidence of post-therapy withdrawal effect, i.e., decline in vision or visual acuity or any CNS manifestation.

DISCUSSION

Roundworm infestation is very common but manifestations like blindness after passing the worm per oral is very uncommon or remains unmarked.

In addition, variable lag period of onset of blindness and worm passage, suggests its dependence on prodromes. Those who had CNS prodromes like headache and involuntary movement had earlier onset.

Patients' presentation on passing worm per oral suggests worm irritation leading to release of a polypeptide ASCARON which stimulates the intestinal mucosal nerve endings, resulting in nausea, vomiting and loose motions.

Absorption of toxin in blood causes anaphylactic reaction resulting in fever and urticarial rash while access to cerebrospinal fluid (CSF) results in neurosuppression due to inhibition of neurotransmitter γ-aminobutyric acid (GABA) as a result of inhibition of coenzyme pyridoxal phosphatase by the toxin.

Sudden blindness occurs as neuroconduction suppression results in blockade of neurotransmission from photoreceptors of retinal fovea (Fig. 3).

Figure 4 depicts the pattern of vision improvement in the patients. No change in bioparameters was observed in any case and eosinophil count came to normal.

All patients recovered of blindness having progressive vision gain from perception of light to normal vision in 6 months' duration with the treatment. It is attributed to:

- IV mannitol 10% with glycerine and 10% relieved neural edema.
- Supplementation of pyridoxine as injection of methylcobalamin, pyridoxine, nicotinamide and pantothenic acid competitively inhibits polypeptide and activates pyridoxal phosphatase and ensures increased neurotransmitter GABA. Methylcobalamin and pantothenic acid promote neuroconduction.
- Herbal composite constituents ensure neuro-vitalization and photoreceptor activation.
- Administration of albendazole *plus* ivermectin ensures worm eradication.
- Nutritious diet supports recovery.

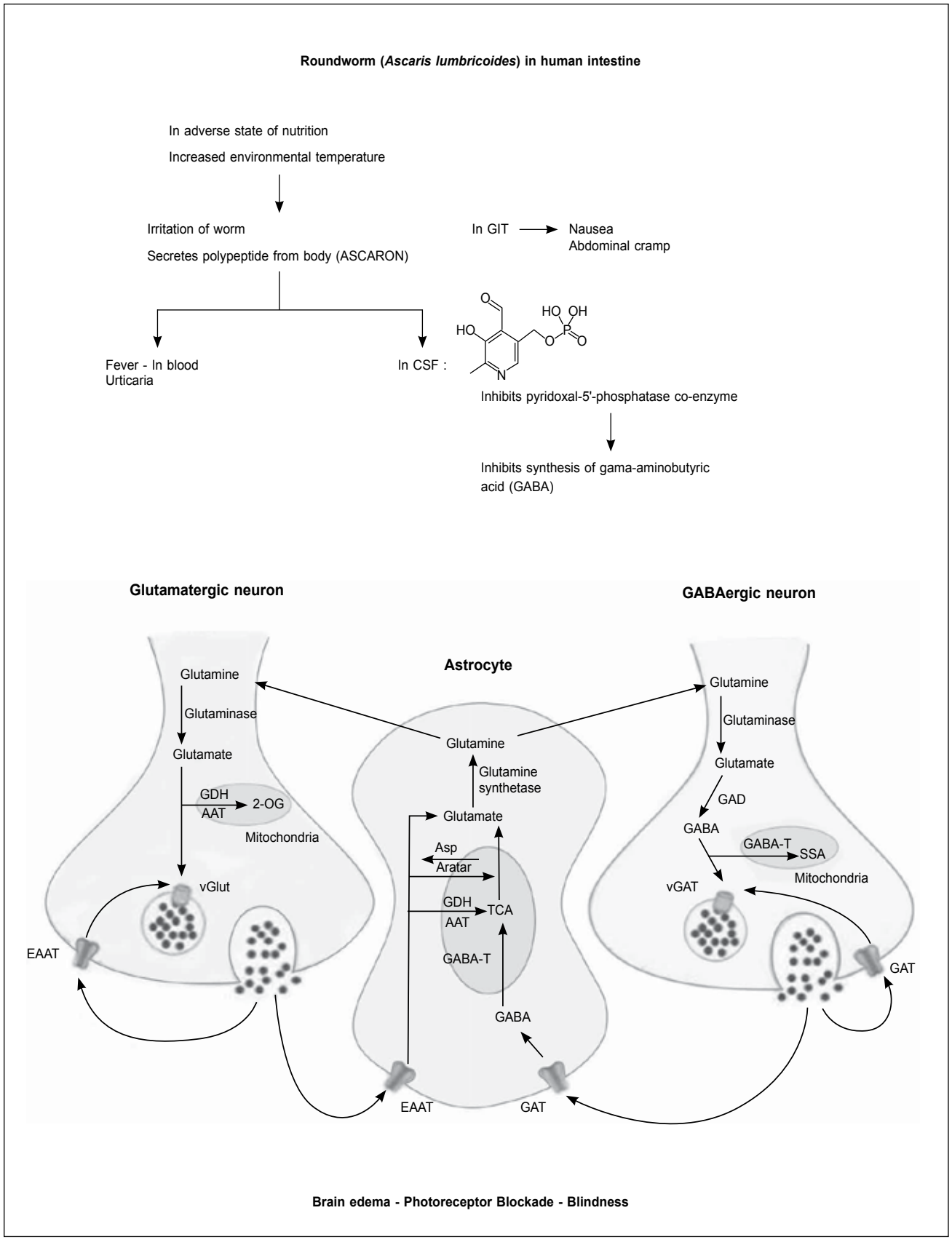

Figure 2. Roundworm kinetics in intestine.

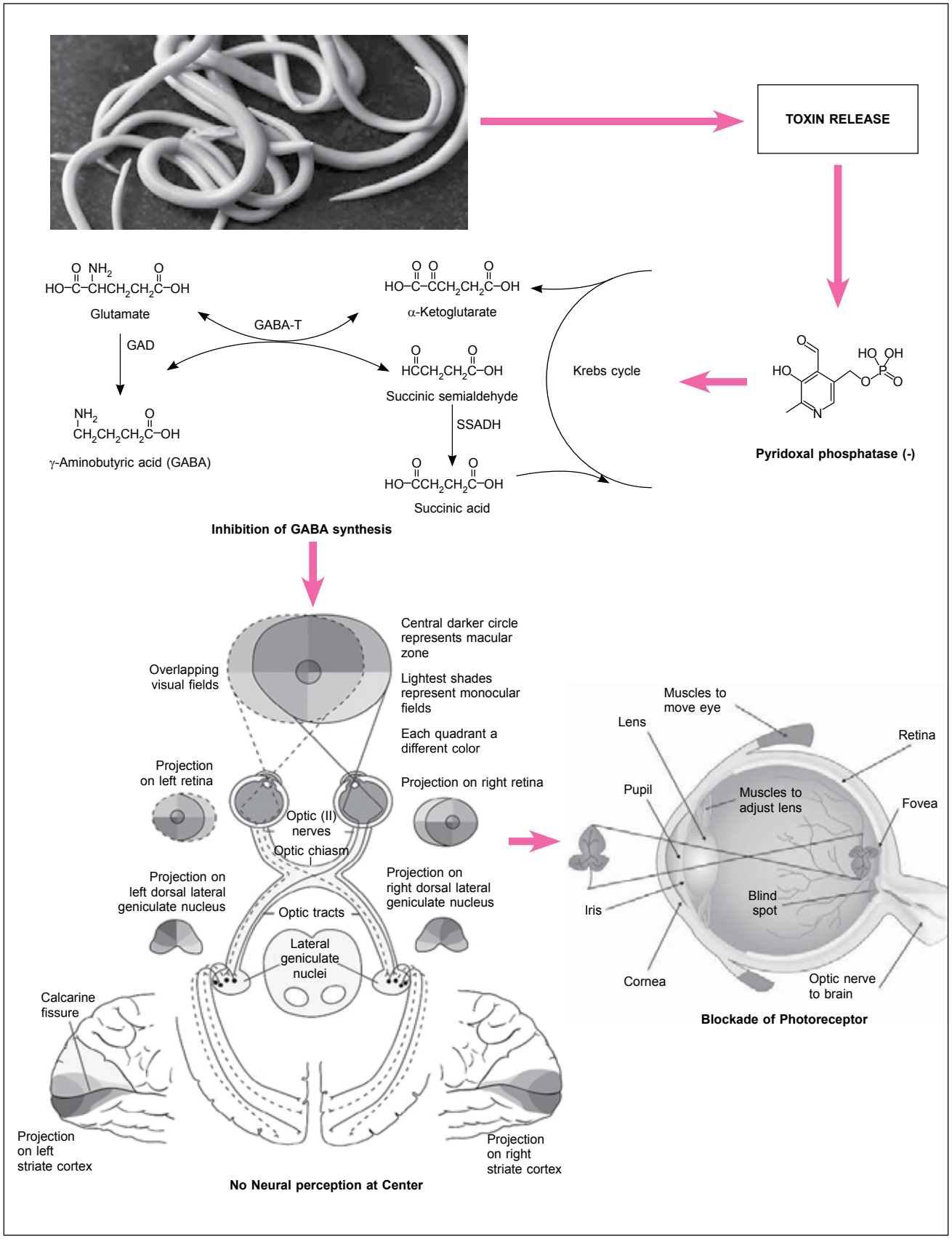

Figure 3. Schematic presentation of pathogenesis of sudden blindness.

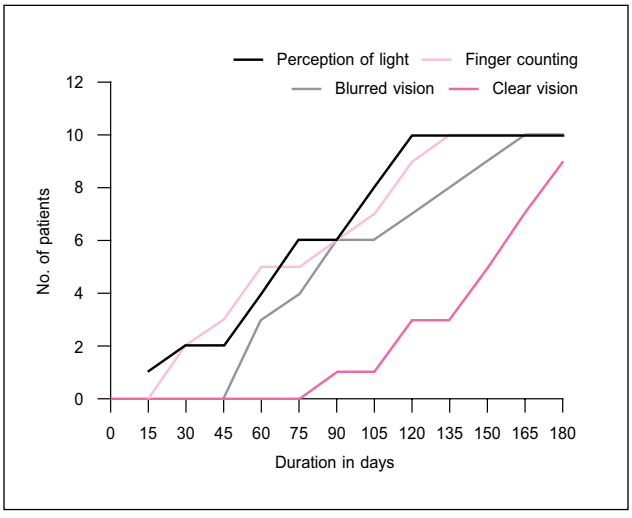

Figure 4. Pattern of vision improvement.

CONCLUSION

Sudden blindness after passing roundworm must be duly taken care of, suspecting Ascaris toxin as a factor. Treatment will ensure cure and safety from undue expenses, especially in tropical countries where roundworm infestation is very common. Herbal composite and pyridoxine supplementation proves a boon for cure.

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