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Original Research Article

Clinical Experience and Experience-Based Recommendations of Indian Paediatricians on Omega-3 Fatty Acid Benefits in Children in the Management of Developmental Delay, Autism & ADHD

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Abstract:

Background: Long-chain omega-3 polyunsaturated fatty acids, principally eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), are structurally and functionally integral to the developing brain, and are widely prescribed in Indian paediatric practice for developmental delay, autism spectrum disorder (ASD) and attention-deficit/hyperactivity disorder (ADHD). Randomised evidence in these indications remains inconsistent, and little is documented about how Indian paediatricians actually use these formulations.

Objective: To document the clinical experience and experience-based recommendations of Indian paediatricians regarding EPA/DHA-containing cognitive nutrition formulae in children with developmental delay, ASD and ADHD.

Materials and Methods: A cross-sectional, questionnaire-based survey was administered to 157 practising Indian paediatricians using a structured 13-item instrument covering prescribing preference, initiation threshold, duration, adherence, perceived improvement, timing and extent of improvement, domain-specific response, and experience-based recommendations. Responses were summarised as counts and percentages and compared between prescribers of CoS 3 and prescribers of other EPA/DHA-containing formulae using the Pearson chi-square test with Yates' continuity correction, or Fisher's exact test where expected cell counts were sparse.

Results: Of 157 respondents, 105 (66.9%) prescribed CoS 3 and 52 (33.1%) other formulae. Overall, 156 (99.4%) reported improvement in developmental milestones at follow-up (100.0% vs 98.1%; Fisher's exact p=0.331), and 117 (74.5%) reported multi-domain improvement. Improvement was first observed between the first and third month by 91 (58.0%) respondents, ($\chi^2(2)=0.99$, p=0.608). Language/speech was the domain most frequently nominated as most responsive (88/157; 56.1%). 66.7% HCPs prescribing Cos 3 reported good patient adherence (>80%). Overall perceived clinical benefit was reported in ASD by 149 (94.9%), in ADHD by 153 (97.5%) and in epilepsy by 132 (84.1%) (p=0.908, p=1.000 and p=0.136, respectively). Overall, 155 (98.7%) endorsed EPA/DHA formulae as part of routine prescribing for developmental delay.

Conclusion: In this survey Indian paediatricians experienced near-universal clinical benefit from EPA/DHA-containing formulae across developmental delay, ASD and ADHD, most often in the language domain and within three months.

Keywords: Omega-3 Fatty Acids; Docosahexaenoic Acid; Developmental Delay; Autism Spectrum Disorder; Attention-Deficit/Hyperactivity Disorder; Physician Survey.

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Introduction

The first five years of life encompass the most rapid phase of human brain growth, during which synaptogenesis, myelination, dendritic arborisation and experience-dependent pruning proceed at a pace never repeated in later life. Because this window is both highly plastic and highly vulnerable, disruptions occurring within it tend to leave durable functional consequences, and interventions delivered within it carry disproportionate leverage. Population-based Indian data indicate that neurodevelopmental disorders are common: across five geographically diverse sites, roughly one in eight children aged 2–9 years was found to have at least one neurodevelopmental disorder [1].

Global developmental delay — significant lag in two or more developmental domains — is frequently the earliest presentation a paediatrician encounters, and it carries a substantial burden in terms of educational attainment, family stress and long-term dependency. A proportion of children with early delay are subsequently diagnosed with a specific neurodevelopmental disorder. Autism spectrum disorder (ASD) is characterised by early-appearing deficits in social communication together with restricted, repetitive patterns of behaviour, with heterogeneous aetiology and a strong genetic contribution [2]. Attention-deficit/hyperactivity disorder (ADHD), affecting approximately 5.9% of youth worldwide, is defined by developmentally inappropriate inattention, hyperactivity and impulsivity and is associated with impairment across academic, social and family domains [3,4].

Long-chain omega-3 polyunsaturated fatty acids provide a plausible nutritional point of intervention. Docosahexaenoic acid (DHA) accumulates preferentially in neuronal and synaptic membranes and in the retina, where it can constitute a substantial fraction of membrane phospholipid fatty acids; inadequate omega-3 supply during development alters brain fatty-acid composition, neurogenesis and neurotransmitter metabolism in animal models [5]. Eicosapentaenoic acid (EPA) and DHA modulate membrane fluidity and lipid-raft organisation, influence dopaminergic and serotonergic signalling, and give rise to specialised pro-resolving mediators that regulate neuroinflammation [6,7]. These mechanisms offer a coherent rationale for effects on attention, behaviour and cognition, though mechanistic plausibility is not itself clinical proof.

The clinical evidence is genuinely mixed. In ADHD, meta-analyses have reported small but statistically significant improvements in symptom scores, with effect sizes generally in the region of 0.2–0.4 and signals suggesting that higher EPA doses and lower baseline omega-3 status predict response [8,9]. Other syntheses applying stricter methodology have concluded that the evidence for core-symptom benefit is weak and of low certainty [10,11]. In ASD, results are more discouraging still: a systematic review and meta-analysis found no effect of omega-3 supplementation on core ASD symptoms [12,13], whereas another meta-analysis reported possible benefit for hyperactivity, lethargy and stereotypy rather than core social deficits [14]. A Cochrane review likewise found insufficient evidence to support routine use in ASD [15]. Trials in developmental delay per se are conspicuously scarce.

Against this uncertain evidence base, EPA/DHA-containing “cognitive nutrition” formulae are prescribed extensively in Indian paediatric practice. Where randomised evidence is equivocal, real-world prescribing is shaped substantially by accumulated clinical observation, and documenting that observation has value: it describes what is actually happening in practice, identifies the outcomes clinicians believe they are seeing, and generates hypotheses that can be tested formally. Such documentation is largely absent for the Indian setting, where dietary omega-3 intake patterns, formulation availability, family expectations and access to structured early-intervention services all differ from the Western contexts in which most trials were conducted [1,23].

The present study was therefore undertaken to document, in a structured manner, the clinical experience and experience-based recommendations of practising Indian paediatricians regarding EPA/DHA-containing formulae in children with developmental delay, ASD and ADHD, and to examine whether reported experience differed between prescribers of different formulations.

Materials and Methods

Study design, setting, population and sampling: This was a cross-sectional, questionnaire-based survey of practising paediatricians in India, conducted as a multi-centre practice-pattern exercise from April 2026 to June 2026. The study population comprised registered paediatricians holding an MD or DCH qualification, actively practising paediatric medicine and prescribing DHA/EPA-containing nutritional formulae to children under five years of age with developmental delay.Participants were sampled

randomly from different regions across India to obtain broad geographical representation. The survey included 157 paediatricians from geographically diverse locations across northern, southern, eastern, western and north-eastern India. Individual respondents recorded their place of practice on the survey form. All clinicians approached completed the survey, resulting in a response rate of 100%, and all completed responses were included in the final analysis.

Instrument: A structured, close-ended questionnaire was used, comprising an identification header (name, speciality, place, date) followed by 13 items. The items addressed: (i) the formula ordinarily prescribed for developmental delay in children under five years (CoS 3 or other EPA/DHA-containing formulae); (ii) the severity threshold at which supplementation is initiated (mild, 1–2 domains; moderate, 3 domains; severe/global delay; or all of these); (iii) average duration of prescription (<3 months, 3–6 months, >6 months); (iv) patient adherence (good, ≥80%; moderate, 50–79%; poor, <50%); (v) whether improvement in developmental milestones was observed at follow-up; (vi) how early improvement was first seen (within the first month, between the first and third month, after the third month); (vii) extent of improvement (none, single-domain, multi-domain); (viii) the developmental domain most effectively improved (gross motor, fine motor, language/speech, social/adaptive); (ix) whether improvement in social/adaptive milestones was observed in children with autism; (x) whether improvement in developmental milestones was observed in children with ADHD; (xi) whether improvement was observed in children with epilepsy; (xii) whether the respondent would recommend CoS 3 to fellow paediatricians for developmental delay; and (xiii) whether EPA/DHA-containing formulae should form part of routine prescribing for developmental delay. The questionnaire was pilot-tested among the first 30 participating paediatricians. Following the pilot testing, the same structured questionnaire was subsequently administered to the remaining 127 paediatricians. All responses were included in the final analysis.

Variables: Variables fell into three groups. Practice-related variables comprised prescribing preference, initiation threshold, prescription duration and observed adherence. Clinical-experience variables comprised perceived improvement at follow-up, time to first observable improvement, extent of improvement, the most responsive developmental domain, and perceived improvement in ASD, ADHD and epilepsy. Recommendation variables comprised endorsement of CoS 3 to peers and endorsement of EPA/DHA formulae as routine practice. All variables were categorical and captured at the level of the responding clinician, not the individual patient.

Formulation, Dosage and Safety Data: Prescribing preference was recorded only at the level of product category (CoS 3 versus other EPA/DHA-containing formulae). Cos 3 syrup contains fish oil 705 mg (EPA: 376 mg, DHA: 235 mg) per 10 ml and Cos 3 drops contains fish oil 500 mg (EPA: 180 mg, DHA: 120 mg) per ml, . Dose prescribed was decided by prescribing pediatrician as per RDA limits for the age group. Other formulae contained similar amounts of EPA/DHA but names of these formulae were not recorded. Adverse events, tolerability and safety outcomes were not assessed by the instrument

Data Collection: Data collection was done through online survey with google survey form. Responses were recorded on the structured form and subsequently compiled into a single spreadsheet, with one row per responding clinician and one column per questionnaire item.

Statistical Analysis: Categorical variables were summarised as frequencies and percentages, both overall and stratified by prescribing preference. Because several response options had been recorded with minor variations in wording and capitalisation, responses were harmonised to the canonical option labels of the questionnaire before analysis; no response was reclassified across substantive categories. One response to the initiation-threshold item was not classifiable to any of the four options and was retained in descriptive tabulations but excluded from the corresponding significance test.

Between-group comparisons used the Pearson chi-square test. For 2×2 tables the Yates continuity-corrected statistic is reported, and Fisher's exact test was performed additionally wherever any expected cell count fell below five; for such tables Fisher's exact test is treated as the primary inferential analysis, consistent with the accompanying statistical reports. Two-sided p-values below 0.05 were considered statistically significant. No adjustment was made for multiple comparisons, and analyses were not adjusted for any clinician-level covariate, since none were collected. Analyses were performed in Python 3 using the pandas and SciPy libraries.

Results

Respondents and Prescribing Preference: Responses were available from 157 paediatricians. Of these, 105 (66.9%) reported ordinarily prescribing CoS 3 for developmental delay in children under five years and 52 (33.1%) reported prescribing other EPA/DHA-containing formulae. Demographics viz — age, sex of the respondentswere not captured by the instrument.All

157 records were complete for all 13 items, with no missing values.

Table 1: Practice-related characteristics reported by 157 Indian paediatricians, by prescribing preference.

Variable	CoS 3 prescribers n=105, n (%)	Other formulae n=52, n (%)	Total N=157, n (%)	Test statistic	p
Severity threshold for initiation					
All degrees of delay	57 (54.3)	26 (50.0)	83 (52.9)	$\chi^2(3)=4.16$ [a]	0.244
Moderate (3 domains)	25 (23.8)	15 (28.8)	40 (25.5)		
Mild (1–2 domains)	19 (18.1)	5 (9.6)	24 (15.3)		
Severe (global delay)	4 (3.8)	5 (9.6)	9 (5.7)		
Not classifiable	0 (0.0)	1 (1.9)	1 (0.6)		
Average duration of prescription					
<3 months	12 (11.4)	7 (13.5)	19 (12.1)	$\chi^2(2)=0.20$	0.907
3–6 months	68 (64.8)	32 (61.5)	100 (63.7)		
>6 months	25 (23.8)	13 (25.0)	38 (24.2)		
Observed patient adherence					
Good (≥80%)	70 (66.7)	29 (55.8)	99 (63.1)	$\chi^2(2)=2.81$ [b]	0.245
Moderate (50–79%)	34 (32.4)	21 (40.4)	55 (35.0)		
Poor (<50%)	1 (1.0)	2 (3.8)	3 (1.9)		

[a] Computed on 156 responses after exclusion of the single response that could not be classified to any listed option. [b] One expected cell count was <5; the p-value should be regarded as approximate. Percentages are column percentages within each prescribing group.

Practice patterns were closely similar across the two prescribing groups. Just over half of respondents (52.9%) reported initiating an EPA/DHA formula irrespective of the degree of delay, while a further 25.5% reserved it for moderate three-domain delay; only 5.7% restricted initiation to global delay, indicating a low clinical threshold for starting supplementation. A prescription duration of 3–6 months predominated (63.7%), with a further 24.2% continuing beyond six months, so that 87.9% of respondents prescribed for at least three months. Overall adherence was rated good in 63.1% and poor in only 1.9%, though this reflects clinician impression while higher adherence with Cos 3 formula vis-à-vis other formula (66.7% vs 55.8%, p>0.05).

Figure 1. Degree of developmental delay at which paediatricians prefer to initiate an EPA/DHA-containing formula (N=157)

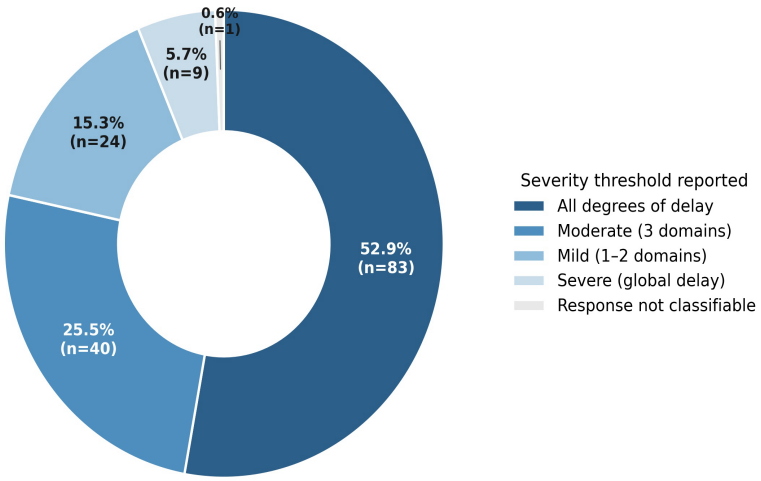


Figure 1. Degree of developmental delay at which paediatricians prefer to initiate an EPA/DHA-containing formula (N=157). [Severe (global delay): Developmental delay in all 4 domains]

Figure 1 illustrates the distribution of initiation thresholds across the whole cohort. The dominant pattern is one of early and unselective initiation: a majority of respondents (83/157) reported that they do not confine supplementation to any particular severity band, Collectively 93.7% HCPs prescribed Cos 3 or other EPA/DHA formula if developmental delay is observed in 1 or more domain. Restriction to severe global delay was distinctly uncommon (9/157). One response could not be mapped to any listed option. The figure therefore indicates that, in this cohort, EPA/DHA supplementation functions as a broadly applied adjunct for management of developmental delay.

Clinical experience of improvement

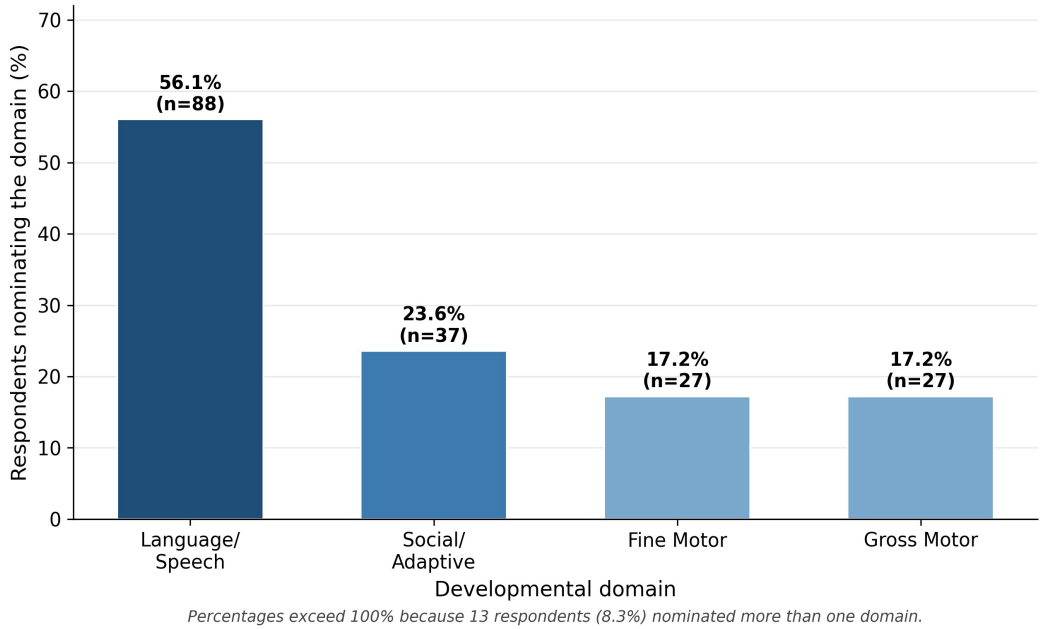
Table 2: Reported clinical experience of improvement with EPA/DHA-containing formulae, by prescribing preference.

Variable	CoS 3 prescribers n=105, n (%)	Other formulae n=52, n (%)	Total N=157, n (%)	Test statistic	p
Improvement in developmental milestones at follow-up					
Yes	105 (100.0)	51 (98.1)	156 (99.4)	Fisher's exact [a]	0.331
No	0 (0.0)	1 (1.9)	1 (0.6)		
Time to first observable improvement					
Within 1st month	9 (8.6)	4 (7.7)	13 (8.3)	$\chi^2(2)=0.99$	0.608
Between 1st and 3rd month	58 (55.2)	33 (63.5)	91 (58.0)		
After 3rd month	38 (36.2)	15 (28.8)	53 (33.8)		
Extent of improvement					
Multi-domain improvement	77 (73.3)	40 (76.9)	117 (74.5)	$\chi^2(2)=0.65$ [b]	0.722
Single-domain improvement	27 (25.7)	12 (23.1)	39 (24.8)		
No improvement	1 (1.0)	0 (0.0)	1 (0.6)		

[a] Fisher's exact test used as the primary analysis because one expected cell count was <5; the corresponding Yates-corrected Pearson statistic was $\chi^2(1)=0.13$, p=0.719. [b] One expected cell count was <5; the p-value should be regarded as approximate.

Perceived improvement was virtually universal: 156 of 157 respondents (99.4%) reported improvement in developmental milestones at follow-up, with a single dissenting response in the comparator group. Roughly two-thirds of respondents (66.2%) reported first seeing improvement within three months, and three-quarters (74.5%) described improvement spanning more than one developmental domain.

Figure 2. Developmental domain reported as most responsive to EPA/DHA supplementation (N=157 respondents; 179 nominations)



Percentages exceed 100% because 13 respondents (8.3%) nominated more than one domain.

Figure 2. Reported time to first observable improvement in developmental milestones, by prescribing preference (N=157).

Figure 2 displays the timing of first observed improvement as a proportion of each prescribing group. The modal response in both groups was improvement appearing between the first and third month (55.2% and 63.5%), while improvement within the first month was uncommon (8.6% and 7.7%). A minority in each group — 36.2% and 28.8% respectively — reported that improvement became apparent only after three months. The two distributions overlap substantially and do not differ significantly ($\chi^2(2)=0.99$, $p=0.608$).The clinically useful message is therefore about expected latency of DHA/EPA formulations showing clinical benefits, as perceived by HCPs.: Most respondents anticipate a period of one to three months before any change becomes visible.

Perceived benefit across neurodevelopmental conditions

Table 3: Perceived benefit of EPA/DHA-containing formulae across neurodevelopmental conditions and developmental domains.

Variable	CoS 3 prescribers n=105, n (%)	Other formulae n=52, n (%)	Total N=157, n (%)	Test statistic	p
Improvement in social/adaptive milestones in children with ASD					
Yes	99 (94.3)	50 (96.2)	149 (94.9)	$\chi^2(1)=0.01$; OR 1.52 [a]	0.908
No	6 (5.7)	2 (3.8)	8 (5.1)		
Improvement in developmental milestones in children with ADHD					
Yes	102 (97.1)	51 (98.1)	153 (97.5)	$\chi^2(1)=0.00$; OR 1.50 [a]	1.000
No	3 (2.9)	1 (1.9)	4 (2.5)		
Improvement in developmental milestones in children with epilepsy					
Yes	92 (87.6)	40 (76.9)	132 (84.1)	$\chi^2(1)=2.23$	0.136
No	13 (12.4)	12 (23.1)	25 (15.9)		
Domain nominated as most responsive [b]					
Language/speech	50 (47.6)	38 (73.1)	88 (56.1)	Not tested [b]	—
Social/adaptive	21 (20.0)	16 (30.8)	37 (23.6)		
Fine motor	17 (16.2)	10 (19.2)	27 (17.2)		
Gross motor	17 (16.2)	10 (19.2)	27 (17.2)		

Chi-square statistics for the three dichotomous items are Yates continuity-corrected. [a] Fisher's exact test was additionally performed because one expected cell count was <5, and confirmed the absence of a significant difference (p=1.000 for both ASD and ADHD items). [b] Thirteen respondents (8.3%), all of them in the other-formulae group, nominated more than one domain (74 nominations from 52 respondents in that group, versus 105 nominations from 105 respondents in the CoS 3 group), so percentages sum to more than 100% in the other-formulae column only. The apparently higher rate of language/speech nomination in that group is generated by this difference in response format rather than by clinical content, and the between-group distribution was therefore not tested.

Perceived benefit extended well beyond developmental delay. Overall improvement in social and adaptive milestones in children with autism was reported by 94.9% of respondents, and improvement in developmental milestones in children with ADHD by 97.5%;(p>0.05). Improvement in children with epilepsy was reported less often (84.1%) and showed the largest, though still non-significant, numerical gap between groups (87.6% versus 76.9%; p=0.136). Language and speech was by a clear margin the domain most often nominated as most responsive, endorsed by 56.1% of all respondents — more than twice the frequency of any other domain.

Figure 3. Perceived clinical benefit of EPA/DHA-containing formulae across four neurodevelopmental contexts, by prescribing preference (N=157)

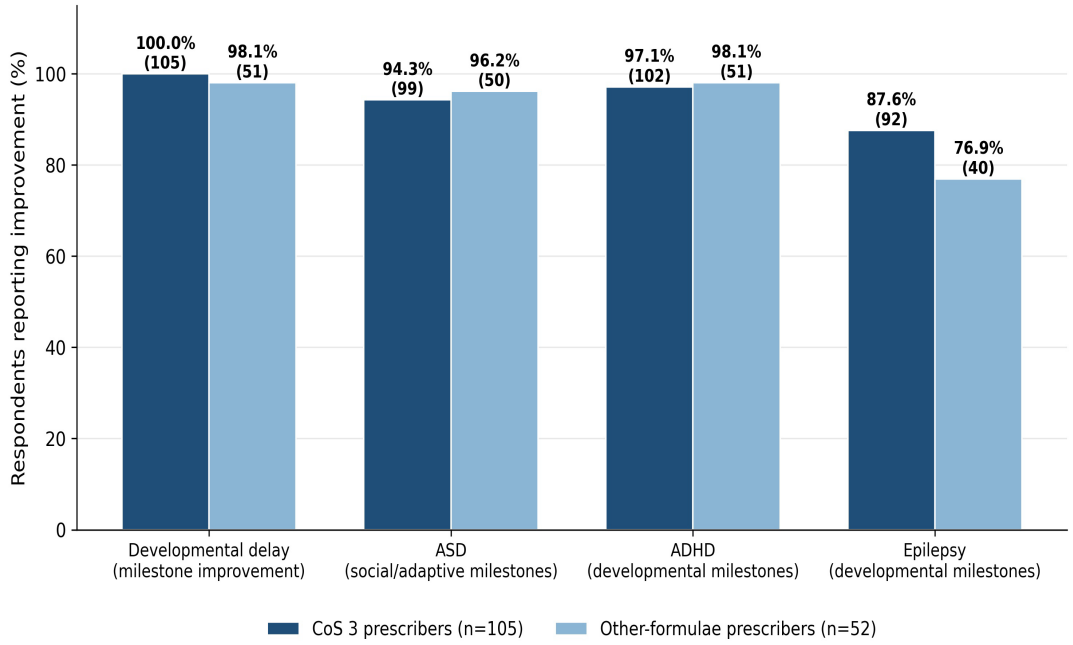


Figure 3. Perceived clinical benefit of EPA/DHA-containing formulae across four neurodevelopmental contexts, by prescribing preference (N=157).

Figure 3 juxtaposes the four benefit items directly. Reported benefit is uniformly high and remarkably flat across indications, ranging only from 84.1% for epilepsy to 99.4% for developmental delay, and the two prescribing groups track one another closely at every point. Percieved clinical benefit in all these indications were >87% in case of Cos 3 formulation with maximum perceived benefit in developmental delay.

Figure 4. Reported time to first observable improvement in developmental milestones, by prescribing preference (N=157)

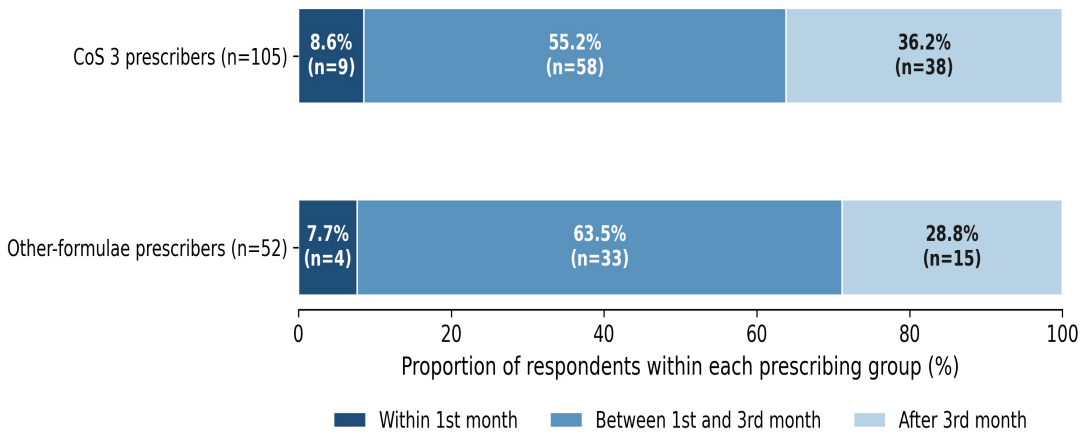


Figure 4. Developmental domain reported as most responsive to EPA/DHA supplementation (N=157 respondents; 179 nominations).

Figure 4 shows that clinical experience of benefit is not distributed evenly across developmental domains. Language and speech was nominated by 88 of 157 respondents (56.1%), followed at a considerable distance by social/adaptive function (23.6%), with fine and gross motor function nominated equally and least often (17.2% each). The ordering — language first, social/adaptive second, motor domains last — was consistent and is the most distinctive substantive signal in the dataset. Because 13 respondents nominated more

than one domain, the percentages sum to more than 100%; the rank ordering is unaffected by this.

Experience-based recommendations

Table 4: Experience-based recommendations of the responding paediatricians, by prescribing preference.

Recommendation	CoS 3 prescribers n=105, n (%)	Other formulae n=52, n (%)	Total N=157, n (%)	Test statistic	p
Would recommend CoS 3 to fellow paediatricians for developmental delay					
Yes	105 (100.0)	48 (92.3)	153 (97.5)	Fisher's exact [a]	0.011
No	0 (0.0)	4 (7.7)	4 (2.5)		
EPA/DHA formulae should form part of routine prescribing for developmental delay					
Yes	105 (100.0)	50 (96.2)	155 (98.7)	Fisher's exact [a]	0.108
No	0 (0.0)	2 (3.8)	2 (1.3)		

[a] Fisher's exact test used as the primary analysis because expected cell counts were <5; corresponding Yates-corrected Pearson statistics were $\chi^2(1)=5.48$, p=0.019 and $\chi^2(1)=1.60$, p=0.205, respectively. The odds ratio for both comparisons is not estimable because one cell contains zero observations.

Endorsement of the class as a whole was near-unanimous: 155 of 157 respondents (98.7%) considered that EPA/DHA-containing formulae should form part of routine prescribing for developmental delay, with no significant difference between groups. 100% of Cos 3 prescribers agreed to recommend Cos 3/ EPA/DHA containing formulations to fellow pediatricians for managing developmental delay. Endorsement of the specific product was also very high (97.5%) but did differ significantly between groups (100.0% versus 92.3%; p=0.011). This is the only statistically significant finding in the study, and it warrants a careful reading: the exposure variable (currently prescribing CoS 3) and the outcome variable (recommending CoS 3) measure closely related constructs, so the association largely reflects internal consistency of respondents' stated preferences.

Discussion

This survey of 157 Indian paediatricians documents a striking convergence of clinical opinion. Almost every respondent (99.4%) reported observing improvement in developmental milestones after prescribing an EPA/DHA-containing formula, three-quarters described improvement across multiple domains, and 98.7% endorsed such formulae as part of routine practice for developmental delay. Improvement was typically expected within one to three months, and language/speech emerged clearly as the domain considered most responsive.

Biological plausibility for these observations is not in doubt. DHA is a major structural constituent of neuronal and synaptic membranes, and omega-3 status modulates membrane fluidity, monoaminergic neurotransmission and the resolution of neuroinflammation — pathways that map onto attention, language acquisition and social cognition **[5,6,7]**. The difficulty lies in the distance between mechanism and demonstrated clinical effect.

The language-domain finding is the most interesting hypothesis generated here. It is coherent with the observation that where omega-3 signals have been detected they tend to appear in cognitive and communication measures rather than in motor function, and it aligns with the ASD literature suggesting effects on associated features rather than on core social deficits **[14]**. It is also, unavoidably, the domain in which parental report and clinician impression are least standardised and most susceptible to expectation.

The principal strengths of this study are its focus on a real-world prescribing question that trials have not addressed, complete data on all 13 items for all 157 respondents, the inclusion of a comparator group of clinicians using other formulations, and the use of exact inferential methods appropriate to sparse contingency tables.

Conclusion

In this cross-sectional survey, Indian paediatricians reported near-universal clinical experience of benefit from EPA/DHA-containing formulae in children with developmental delay, with improvement typically first observed within one to three months, most often multi-domain, and most frequently in the language/speech domain. Perceived benefit was similarly high in autism spectrum disorder and ADHD, and overall 98.7% endorsed these formulae as part of routine prescribing. These findings represent the clinical experience and experience-based recommendations of practising paediatricians and; adequately powered randomised trials with blinded developmental outcome assessment remain necessary.

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