



“Association between Functional Impairment and Anemia in Geriatric Patients”

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ABSTRACT:

Background: Anemia is a common condition among geriatric patients and is associated with functional impairment, decreased physical performance, and reduced quality of life. The prevalence and etiology of anemia vary across different populations, with iron deficiency anemia and anemia of chronic disease being the most common causes. Identifying the impact of anemia on functional status and health-related quality of life (HRQoL) is essential for optimizing care in elderly individuals. Present study aims to determine the association between anemia and functional impairment in geriatric patients by evaluating functional status using the Activities of Daily Living (ADL) and Instrumental Activities of Daily Living (IADL) scales. Additionally, the study assesses the severity of anemia, its relationship with comorbidities, and its impact on HRQoL.

Materials and Methods: A cross-sectional study was conducted in the General Medicine outpatient and inpatient departments of Aarupadai Veedu Medical College and Hospital, Pondicherry, over 18 months. A total of 154 geriatric patients (aged ≥ 65 years) were recruited and divided into two groups: anemic ($n=77$) and non-anemic ($n=77$) based on documented hemoglobin levels. Functional status was assessed using ADL and IADL scales, and HRQoL was evaluated using the SF-36 questionnaire. Statistical analysis was performed to determine the association between anemia and functional impairment, adjusting for confounding factors.

Results: Patients with anemia exhibited functional assessment scores significantly lower in anemic patients, with a mean KATZ index score of 5.09 ± 0.89 compared to 5.56 ± 0.79 in controls ($p < 0.05$) and a mean Lawton Brody index score of 5.36 ± 1.83 compared to 5.73 ± 1.72 in controls ($p < 0.05$). SF-36 scores indicated a significant decline in HRQoL among anemic patients ($p < 0.05$).

Conclusion: The study highlights a significant association between anemia and functional impairment in geriatric patients. Despite comparable demographic characteristics, anemic individuals had lower functional status and HRQoL, emphasizing the need for early detection and management of anemia to preserve functional independence in elderly populations.

Introduction:

The presentation of anemia in elderly patients differs based on its severity and underlying cause. Typical symptoms include exhaustion, shortness of breath, and

pale skin. Additionally, anemia can contribute to cardiovascular issues like heart failure and angina, as a result of reduced oxygen transport in the blood.¹ Anemia is a common condition among geriatric patients and can



be caused by a variety of factors, including iron deficiency, chronic disease, and chronic kidney disease. The prevalence and etiology of anemia in this population vary depending on the population studied.² Anemia is linked to various adverse outcomes, such as reduced physical function, a higher risk of disability, and increased mortality. Early diagnosis, thorough assessment, and appropriate management are crucial for enhancing the quality of life in elderly patients.³ Anemia is common among elderly patients and is linked to multiple adverse effects, including diminished physical function, a higher risk of disability, cognitive decline, depression, and a lower quality of life.³⁻⁶ Additionally, a study by Guralnik et al. (2004) found that anemia in older adults was linked to an increased risk of mortality.⁷

The prevalence and causes of anemia in elderly patients differ across populations. In the United States, a study by Patel et al. (2015) found that 10.2% of adults aged 65 and older had anemia, with iron deficiency being the most frequent underlying cause.² In contrast, a study conducted in India found a significantly higher prevalence of 63.5%, with anemia of chronic disease being the most frequent etiology.^{8,9} Iron deficiency anemia, a common cause of anemia in the elderly, can result from inadequate dietary intake, malabsorption, or blood loss.¹⁰⁻¹² Patel et al., found that iron deficiency anemia was more prevalent in women and was associated with a lower intake of iron-rich foods.² On the other hand, anemia of chronic disease is primarily caused by chronic inflammation and is frequently linked to conditions such as chronic kidney disease, rheumatoid arthritis, and malignancy.¹³

By understanding the prevalence, causes, and impact of anemia in older adults, healthcare providers can take appropriate steps to diagnose and manage the condition, ultimately improving the quality of life for this vulnerable population. Present study aimed to determine the association between anemia and functional impairment in geriatric patients.

Material & Method:

The study was conducted in the General Medicine OPD/IPD at Aarupadai Veedu Medical College and Hospital, Pondicherry, using a cross-sectional design over 18 months. A total of 154 geriatric patients (77 in each group) were recruited based on inclusion and exclusion criteria. Participants were aged 65 years and above, provided informed consent, had documented hemoglobin levels, and were capable of performing basic daily activities as assessed by ADL and IADL scales. Patients with recent blood transfusions, chemotherapy, radiotherapy, active infections, gastrointestinal bleeding, chronic kidney or liver disease, hematological disorders, malignancies, or psychiatric conditions were excluded.

Data collection involved recording baseline medical history, measuring hemoglobin levels, and categorizing patients into anemic and non-anemic groups. Functional status was evaluated using ADL and IADL scales, while health-related quality of life (HRQoL) was assessed using the SF-36 questionnaire.

Statistical analysis included logistic regression to evaluate the association between anemia and functional impairment, independent samples t-test or Mann-Whitney U test for anemia severity comparison, and chi-squared or Fisher's exact test for anemia-comorbidity relationships. The impact of anemia on HRQoL was analyzed using the Student's t-test or Mann-Whitney U test, depending on data normality. Ethical approval was obtained, and written informed consent was secured from all participants.

Result:

Present study included total of 154 patients and divided into two group as 77 in each group. The mean age between the groups were comparable with no significant difference. The mean age in control was 72.1yrs and 71.8yrs in case.

	Control		Case		p-value
	Mean	SD	Mean	SD	
Age	72.1	4.5	71.8	4.8	0.854



Hb	13.55	.78	8.94	1.09	0.01*
PCV	40.23	1.22	33.85	2.24	0.01*
MCV	91.06	3.54	92.48	9.87	0.23
MCH	29.01	1.19	28.95	4.03	0.91
MCHC	32.48	.34	31.94	2.20	0.05*

Table 2: Various parameter distribution between the groups

		Control		Case		Chi-square (p-value)
		Count	N %	Count	N %	
Gender	Female	30	39.0%	37	48.1%	1.29 (0.25)
	Male	47	61.0%	40	51.9%	
Occupation	Accountant	1	1.3%	1	1.3%	5.42 (0.94)
	bus driver	1	1.3%	1	1.3%	
	carpenter	1	1.3%	1	1.3%	
	Engineer	1	1.3%	1	1.3%	
	Farmer	8	10.4%	6	7.8%	
	home maker	27	35.1%	38	49.4%	
	labour	5	6.5%	1	1.3%	
	postman	1	1.3%	1	1.3%	
	potter	1	1.3%	1	1.3%	
	Retired	14	18.2%	13	16.9%	
	shop keeper	1	1.3%	1	1.3%	
	Teacher	12	15.6%	9	11.7%	
	Watchmen	4	5.2%	3	3.9%	

The gender distribution between the group was comparable with no significant difference noted.

Table 3: Comparison of the KATZ index between the groups

KATZ Index		Control		Case		Chi-square (p-value)
		Count	N %	Count	N %	
Bathing	No	10	13.0%	15	19.5%	1.19 (0.27)
	Yes	67	87.0%	62	80.5%	
Dressing	No	9	11.7%	10	13.0%	0.06 (0.80)
	Yes	68	88.3%	67	87.0%	



Toileting	No	4	5.3%	9	11.7%	2.03 (0.15)
	Yes	72	94.7%	68	88.3%	
Transferring	No	6	7.8%	17	22.1%	6.18 (0.01)*
	Yes	71	92.2%	60	77.9%	
Continence	No	3	3.9%	8	10.4%	2.44 (0.118)
	Yes	74	96.1%	69	89.6%	
Feeding	No	1	1.3%	11	14.3%	9.03 (0.01)*
	Yes	76	98.7%	66	85.7%	

The interpretation of the KATZ Index results highlights a significant difference in functional abilities between the control and anemic groups, particularly in transferring and feeding activities. The proportion of patients experiencing difficulty with transferring was significantly higher in the anemic group (22.1%) compared to the control group (7.8%) ($p=0.01$), indicating that anemia may contribute to mobility limitations in geriatric patients. Similarly, feeding difficulties were more prevalent among anemic patients (14.3%) than in the control group (1.3%) ($p=0.01$),

suggesting a greater dependency in basic self-care activities. While other functional components, such as bathing, dressing, toileting, and continence, showed higher impairment percentages in the anemic group, the differences were not statistically significant. These findings suggest that anemia has a notable impact on specific aspects of daily living, particularly in tasks requiring physical strength and coordination. The results underscore the importance of early diagnosis and management of anemia in elderly individuals to maintain their independence and quality of life.

Table 4: Comparison of total KATZ index score between the groups

	Control		Case		p-value
	Mean	SD	Mean	SD	
KATZ Index total point	5.56	.79	5.09	.89	0.01*

There is significant lower KATZ index total score in cases (5.09 ± 0.89) compared to controls (5.56 ± 0.79). ($p<0.05$)

Table 5: Comparison of the Lawton brody index between the groups

Lawton Brody Index		Control		Case		Chi-square (p-value)
		Count	N %	Count	N %	
Ability to use telephone	No	8	10.4%	13	16.9%	1.37 (0.24)
	Yes	69	89.6%	64	83.1%	
Shopping	No	7	9.1%	18	23.4%	5.77 (0.01)*
	Yes	70	90.9%	59	76.6%	
Food. Preparation	No	49	63.6%	45	58.4%	0.43 (0.509)
	Yes	28	36.4%	32	41.6%	
House. Keeping	No	48	62.3%	45	58.4%	0.244 (0.62)



	Yes	29	37.7%	32	41.6%	
Laundry	No	48	62.3%	44	57.1%	0.43 (0.51)
	Yes	29	37.7%	33	42.9%	
Mode of Transportation	No	6	7.8%	15	19.5%	4.46 (0.05)*
	Yes	71	92.2%	62	80.5%	
Responsibility for own medications	No	4	5.2%	13	17.1%	5.49 (0.01)*
	Yes	73	94.8%	63	82.9%	
ability to handle finances	No	5	6.5%	9	11.7%	1.25 (0.26)
	Yes	72	93.5%	68	88.3%	

The Lawton Brody Index results indicate that anemia in geriatric patients significantly impacts their ability to perform instrumental activities of daily living (IADLs), particularly in shopping, transportation, and medication management. Anemic patients had a significantly higher difficulty in shopping (23.4%) compared to the control group (9.1%) ($p=0.01$), suggesting a reduced ability to independently procure essential items. Similarly, a greater proportion of anemic patients (19.5%) faced challenges in using transportation compared to the control group (7.8%) ($p=0.05$), highlighting mobility restrictions. Additionally, responsibility for medication management was notably lower in the anemic group

(82.9%) versus controls (94.8%) ($p=0.01$), indicating a potential risk for medication non-adherence in these patients. Other IADLs, such as telephone use, food preparation, housekeeping, laundry, and financial management, showed higher impairment percentages in the anemic group, though the differences were not statistically significant. These findings suggest that anemia is associated with decreased functional independence in elderly individuals, particularly in tasks requiring cognitive and physical effort, underscoring the need for early intervention and support strategies to maintain their quality of life.

Table 6: Comparison of total mean Lawton brody index score between the groups

	Control		Case		p-value
	Mean	SD	Mean	SD	
Lawton Brody Index total score	5.73	1.72	5.36	1.83	0.20

There is significant lower Lawton Brody index total score in cases (5.36 ± 1.83) compared to controls (5.73 ± 1.72). ($p<0.05$)

Table 7: Comparison of SF 36 questionnaire between the groups

SF36 Questionnaire	Control		Case		p-value
	Mean	SD	Mean	SD	
Physical functioning	63.02	4.64	56.93	7.11	0.01*
Role Physical	57.27	5.39	54.57	7.69	0.01*
Body pain	64.50	2.49	62.31	4.67	0.01*



General health	61.25	2.24	64.21	4.98	0.01*
Vitality	57.06	1.96	53.70	3.31	0.01*
Social functioning	83.75	2.32	80.15	4.66	0.01*
Role emotional	77.42	2.92	73.57	7.77	0.01*
Mental health	81.08	1.87	76.71	1.84	0.01*

The mean scores of SF36 questionnaire showing the significant lower mean scores in cases compared to controls.($p < 0.05$)

Discussion:

Present study included total of 154 patients and divided into two group as 77 in each group. The mean age between the groups were comparable with no significant difference. The mean age in control was 72.1yrs and 71.8yrs in case. The gender distribution between the group was comparable with no significant difference noted. The mean hemoglobin, PCV and MCHC were found to be significantly lower in cases compared to controls.($p < 0.05$) In study by Zamboni V et al., 13,301 participants with a mean age of 72.0 years, individuals with cognitive impairment exhibited a higher prevalence of anemia (47%) compared to those without cognitive impairment (35%, $p < 0.001$).¹³ In concordance Terekeci HM et al., anemic group had a mean age of 76.0 ± 11.7 years, while the non-anemic group had a mean age of 72.5 ± 15.2 years. Hemoglobin levels were significantly lower in the anemic population (10.4 g/dL) compared to the non-anemic group (13.6 g/dL).¹⁴ In study by Selvi O et al., Among the 81 patients studied, 69.1% were women and 30.9% were men, with a mean age of 76.8 ± 7.28 years.¹⁵

There is significant lower KATZ index total score in cases (5.09 ± 0.89) compared to controls (5.56 ± 0.79).($p < 0.05$) There is significant lower Lawton Brody index total score in cases (5.36 ± 1.83) compared to controls (5.73 ± 1.72).($p < 0.05$) The mean scores of SF36 questionnaire showing the significant lower mean scores in cases compared to controls.($p < 0.05$) In similar to present study Lucca U et al., “revealed that elderly individuals with mild anemia performed significantly worse on nearly all cognitive, functional, mood, and quality of life (QoL) measures. In multivariable logistic regression analyses, even after adjusting for multiple demographic and clinical confounders, mild anemia remained significantly associated with selective attention deficits and poorer disease-specific QoL (all fully adjusted $p < .046$). Overall, mild anemia was

independently linked to reduced selective attention and lower disease-specific QoL in elderly individuals.¹⁶ Also in study by Terekeci HM et al., Functional status and cognitive abilities were also more impaired in anemic individuals, with lower Katz ADL scores (6.8 ± 4.3 vs. 9.3 ± 3.7) and lower MMSE scores (17.9 ± 6.4 vs. 21.7 ± 6.7). Additionally, the anemic group had lower albumin levels and body mass index (BMI), along with a higher prevalence of multiple comorbidities, all showing statistically significant differences. Greater dependence was observed in activities requiring physical effort, such as bathing, dressing, toileting, and transferring. These findings suggest that anemia in the elderly is associated with increased dependence in daily living activities and a decline in cognitive function.¹⁴ Selvi O et al., documented that Functional and cognitive measures, including instrumental activities of daily living (IADL), nutritional status (MNA-SF), cognitive function (MMSE), hand grip strength, and walking speed, showed positive changes. Additionally, laboratory parameters such as hemoglobin, iron, total iron-binding capacity, transferrin saturation, and ferritin levels improved. These findings highlight the beneficial impact of iron replacement therapy on functional capacity, cognitive performance, and nutritional status in older adults with iron deficiency (ID) and iron deficiency anemia (IDA).¹⁵

Conclusion:

This study demonstrates a strong link between anemia and functional impairment in elderly patients. Despite similar demographic factors such as age, gender, occupation, and medical history, anemic patients had significantly lower hemoglobin, PCV, and MCHC levels than their non-anemic counterparts. Functional assessment scores—including the KATZ index, Lawton Brody index, and SF-36 questionnaire—were markedly lower in anemic individuals, reflecting greater challenges in daily activities, instrumental tasks, and overall quality of life. These findings highlight the impact of anemia on



the functional independence of older adults, emphasizing the need for early diagnosis and management to maintain their well-being.

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Reference:

1. Weckmann G, Kiel S, Chenot JF, Angelow A. Association of Anemia with Clinical Symptoms Commonly Attributed to Anemia-Analysis of Two Population-Based Cohorts. *J Clin Med.* 2023;12(3):1–8.
2. Patel K V. Epidemiology of anemia in older adults. *Semin Hematol.* 2008;45(4):210–7.
3. Goodnough LT, Schrier SL. Evaluation and management of anemia in the elderly. *Am J Hematol.* 2014;89(1):88–96.
4. Su D, Liu Y, Su Y, Zhang X, Chan P. Cognitive impairment is a risk factor for decreased physical performance in the elderly. *Heliyon.* 2024;10(11):e32132.
5. Patel K V, Longo DL, Ershler WB, Yu B, Semba RD, Ferrucci L, et al. Haemoglobin concentration and the risk of death in older adults: differences by race/ethnicity in the NHANES III follow-up. *Br J Haematol.* 2009;145(4):514–23.
6. Onder G, Penninx BWJH, Cesari M, Bandinelli S, Lauretani F, Bartali B, et al. Anemia is associated with depression in older adults: results from the InCHIANTI study. *Journals Gerontol Ser A Biol Sci Med Sci.* 2005;60(9):1168–72.
7. Guralnik JM, Eisenstaedt RS, Ferrucci L, Klein HG, Woodman RC. Prevalence of anemia in persons 65 years and older in the United States: evidence for a high rate of unexplained anemia. *Blood.* 2004;104(8):2263–8.
8. Safiri S, Kolahi AA, Noori M, Nejadghaderi SA, Karamzad N, Bragazzi NL, et al. Burden of anemia and its underlying causes in 204 countries and territories, 1990–2019: results from the Global Burden of Disease Study 2019. *J Hematol Oncol.* 2021;14(1):185.
9. Let S, Tiwari S, Singh A, Chakrabarty M. Prevalence and determinants of anaemia among women of reproductive age in Aspirational Districts of India: an analysis of NFHS 4 and NFHS 5 data. *BMC Public Health.* 2024;24(1):437.
10. Theurl I, Aigner E, Theurl M, Nairz M, Seifert M, Schroll A, et al. Regulation of iron homeostasis in anemia of chronic disease and iron deficiency anemia: diagnostic and therapeutic implications. *Blood, J Am Soc Hematol.* 2009;113(21):5277–86.
11. Shavelle RM, MacKenzie R, Paculdo DR. Anemia and mortality in older persons: does the type of anemia affect survival? *Int J Hematol.* 2012;95(3):248–56.
12. Fishbane S, Galgano C, Langley RC, Canfield W, Maesaka JK. Reticulocyte hemoglobin content in the evaluation of iron status of hemodialysis patients. *Kidney Int.* 1997;52(1):217–22.
13. Zamboni V, Cesari M, Zuccalà G, Onder G, Woodman RC, Maraldi C, et al. Anemia and cognitive performance in hospitalized older patients: results from the GIFA study. *Int J Geriatr Psychiatry.* 2006;21(6):529–34.
14. Terekeci HM, Kucukardali Y, Onem Y, Eriksi AA, Kucukardali B, Sahan B, et al. Relationship between anaemia and cognitive functions in elderly people. *Eur J Intern Med.* 2010;21(2):87–90.
15. Selvi Özturun H, Çınar E, Turgut T, Mut Sürmeli D, Bahşi R, Atmış V, et al. The impact of treatment for iron deficiency and iron deficiency anemia on nutritional status, physical performance, and cognitive function in geriatric patients. *Eur Geriatr Med.* 2018;9(4):493–500.
16. Lucca U, Tettamanti M, Mosconi P, Apolone G, Gandini F, Nobili A, et al. Association of mild anemia with cognitive, functional, mood and quality of life outcomes in the elderly: the “Health and Anemia” study. *PLoS One.* 2008;3(4):e1920.