Liver Function Parameters and Validation of Health-Related Quality of Life Assessment of β-Thalassemia Cases at a Tertiary Care Hospital, Lumbini Province, Nepal

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ABSTRACT

Background

Individuals affected by β-thalassemia experience complications such as hepatic hemosiderosis and fibrosis due to frequent blood transfusions, which can lead to iron overload. Multiple blood transfusion burdens in thalassemia, particularly in low-income countries, impact health-related quality of life.

Objective

Liver function parameters and health-related quality of life were assessed using Nepali version 36 short-form survey instruments to reveal the vitality, physical, mental, emotional, pain, general health, and social functioning of β-thalassemia cases.

Method

In this cross-sectional study, forty β-thalassemia cases who had visited the Universal College of Medical Sciences tertiary care teaching hospital of Lumbini Province, Nepal were enrolled. The hemoglobin variant band percentage was estimated by D-10 BioRad high performance liquid chromatography (HPLC), Mentzer Index (Mean Cell Volume by Red Blood Cell count) by Beckman hematological analyzer, and serum liver parameters (Bilirubin, Total protein, Albumin, Alanine aminotransferase, Aspartate aminotransferase, Alkaline phosphatase) were estimated by using Diatron fully automated analyzer. The internal consistency of the Nepali version of 36 short-form survey instruments was checked by Cronbach`s alpha was found to be > 0.70 from the recoded value. Data are analyzed using the STATA/MP14, and ANOVA and t-test are applied to test the significance considering p-value < 0.05.

Result

The frequency of the β-thalassemia Trait (60%) was higher than β-thalassemia Major (30%) and 7.5% β-thalassemia Intermedia co-morbidities with Sickle cell (2.5%) and β/δ variants (2.5%). Higher frequency was found in ethnic groups Muslim (32.5%) followed by Terai indigenous-Tharu (30%) and Madheshi (27.5%). The transfusion-dependent cases have significantly higher Total, Direct, Indirect Bilirubin, and Alkaline phosphatase levels than non-transfusion dependent cases ($p<0.001$). The physical functioning, general health, emotional health, and vitality were significantly decreased in β-thalassemia Major as compared to β-thalassemia Trait ($p<0.001$), and significantly correlated with Mentzer index and HPLC patterns (HBA2/HBF) ($p<0.05$).

Conclusion

Transfusion dependent β-thalassemia Major and Intermedia had elevated Bilirubin and Alkaline phosphatase levels as compared to non-transfusion dependent β-thalassemia Trait, exacerbating health-related quality of life, emphasizing the preventable disparities for optimized transfusion protocols and psychosocial support.

KEY WORDS

β-thalassemia, Health-related quality of life, Liver function tests

INTRODUCTION

Thalassemia is identified as the most common chronic genetic disease by World Health Organization in Mediterranean, Middle East and South-EastAsia including Nepal.[1] β-thalassemia trait (β-TT) results from heterozygosity which is clinically asymptomatic. However, β-thalassemia major (β-TM) is a severe form of transfusion-dependent anemia and β-thalassemia intermedia (β-TI) comprehend a clinically and genotypically very heterogeneous group of disorders, ranging in severity from the asymptomatic carrier state to the severe transfusion-dependent type.[2]

Individuals affected by β-thalassemia experience several disease-related acute and chronic complications across their lifespan, which decrease their health-related quality of life (HRQoL). SF-36 is a 36-item patient reported questionnaire on health status, which is widely used to assess chronic disease burden and cost effectiveness of treatment.[3] β-thalassemia causes severe clinical, physical, social and psychological complications hence reducing their HRQoL.[4]

Hepatocellular illness is indicated by elevations of Alanine aminotransferase (ALT), Aspartate aminotransferase (AST), and Bilirubin that are out of proportion to Alkaline phosphatase (ALP) and increase De-ritis ratio (AST/ALT) values indicate a mixed liver damage pattern.[5]

Homozygotes for β-thalassemia have a significant range in serum unconjugated bilirubin levels, depending on whether they have a severe, transfusion-dependent β-TM or a milder, non-transfusion-dependent β-TI.[6] Many studies have found that patients with β-TM receiving prolonged transfusion therapy had a high prevalence of hepatic hemosiderosis and fibrosis. This is true despite the use of iron chelation therapy with desferrioxamine.[7] The damaged hepatocytes is the consequences of the iron deposition with Fenton's reaction causes oxidative stress induced lipid peroxidation in transfusion-dependent β-TM, a rise in serum ALT, AST, ALP, and change in proteins level is observed.[8]

Multiple blood transfusion burden for thalassemia, and health-care system's characteristics, particularly in low-income countries, have an impact on HRQoL and should be considered in health care plan. This study find out the liver function status and HRQoL of β-thalassemia patients revealing the chronicity and disease burden.

METHODS

The cross-sectional study was conducted at Universal College of Medical Sciences suspected of hemoglobin disorders and anemia on presentation with 10 to 50 years excluding chronic alcoholics, cirrhosis, and under hepatotoxic medications. Ethical approval was obtained from the Institutional Review Committee (IRC) of UCMS (IRC No. UCMS/IRC/049/23).

The sample size calculation was done by Cochran's formula as $Z^2(1-\alpha/2)*p*(1-p)/d^2$ Here, $Z(1-\alpha/2)$ = standard normal variate, at 5% type 1 error ($P < 0.05$) it is 1.96, p = Expected prevalence based on previous studies=2.6%[9], d= Absolute error or precision = 5%, Calculated sample size = $(1.96)^2 \times 2.6 \times 97.3/ 5^2 = 38.91 \approx 40$, the total sample size of 40 β-thalassemia patients were taken.

β-thalassemia patients were screened initially based on the calculation of Mentzer Index (MCV/RBC) count in million per µl, which is < 13. The examination of peripheral blood smear (PBS) showed microcytic cells (anisocytosis), hypochromic cells and marked poikilocytosis with target cells. β-thalassemia suspected cases were run in the D-10 HPLC and percentage of band were evaluated as HbA1 (< 97%), HbA2 (>3.5%) normal to increased HbF or associated with other co-morbidities like HbS, HbC, HbE.

The 36 short-form survey instruments (SF-36) has been widely used in different studies for assessment of HRQoL. SF-36 has eight domains and 36 items. Eight domains (items) of SF-36 are physical functioning (10), role limitations due to physical health (4), role limitations due to emotional problems (3), energy/fatigue (4), emotional well-being (5), social functioning (2), pain (2) and general health (5).[1]

After taking both verbal and written consent from the patients diagnosed with β-thalassemia, the standard Nepali version of SF-36 questionnaire was asked to each of the β-thalassemic patients who were ready for answering without any hesitation. If the patients need any explanation on the questions which are unclear for them then proper explanation was given by the investigator without distorting the actual meaning of the questions. The responses of the patients to the each questions were noted or filled by the principal investigator. The validation of the Nepali version of SF-36 questionnaire was done by translating and checking it into English language and again re-translating it into Nepali version by three expert faculties. To check the internal consistency of the Nepali version of SF-36, Cronbach's alpha was calculated from the recoded value of each and every responses of all the 36 items of the questionnaire during pre-testing. Cronbach's alpha value was found to be > 0.70 in all domains, indicating adequate internal consistency (Fig. 1).

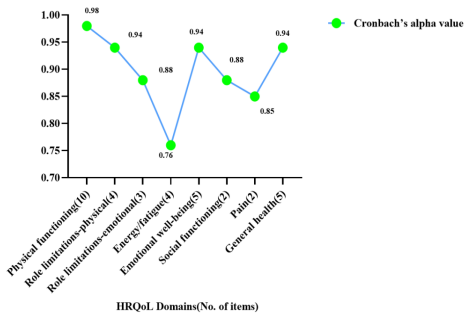

Figure 1. Reliability testing of SF-36 for HRQoL

Blood samples were collected in plain vials and centrifuged to obtain serum for analysis of liver function parameters viz a viz serum bilirubin was estimated by Modified Jendrassic and Grof method, serum albumin was estimated by Bromocresol Green, serum total protein was estimated by Modified Biuret method. Serum AST, ALT and ALP were estimated by Modified IFCC, Kinetic Method. All biochemical assay were performed in fully automated Diatron analyzer.

Data was introduced and then analyzed by STATA/MP 14. Shapiro-Wilk test for numerical variables showed a normal distribution of data. Categorical data are expressed in frequency (%) and presented in bar diagram drawn by GraphPad Prism software. Continous data are expressed in mean±standard deviation (SD). Independent t-test for continous data and binary odd ratio for categorical data with confidence interval (95% CI) are applied to test the significance considering p-value < 0.05.

RESULTS

Out of 40 β-thalassemia cases, maximum patients were Male by sex (57.5%), 24-35 years by age group (37.5%), Muslim (32.5%) followed by Terai Janajati Tharu (30%) by ethnicity. Most prevalent case type was β-thalassemia Trait (62.5%) followed by β-thalassemia Major (30%) and maximum of the cases were non-transfusion dependent (65%) (Table 1). All patients with β-thalassemia Trait didn't undergo transfusion where as all β-thalassemia Major and Intermedia cases underwent transfusion except for one β-thalassemia Intermedia case who didn't need transfusion.

Table 1. Demographic and clinical distribution of the β-Thalassemia types (n=40)

Demographic Variables	Frequency	Percentage (%)
Gender		
Female	17	42.5
Male	23	57.5
Age Groups		
< 12	10	25
12-23	6	15
24-35	15	37.5
36-47	8	20
≥ 48	1	2.5
Ethnicity		
Chhetri	2	5
Hill Janajati	2	5
Madhesi	11	27.5
Muslim	13	32.5
Terai Janajati (Tharu)	12	30
β-Thalassemia types		
β-Thalassemia Major	12	30
β-Thalassemia Intermedia	3	7.5
β-Thalassemia Trait	25	62.5
Blood Transfusion		
Transfusion Dependent	14	35
Non Transfusion Dependent	26	65

Table 2. Hemogram, LFT and HRQoL domains of β-thalassemia cases with Gender-wise association (n=40)

Variables	Total (N=40)	Male (n=23)	Female (n=17)	p-value
Mentzer Index	24.25 ± 7.95	23.56 ± 6.35	25.17 ± 9.86	0.53
HbA1 %	63.66 ± 41.05	64.37 ± 42.11	62.68 ± 9.90	0.89
HbA2 %	6.89 ± 2.25	6.73 ± 2.16	7.11 ± 2.41	0.60
HbF %	28.37 ± 39.78	28.66 ± 41.41	27.97 ± 38.71	0.95
Total Bilirubin (mg/dl)	1.21 ± 0.72	1.10 ± 0.64	1.36 ± 0.81	0.28
Direct Bilirubin (mg/dl)	0.46 ± 0.26	0.46 ± 0.31	0.45 ± 0.21	0.90
Indirect Bilirubin (mg/dl)	0.75 ± 0.56	0.63 ± 0.42	0.90 ± 0.68	0.13
Total Protein (g/dl)	6.49 ± 0.87	6.68 ± 0.70	6.24 ± 1.03	0.11
Albumin (g/dl)	3.96 ± 0.63	4.13 ± 0.55	3.72 ± 0.68	0.04
Globulin (g/dl)	2.53 ± 0.50	2.54 ± 0.42	2.51 ± 0.61	0.82
AST (IU/L)	43.14 ± 25.66	45.52 ± 31.97	39.9 ± 13.42	0.50
ALT (IU/L)	32.93 ± 12.65	34.10 ± 13.39	31.34 ± 11.79	0.50
ALP (U/L)	178.7 ± 160.04	202.17 ± 189.68	147.05 ± 105.36	0.28
Physical Functioning (%)	68.75 ± 20.93	71.73 ± 20.48	64.70 ± 21.46	0.29
Role limitations/physical (%)	68.75 ± 20.93	51.08 ± 44.26	45.58 ± 42.60	0.69
Role limitations/emotional (%)	52.51 ± 40.57	55.09 ± 42.18	49.02 ± 39.30	0.64
Energy/fatigue (%)	57.62 ± 20.90	61.73 ± 19.74	52.05 ± 21.72	0.15
Emotional well-being (%)	69.4 ± 15.75	72.00 ± 15.30	65.88 ± 16.13	0.22
Social Functioning (%)	78.75 ± 19.03	79.89 ± 17.97	77.20 ± 20.83	0.66
Pain (%)	70.95 ± 21.64	73.82 ± 20.94	67.05 ± 22.59	0.33
General Health (%)	37.62 ± 22.24	40.65 ± 22.72	33.52 ± 21.56	0.32
Total HRQoL score (%)	60.56 ± 24.11	65.25 ± 23.80	56.88 ± 24.43	0.41
Health Change (%)	40.62 ± 12.25	42.39 ± 11.76	38.23 ± 12.86	0.29

Abbreviation: HbA1- Adult hemoglobin major band, HbA2- Adult hemoglobin minor band, HbF-Fetal hemoglobin band, AST-Aspartate aminotransferase, ALT-Alanine aminotransferase, ALP-Alkaline phosphatase. Data are expressed in Mean±SD values, P-values obtained from t-test. P value<0.05 considered statistically significant shown in the bold.

Albumin value was found to be significantly differ in Male and Female gender in β-thalassemia cases (p-value<0.05) (Table 2).

Mean age was significantly higher in the β-TT group as compared to β-TM+β-TI group (p < 0.001; 95% CI 14.8 to -24.4 years). Among the liver function parameters bilirubin, AST and ALP levels were significantly different between two groups. All the domains as well as total HRQoL score and health change were significantly higher in the β-TT group as compared to β-TM+β-TI group (p < 0.001) (Table 3).

Total Bilirubin, Direct Bilirubin, ALP level was observed to be significantly higher in Tranfusion Dependent group than Non-Transfusion Dependent group (P-value < 0.001). All the SF-36 domains were significantly decreased in the Transfusion Dependent as compared to Non-Transfusion Dependent cases (P-value < 0.001) (Table 4).

Pearson's correlation coefficients between the variables are calculated to show the correlation between the above variables and the correlation was observed between the HbA1, HbA2 and HbF with all LFT and HRQoL parameters (P < 0.001) except Total Protein, Albumin and health change between HbA2 (Table 5).

Table 3. Association of sociodemographic, LFT parameters and HRQoL domains with β-thalassemia groups (n=40)

Variables		β-thalassemia groups		OR	P-value	95% CI
		β-TT (n=25)	β-TM+β-TI (n=15)			
CATEGORICAL						
Sex	Male	15	8	0.762	0.413	
	Female	10	7			
Ethicity	Tharu	8	4			
	Non Tharu	17	11	0.773	0.356	
NUMERICAL						
Age (years)		33.4 ± 7.6	13.8 ± 6.5	-	< .001	14.8 to -24.4
Total Bilirubin (mg/dl)		0.93 ± 0.53	1.67 ± 0.77	-	0.003	-1.21 to -0.27
Direct Bilirubin (mg/dl)		0.35 ± 0.15	0.63 ± 0.33	-	0.001	-0.43 to -0.12
Indirect Bilirubin (mg/dl)		0.57 ± 0.46	1.18 ± 0.58	-	0.009	-0.81 to -0.12
Total Protein (g/dl)		6.59 ± 0.76	6.33 ± 1.03	-	0.373	-0.32 to 0.28
Albumin (g/dl)		4.06 ± 0.63	3.79 ± 0.62	-	0.197	-0.15 to 0.69
Globulin (g/dl)		2.52 ± 0.44	2.54 ± 0.60	-	0.943	-0.35 to 0.33
AST (IU/L)		36.64 ± 8.96	53.98 ± 38.66	-	0.037	-33.5 to -1.1
ALT (IU/L)		30.18 ± 8.20	37.52 ± 17.16	-	0.075	-15.5 to 0.8
ALP (IU/L)		99.72 ± 27.87	310.46 ±200.69	-	0.001	-322.3 to -99.2
Physical Functioning (%)		82.8 ± 11.00	45.33 ± 8.54	-	<0.001	30.74 - 44.19
Role limitations/ physical (%)		77.00 ± 27.87	1.66 ± 6.45	-	<0.001	63.41 - 87.25
Role limitations/ emotional (%)		77.35 ± 26.73	11.10 ± 0.57	-	<0.001	49.96 - 82.54
Energy/fatigue (%)		70.60 ± 13.94	36.00 ± 9.10	-	<0.001	27.21 - 41.98
Emotional well-being (%)		77.76 ± 12.22	55.46 ±10.12	-	<0.001	14.69 - 29 .89
Social Functioning (%)		92.00 ± 7.97	56.66 ± 7.99	-	<0.001	30.06 - 40.61
Pain (%)		85.32 ± 11.87	47.00 ± 8.92	-	<0.001	31.61 - 45.03
General Health (%)		50.40 ± 18.02	16.33 ± 6.68	-	<0.001	25.94 - 42.12
Total HRQoL score (%)		76.65 ± 13.53	33.69 ± 7. 15	-	<0.001	36.30 - 49.59
Health Change (%)		47 ± 8.29	31.25 ±11.30	-	<0.001	10.98 - 23.02

Odds ratio for binary independent variables and independent sample t-test for continuous independent variables were shown.

DISCUSSION

In our study, the predominance of β-thalassemia in males was observed as compared to females, which is supported by the study done by Sharma et al.[10] The most common ethnic group with β-thalassemia was found to be Muslim, followed by Terai Janajati (Tharu), which agrees with a study conducted by Nigam et al., with a similar outcome.[11] Muslim and Tharu populations with higher frequency in the study may indicate the majority of them having consanguineous marriage or caste endogamy, which means racial inheritance of the β globin gene located on chromosome 11 to their offspring.

In our study, transfusion-dependent thalassemia patients presented with relatively higher mean ± SD values of LFT parameters than those of non-transfusion-dependent thalassemia, which is similar to the result of a descriptive cross-sectional study conducted by Al-Moshary et al., which showed increased ALT, AST, and ALP levels in transfusion-dependent patients.[8]

The significant correlation of β-thalassemia disease with all parameters of LFT are significantly higher except total protein, albumin, and globulin, which were not significantly changed. A study conducted by Shanaki et al., found that serum ferritin, ALT, ALP, and risk factor biomarkers were statistically increased in patients with β-thalassemia Major versus the control (P < 0.001).[12]

The mean AST and ALT level was found to be slightly increased to 43.14 IU/L, and 32.93 IU/L respectively in β-thalassemia cases whereas descriptive cross-sectional study by Ibrahim et al. showed that both ALT and AST means were elevated to 62.32 IU/L and 70.76 IU/L, respectively in β-Thalassemic patients.[13]

Table 4. LFT parameters and HRQoL domains in Non-Transfusion Dependent and Transfusion Dependent β-thalassemia cases (n=40)

Variables	Non-Tranfusion Dependent (N=26)	Tranfusion Dependent (N=14)	P-Value
Value			
Total Bilirubin (mg/dl)	0.92±0.52	1.74±0.75	<0.001
Direct Bilirubin (mg/dl)	0.35±0.15	0.64±0.33	<0.001
Indirect Bilirubin (mg/dl)	0.56±0.46	1.09±0.58	0.002
Total Protein (g/dl)	6.66±0.74	6.18±1.03	0.102
Albumin (g/dl)	4.05±0.65	3.8±0.59	0.120
Globulin (g/dl)	2.61±0.47	2.38±0.54	0.181
AST (IU/L)	37.5±8.71	53.62±40.58	0.056
ALT (IU/L)	30.44±8.04	37.56±17.91	0.089
ALP (U/L)	103.65±42.53	318.21±202.81	<0.001
Physical Functioning (%)	81.7±12.24	44.64±7.95	<0.001
Role limitations/physical (%)	73.07±32.34	3.57±13.36	<0.001
Role limitations/emotional (%)	75.66±29.14	9.51±15.61	<0.001
Energy/fatigue (%)	68.65±16.52	37.14±9.55	<0.001
Emotional well-being (%)	77.07±12.47	55.14±10.42	<0.001
Social Functioning (%)	89.90±11.73	58.03±10.52	<0.001
Pain (%)	83.28±14.21	48.03±12.09	<0.001
General Health (%)	49.23±18.63	16.07±6.84	<0.001
Total HRQoL score (%)	74.83±16.04	34.01±7.96	<0.001
Health Change (%)	46.15±9.19	30.35±10.64	<0.001

Abbreviation: AST-Aspartate aminotransferase, ALT-Alanine aminotransferase, ALP-Alkaline phosphatase. Mean±SD of the HRQoL SF-36 Domains for Non-Transfusion Dependent and Transfusion Dependent cases are expressed in score percentage (%). Data are expressed in Mean±SD. P-values obtained from t-test. P- value < 0.05 considered statistically significant shown in bold.

In our study, transfusion-dependent cases (both β-TM and β-TI) presented with relatively higher mean ± SD values for total, direct, and indirect bilirubin and ALP levels, whereas AST and ALT levels were found to be slightly increased, respectively, which is in congruence with the study by Jwaid and Gata, who showed statistically significant differences in AST, ALT, ALP, bilirubin, and ferritin levels in both β-TM and β-TI compared to the control group.[14] This may signify the liver abnormalities in the study subjects of various β-thalassemia types.

In our study, β-thalassemia Major patients had significantly higher (mean ± SD) levels of total bilirubin, AST, ALT, and ALP, respectively, which are similar results to a study conducted by Sultana et al. ($p < 0.001$) in β-thalassemia patients than in normal children.[15] The significant change in the ALP level in our study, however, may signify the tissue-level pathology of the other organs, such as bone deformity and children's subjects, or hypercoagulability due to hemolysis precipitating bile stone in such cases. Our study with β-thalassemia patients presented with

Table 5. Correlation of Age, LFT parameters and SF-36 domains with Hemogram and Hb Variant band %

Variables	Mentzer Index r (P-value)	HbA1 r (P-value)	HbA2 r (P-value)	HbF r (P-value)
Age	-0.19 (0.230)	0.82 (<0.001)	-0.32 (0.044)	-0.82 (<0.001)
Total Bilirubin	0.42 (0.006)	-0.61 (<0.001)	0.40 (0.009)	0.61 (< 0.001)
Direct Bilirubin	0.19 (0.236)	-0.58 (<0.001)	0.29 (0.067)	0.58 (< 0.001)
Indirect Bilirubin	0.45 (0.003)	-0.50 (0.001)	0.30 (0.013)	0.50 (< 0.001)
Total Protein	-0.20 (0.122)	0.10 (0.539)	-0.25 (0.108)	-0.11 (0.465)
Albumin	-0.22 (0.157)	0.12 (0.439)	-0.09 (0.579)	-0.13 (0.406)
Globulin	-0.14 (0.377)	0.015 (0.927)	0.40 (0.035)	0.61 (0.824)
AST	0.008 (0.618)	-0.36 (0.022)	0.30 (0.054)	0.34 (0.028)
ALT	0.08 (0.607)	-0.35 (0.025)	0.37 (0.018)	0.33 (0.034)
ALP	0.16 (0.318)	-0.66 (<0.001)	0.22 (0.156)	0.69 (<0.001)
Physical Functioning	-0.33 (0.032)	0.84 (<0.001)	-0.40 (0.010)	-0.82 (<0.001)
Role limitations/physical	-0.39 (0.011)	0.84 (<0.001)	-0.50 (0.001)	-0.81 (<0.001)
Role limitations/emotional	-0.35 (0.024)	0.83 (<0.001)	-0.51 (0.001)	-0.70 (<0.001)
Energy/fatigue	-0.38 (0.057)	0.79 (<0.001)	-0.49 (0.001)	0.61 (<0.001)
Emotional well-being	-0.32 (0.039)	0.78 (<0.001)	-0.44 (0.004)	-0.68 (<0.001)
Social Functioning	-0.33 (0.034)	0.90 (<0.001)	-0.47 (0.002)	-0.87 (<0.001)
Pain	-0.36 (0.021)	0.85 (<0.001)	-0.37 (0.016)	-0.84 (<0.001)
General Health	-0.34 (0.021)	0.72 (<0.001)	-0.47 (0.002)	-0.70 (<0.001)
Health Change	-0.51 (0.001)	0.64 (<0.001)	-0.23 (0.136)	-0.62 (<0.001)

Abbreviation: HbA1- Adult hemoglobin major band, HbA2- Adult hemoglobin minor band, HbF-Fetal hemoglobin, r states for correlation coefficient and the numerical values in the parenthesis indicate P- value < 0.05 considered statistically significant.

significantly higher levels of AST, ALT, and ALP, which is supported by a study conducted by Karim, Md Fazlul et al., in which significantly higher ALT ($P < 0.001$), AST ($P < 0.05$), and ALP ($P < 0.001$) activities in β-thalassemia patients were found in comparison to healthy individuals.[16]

Higher (mean ± SD) levels Total Bilirubin, AST, ALT and ALP were seen in our study which is quite similar to the study conducted by Jain et al. in which AST, ALT, ALP, and Bilirubin concentration value was much higher in β-thalassemia Major cases.[17]

In our study mean ± S.D of major domains of SF-36 physical functioning (60.0 ± 0.0), general health (15.83 ± 6.68), emotional health (53.33 ± 10.13), vitality or energy/ fatigue (35.00 ± 8.25) showed compromised HRQoL of the β-thalassemia major patients which was also revealed in a study conducted by Arian et al. in which pooled mean scores of the physical health domains ranged from 52.74 to 74.5, with the general health and physical functioning domains being the lowest and the highest, respectively.[18] Further, the pooled mean scores of the mental health domains varied between 59.6 and 71.11, with the (Mental Health-Vitality) and social functioning domains being the maximum and the minimum, respectively. Patients with β-TM had a substantially compromised HRQoL in comparison with the general population.[18]

Gender-wise Mean ± SD of the SF-36 Domains of β-thalassemia cases showed that males presented comparatively better HRQoL than the female patients in each aspects or in each domains and the transfusion dependent patients experienced poor HRQoL in each aspects with significant (P-value = 0.0001) in contrast to non- transfusion dependent patients which is also represented by a study done by Hossain et al. in which male patients showed significantly higher scores of bodily pains and physical health summaries than female patients.[19] Lower income, high blood transfusion status, disease severity, comorbidities, and medical expenses (P-value < 0.05) are significantly associated with lower SF-36 scores and the deterioration of HRQoL.[19]

Gender-wise Mean score of the two domains Pain and Emotional well-being of β-thalassemia cases showed that males presented comparatively better HRQoL score than the female patients which is in agreement with the study conducted by Haghpanah et al. on two scales, pain (P=0.041) and emotional role (P=0.009), the women showed significantly lower scores than the men.[20] Lower income, poor compliance with iron-chelating therapy and presence of comorbidities were significantly correlated with lower SF-36 scores.[20]

In our study, the prevalence of β-thalassemia minor patients was 62.5% with 2.5% HbE variant, β-thalassemia Major patients was 30%, β-thalassemia Intermedia were 7.5% out of which 2.5% having comorbidity with sickle variant and β/δ variant each. Patients with β-thalassemia major, require life long RBC transfusions to cope with anemia and suppress extramedullary erythropoiesis. Without transfusions, expanded erythropoiesis results in progressive hepatosplenomegaly and bone deformities, due to expansion of extramedullary and intraosseous erythropoiesis, respectively. In contrast, patients with β-thalassemia Intermedia show a milder clinical picture requiring only intermittent transfusions. Both β-thalassemia Major and especially intermedia have increased intestinal iron absorption which, in addition to transfusion, contributes to iron overload. If left untreated, iron overload results in progressive iron deposition, leading to multiple organ dysfunction (mainly liver and heart) and accounts for the majority of deaths in this disease. So our study tried to assess and predict the liver status of the β-thalassemia patients.

Splenectomy, short stature, undernutrition, longer hospital stays, and lower paternal education and weak economic condition may be associated with poor HRQoL.[21] It is necessary that timely steps needed to be taken, in developing countries like Nepal, to direct emphasis towards improving standards of living and health related quality of life of patients with β-thalassemia.

CONCLUSION

β-Thalassemia is likely to be more prevalent in Terai indegenous (Tharu) and Muslim community as well as in rural Madheshi community in terai districts of Southwestern, Nepal. The LFT parameters Total, Direct, Indirect bilirubin, AST, ALT and ALP are significantly increased mostly in β-thalassemia Major and Heterozygous δ/β-thalassemia intermedia undergoing frequent blood transfusions may be due chronic liver diseases. The HRQoL of transfusion dependent patients is lower in physical, mental, social, emotional and general health aspects compared to non-transfusion dependent cases despite of iron chelation therapy.

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