

REVIEW ARTICLE

Correlation of Serum Ferritin Level with Heart T2 MRI in Transfusion Dependent Thalassemia: a Systematic Review and Meta-Analysis

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SUMMARY

Background: Cardiac complications in patients with transfusion-dependent thalassemia (TDT) are one of the major causes of mortality in these patients which annually impose economic burden on the endemic countries. Heart T2 MRI is a good modality for evaluating iron overload. Our aim was to investigate the pooled correlation between the serum ferritin level and heart iron overload in TDT patients and compare the effect size in different geographical areas.

Methods: PRISMA checklist was used to summarize the literature search. Three major databases were used for the papers and exported into endnote for screening. Data were extracted into an Excel spreadsheet. The data were analyzed using STATA software. CC was considered as the effect size, and the amount of heterogeneity was indicated by I-squared. Meta-regression was used for age. Also, sensitivity analysis was performed.

Results: The present study showed a statistically significant negative correlation of the serum ferritin level with heart T2 MRI: -0.30 (95% CI -0.34, -25). This correlation was not significantly affected by the patients' age (p-value: 0.874). Given different geographic area, most of the studies from different countries indicated that the correlation between the serum ferritin and heart T2 MRI was statistically significant.

Conclusions: The pooled analysis showed a significant negative moderate correlation between the serum ferritin level and heart T2 MRI in patients with TDT, regardless of their age. This issue underscores the importance of periodical evaluation of serum ferritin level in patients with TDT in developing countries with low financial supports and limited resources. Further studies are suggested to evaluate the pooled correlation of the serum ferritin level with iron concentration of other vital organs.

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Supplementary Data

Table S1. General characteristics of the included studies.

Author	Year	Country	Number of patients	Male (%)	Mean age \pm SD	Mean ferritin level	Splenectomy (%)	Quality score
Spasiano #A [1]	2021	Italy	32	NR	40.03 \pm 9.15	811.41	NR	7
Spasiano #B [1]	2021	Italy	21	NR	40.03 \pm 6.15	811.41	NR	7
Ojha [2]	2021	India	86	68.6	17.32 \pm 6.1	2,957.62	NR	7
Khadivi Heris [3]	2021	Iran	58	67.3	22, IQR (20 - 25)	3,460	NR	6
Fianza [4]	2021	Indonesia	66	37.9	21.5 \pm 7.2	4,414.5	NR	7
Fattahi [5]	2021	Iran	48	54.1	31 \pm 8	2,234	NR	6
El Sherif [6]	2021	Egypt	60	63.3	13.23 \pm 3.01	2,639.47	56.6	6
Atmakusuma [7]	2021	Indonesia	62	58.1	22, range (18 - 39)	5,130	NR	6
Shaykhbaygloo [8]	2020	Iran	40	32.5	23.8 \pm 10.7	1,681.75	7.5	6
Parsaee [9]	2020	Iran	90	53.4	29 \pm 6	693.5	NR	6
El-Shanshory [10]	2020	Egypt	100	40	10.98 \pm 3.75	4,657.12	48	6
Eghbali #1 [11]	2020	Iran	63	46	23.19 \pm 9.86	1,894.9	NR	6
Aggarwal [12]	2020	India	48	81.3	10.7 \pm 3.4	2,318.6	NR	6
Shehata [13]	2019	Egypt	45	47.7	10.9 \pm 2.9	3,141.2	NR	6
Ngim [14]	2019	Malaysia	53	34	22 \pm 9	3,848	39.6	7
Khaled [15]	2019	Egypt	40	42.5	12.95 \pm 4.5	2,851	12.5	6
Fekri [16]	2019	Iran	91	58	19 \pm 7.5	NR	NR	6
Chaosuwannakit [17]	2019	Thailand	210	52.3	11.1 \pm 9.8	1,953	5.7	6
Abtahi [18]	2019	Iran	52	55.7	23.7 \pm 5	2,584	NR	6
Wahidiyat #1 [19]	2018	Indonesia	546	50.7	308 (less than 18) 238 (more than 18)	NR	NR	6
Suthar [20]	2018	India	73	65.75	9.062 \pm 4.685	1,895.068	NR	6
Soltanpour [21]	2018	Iran	60	53.3	17.5 \pm 9.1	NA	25	6
Karakas [22]	2018	Turkey	106	50	21.9, range (8 - 46)	1,496	43	6
Elfawal [23]	2018	Egypt	80	31.3	24, range (8 - 53)	1,700	NR	6
Wahidiyat #2 [24]	2017	Indonesia	162	48.1	14, range (3 - 43)	3,793	NR	6
Ouederni [25]	2017	Tunisia	100	50	16.1 \pm 5.2	1,751.5	89	6
Mandal [26]	2017	India	50	76	13.26 \pm 3.463	2,150	28	6
Ferro [27]	2017	Italy	105	44.7	range 26 - 53	1,217.9	NR	6
Farhangi [28]	2017	Iran	88	51.1	21.2 \pm 5.6	4,057	NR	6
Ari [29]	2017	Turkey	30	50	14.6 \pm 3.6	1,842	50	7
Yuksel [30]	2016	Turkey	57	54.4	25 \pm 7	2,072	NR	6
Taghizadeh [31]	2016	Iran	52	55.8	17.3 \pm 7.3	2,644.8	NR	6
Silvilairat [32]	2016	Thailand	101	47	18, range (8 - 59)	NA	63	7
Mokhtar [33]	2016	Egypt	100	48	13.9 \pm 2.4	3,338	NR	7
Hamed [34]	2016	Egypt	45	57.7	12.12 \pm 3.08	2,959	NR	7
Chen [35]	2016	China	110	63.64	11, range (3.0 - 48.0)	4,058.1	NR	6
Azarkeivan #1 [36]	2016	Iran	164	45.7	30, range (10 - 60)	1,544	NR	6
Alvi [37]	2016	Pakistan	83	59	19, range (5 - 45)	5,575	NR	6
Majd [38]	2015	Iran	85	48.2	22.78 \pm 6.8	1,543	NR	7
Casale [39]	2015	Italy	107	57	14.4, range (4.2 - 17.9)	1,814	23.4	6
Yang [40]	2014	China	201	62.2	9, range (4 - 25)	4,536	17.4	6
Li [41]	2014	Taiwan	71	45%	21.7 \pm 6.3	3,823	25.4	6

Table S1. General characteristics of the included studies (continued).

Author	Year	Country	Number of patients	Male (%)	Mean age \pm SD	Mean ferritin level	Splenectomy (%)	Quality score
Eghbali #2 [42]	2014	Iran	60	55	17.65 \pm 9.28	1,927.1	6.6	6
Piga [43]	2013	Italy	341	50	30.1 \pm 9.1	1,326.5	42.7	6
Lu #A [44]	2013	Taiwan	54	44.3	22 \pm 6.1	2,429	NR	6
Lu #B [44]	2013	Taiwan	34	44.3	27 \pm 5	4,963	NR	6
Djer [45]	2013	Indonesia	30	50	range (13 - 41)	6,405	NR	6
Azarkeivan #2 [46]	2013	Iran	156	53.8	24.1 \pm 5.4	2,500	49.1	6
Shamsian [47]	2012	Iran	93	44	16.9 \pm 4.7	2,418	NR	6
Marsella [48]	2011	Italy	776	47.6	30.44 \pm 8.67	1,653	NR	7
Fragasso [49]	2011	Italy	99	48.4	30, range (15 - 48)	1,600	NR	6
Assis [50]	2011	Brazil	115	43.4	21.25, range (7 - 54)	2,676.50	NR	6
Patton [51]	2010	Australia	30	30	32.6 \pm 6.8	2,454.6	NR	6
Alpendurada [52]	2010	UK	319	45.1	26.5 \pm 8.9	2,251	41	6
Lam [53]	2008	Hong Kong	50	48	23.3 \pm 6.6	6,968.4	NR	6
Maris [54]	2007	Greece	48	56.2	29.2 \pm 3.8	1,823.4	NR	7
Tanner [55]	2006	UK	167	44.9	30 \pm 5.3	1,640	NR	6
Christoforidis [56]	2006	Greece	30	56.6	16.6 \pm 4.1	1,525	NR	6
Voskaridou [57]	2004	Greece	80	37.5	34.5, range (19 - 65)	2,296	NR	7
Anderson [58]	2001	UK	106	47.1	27 \pm 7	2,095	NR	6

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