Health-related quality of life in children with hemoglobin E-β-thalassemia with special reference to iron overload

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ABSTRACT

Background: Hemoglobin (Hb) E disease is the most common Hb variant in Southeast Asia. However, in India, it is prevalent in Eastern India and West Bengal, but relatively rare in rest of the country. **Objective:** The objective of the study was to study the quality of life (QOL) in Hb E/β-thalassemia children with special reference to iron overload. **Materials and Methods:** An analytical case–control study on Hb E/β-thalassemia children aged 8–12 years was conducted who were admitted in the thalassemia unit and outdoor basis from the departments of pediatric medicine and hematology. They were evaluated for a period of 1 year and the effect on the QOL was assessed with health-related QOL (HRQOL) score along with psychological assessment. **Results:** A total of 50 subjects were included in the study. The HRQOL was assessed by PedsQL 4.0 generic core scale along with parent proxy report and psychological assessment was done by childhood psychopathology measurement schedule score. It was found that QOL was significantly better when pre-transfusion Hb level was above 7 g/dl. **Conclusion:** We found that total summary QOL score was not statistically significant, but the physical domain of QOL score showed statistically significant better score when the duration of blood transfusion is less. Therapy should widen beyond drugs with adequate physical rehabilitation and emotional support.

Key words: *E-β-thalassemia, Hemoglobin, Health-related quality of life score, Rehabilitation*

Hemoglobin (Hb) E disease is the most common Hb variant in Southeast Asia. However, in India, it is prevalent in Eastern India and West Bengal but is relatively rare in rest of the country. Worldwide, patients with Hb E/β-thalassemia represent approx. 50% of those affected with severe beta-thalassemia. The highest frequencies are observed in India, Bangladesh, and throughout Southeast Asia, particularly in Thailand, Laos, and Cambodia. It has recently become the most common form of β-thalassemia identified by many newborn screening programs. There is a widely disparate range of clinical and hematological parameters in patients with Hb E/β-thalassemia. Its phenotypic variability, an emerging awareness that its phenotype may evolve overtime, and the limited understanding of its natural history combine to make the management of Hb E/β-thalassemia, particularly challenging.

Once a child has been diagnosed as thalassemia, he/she has to take lifelong treatment that can be availed by only 5–10% thalassemic children in India. For a chronic disease such as thalassemia, where cure is not attainable and treatment may be prolonged, quality of life (QOL) is likely to be an essential outcome. Children are usually unable to express their concerns; thus, the assessment of QOL is essential for the provision of proper care as it helps in identifying the impact of the disease and treatment from the child's perspective. However, this aspect has not received due attention and priority from the relevant health-care delivery system.

Research findings in this regard are also very limited. However, information in this aspect in our country, including West Bengal, is scarce, which has the highest prevalence of Hb E/β-thalassemia. A better understanding of the factors associated with QOL among these children is required for the development of more suitable clinical, counseling, and social support program to enhance treatment outcome, especially in terms of QOL. The aim of the study was to assess the QOL in Hb E/β-thalassemia children with special reference to iron overload.

MATERIALS AND METHODS

This was a cross-sectional study conducted between April 1, 2016, and March 31, 2017, on 50 children attending thalassemia day care unit and outdoor departments of pediatric medicine and hematology of a tertiary care hospital of Eastern India. All the children who were 8–12 years old and diagnosed cases of Hb E-β-thalassemia were included in the study. Children who were non-Hb E-β-thalassemia or children with Hb E/β-thalassemia aged <8 years or >12 years or children with Hb E/β-thalassemia with other organ dysfunctions not related to thalassemia were excluded from the study.

All subjects of the study population were studied in a methodical manner in a predesigned PedsQL 4.0 generic core scale[02]. A detailed history and clinical examination were done. Age and sex of the subjects were noted. The investigations done were serum ferritin and pre-transfused Hb level. Childhood psychopathology measurement schedule (CPMS) was also noted.

All the statistical analyses were done in SPSS software version 20.0. Difference between two mean values was tested by unpaired Student's t-test, while analysis of variance was used to compare more than 2 values. Degree and direction of relationship between two variables was computed by Pearson's correlation coefficient (r).

RESULTS

A total of 50 children, with Hb E/β-thalassemia, were interviewed children during the study period with the mean age of 9.98±1.39 years and male and female ratio of 1.38:1. A total of 58% of children were male and 42% were female (Table 1). We found that Muslim population was higher (54%) than the Hindu population and 28% of children had a history of consanguineous marriage of parents. It was observed that most of the subjects (66%) belonged to nuclear families and most of the children were residents of rural region (70%).

Most of the subjects (36%) belonged to the upper-lower socioeconomic status (according to modified Prasad's classification). Most of the children (58%) received blood transfusion last time when pre-transfusion Hb level was between 5 and 7 g/dl. The majority of subjects were receiving blood transfusion for the past 2–5 years (28%) and only 20% of population received blood transfusion more than 5 times in the past 1 year. A total of 58% of children were on oral chelation therapy and the majority of them got drugs from our hematology unit. Iron overload was determined by serum ferritin; although, ferritin level was lower when chelation therapy was continued.

It was found that mean score of QOL (total) was 63.51. The mean score of social domain was the highest score (66.10) among the mean scores in different QOL domains and was the worst in the school domain (60.70). Most of the study population has the CPMS score in the range of 18.4–21.2. The QOL score

Table 1: Distribution of QOL scores

Variable	Observations	Minimum	Maximum	Mean	SD
QOL (physical)	50	46.87	75.0	64.21	5.88
QOL (emotional)	50	50.00	75.00	63.40	5.19
QOL (social)	50	50.00	75.00	66.10	5.65
QOL (school)	50	50.00	70.00	60.70	5.98
QOL (total)	50	51.71	72.97	63.56	4.86

QOL: Quality of life

Table 2: QOL score and CPMS score in relation to pre-transfusion Hb, frequency of blood transfusion, and iron chelation

Variables		Scores in various domains (mean±SD)			p value
Frequency of blood transfusion	QOL	2–5 times (40)	>5 times (10)		
	Physical	64.58±6.20	62.71±4.28		0.37
	Emotional	63.37±5.35	63.50±4.74		0.94
	Social	65.87±5.76	67.00±5.37		0.578
	School	60.75±6.15	60.50±5.50		0.90
	Total QOL	63.67±5.04	62.83±4.20		0.62
	CPMS	23.45±4.71	23.50±4.00		0.97
Iron chelation	QOL	YES (29)	NO (21)		
	Physical	66.73±4.98	60.72±5.29		0.0002*
	Emotional	65.69±3.94	60.23±5.11		<0.0001*
	Social	67.58±5.11	64.04±5.83		0.02*
	School	64.13±4.02	55.95±4.90		<0.0001*
	Total QOL	65.85±3.60	60.27±4.56		<0.0001*
	CPMS	22.65±4.83	24.57±3.94		0.142
Pre-transfusion Hb level (g/dl)	QOL	<5 (12)	5–7 (29)	>7 (9)	
	Physical	61.82±4.13	64.34±6.26	66.60±5.99	–0.177
	Emotional	62.08±3.96	63.64±5.32	64.44±6.34	–0.561
	Social	65.00±4.76	65.53±6.13	68.00±5.37	–0.81
	School	58.07±5.22	60.92±6.51	63.50±4.11	–0.09
	Total QOL	60.60±3.22	63.62±5.15	66.01±5.14	–0.049*
	CPMS	22.25±3.95	23.75±4.53	24.11±5.46	–0.568

QOL: Quality of life, CPMS: Childhood psychopathology measurement schedule, Hb: Hemoglobin

was significantly better in males than in females and in Hindu population than in Muslims. There was no statistically significant difference in QOL score and CPMS score in urban or rural population, joint or nuclear family, and presence or absence of the history of consanguineous marriage in parents. We found that QOL was significantly better in upper-middle class population in total score along with physical and school functioning (Table 2).

The QOL score was significantly better when pre-transfusion Hb level was above 7 g/dl and in subjects receiving iron chelation therapy; however, no significant difference was seen in CPMS score. It was found that in the correlation matrix, independent variables were interrelated. Hence, to get true relation between independent and dependent variables, multiple linear regression analysis was done. QOL score was positively correlated with the pre-transfusion Hb level >7 g/dl and socioeconomic status and negatively correlated with the duration of blood transfusion and ferritin level.

DISCUSSION

In the present study, overall QOL score of these children was 63.50±4.86 which was in accordance to the studies done by El Dakhakhny *et al.* (64.8±13.8) [1] and Thavorncharoensap *et al.* (76.67±11.40) [2]. PedsQL™ 4.0 was used in the previous studies [3-5]. The social functioning score was 66.10±5.65 which was the highest among the different domains of QOL and the school domain was the worst. These results were also supported by Gharaibeh and Gharaibeh [6]. Saha *et al.* [7] observed that the school domain had significantly low score (49.42) in thalassemic children. We used CPMS score for the psychological assessment and it was also used previously by Shaligram *et al*. [8]. In the present study, CPMS score was 23.46±4.54 and the total summary score was found to be a good score for psychological status.

In this study, the QOL score (total, school, social, and emotional health domain) was higher in male than in female population which contradicts the results of studies by Saha *et al*. and Borgna-Pignatti [7,9]. This may be due to the sex bias as more attention and care is given to male children in seeking health-care delivery system, timely blood transfusion, or more chelation therapy use. The QOL score was better in Hindu population and it was statistically significant. The reason may be multifactorial such as family size and education of parents, whether children were school going or not and socioeconomic status.

Patients maintaining pre-transfusion Hb >7 g/dl had better total QOL score as observed in earlier studies also [2,7,10-12]. A number of symptoms such as fatigue, generalized weakness, decreased mental alertness, and decreased school performance may lead to impairment of health-related QOL (HRQOL). Thavorncharoensap *et al.* and Saha *et al*. found that severity of disease was an important predictor of QOL score [2,7]. In the present study, QOL score was worse in children who got transfusion for >5 years which could be due to more iron overload after more transfusions. The QOL was significantly higher in all domains of HRQOL score in children with higher ferritin levels. These results were in accordance to the study by Ismail *et al.* [13].

On multiple regression analysis, total QOL score was correlated with four independent variables including socioeconomic status, pre-transfusion Hb level, iron chelation therapy, and duration of blood transfusion. The limitations of the study were that the approach of the support group, psychosocial counseling, and emotional support was not considered during the assessment in the study.

CONCLUSION

Iron chelation therapy, pre-transfusion Hb level above 7 g/dl, regular blood transfusions, family socioeconomic status, and late onset of blood transfusion are associated with better QOL. Therapy should widen beyond drugs with adequate physical rehabilitation and emotional support.

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