

ASSOCIATION BETWEEN ANEMIA AND PHYSICAL ACTIVITY AMONG ELDERLY IN RURAL AREAS, SHARKIA GOVERNORATE

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Abstract:

Background: Anemia is a common, multifactorial condition in the elderly; its prevalence increases with age which adversely affects older adult's general health and physical activity. Rural elderly are more prone to becoming anemic due to lack of medical facilities and poor economic conditions. **The aim** of this study was to investigate the association between anemia and physical activity among elderly in rural areas, Sharkia governorate. **Design:** A cross-sectional descriptive design was utilized in the study. **Setting:** The study was conducted at Sharkiat Mobasher Village, Elibrahemya District, Sharkia Governorate. **Sample:** A systematic random sampling technique of 150 elderly, then anemic elderly were selected and given the nutritional guidelines. **Tools:** Four tools were used to collect the study data: **I)** A structured interview sheet. **II)** The Mini Nutritional Assessment short form (MNA). **III)** Assessment of elderly's activity level [Katz scale for activities of daily life (ADLs) & International Physical Activity Questionnaire (IPAQ) short form]. **IV)** Laboratory investigations [complete blood count (CBC) & stool analysis]. **Results:** The study results revealed that the prevalence of anemia among the studied elderly was 36.7%. The anemic elderly had poorer physical activity level and more disability in activities of daily living than non-anemic elderly. **Conclusion:** Anemia representing an important health problem among older individuals and had an adverse effect on the elderly's physical activity. **Recommendation:** Health education programs to increase the elderly awareness about the importance of periodic medical check-up and healthy life habits.

Keywords: Anemia, Elderly, Physical activity, Rural areas

Introduction:

Anemia is a condition characterized by decreased hemoglobin concentration or RBC count or both which lead to reduced oxygen-carrying capacity of the blood^[1]. Anemia defined in the elderly according to the world health organization (WHO) criteria by decrease Hb concentration below 13 g / dL in men and below 12 g / dL in women^[2].

Rural seniors suffer from more chronic diseases than their urban counterparts. Furthermore, the health of rural elders is influenced by a lack of health insurance, shortages of doctors,

other health care workers, limited access to health care services and lack use of new medical technology in rural areas; which become barriers for rural seniors to get health care for prevention and treatment of diseases^[3].

Increasing physical activity is the most critical intervention to improve health in people of all ages. In older adults, physical activity is a high importance to conserve a high level of functional independence, improve the quality of life and reduces economic, health and social

care costs through enabling healthy aging^[4].

Anemia has been associated with loss of physical function independent of underlying diseases. Decrease Hb level make the elderly at risk for multiple poor health outcomes such as reduced physical performance, fatigue, exhaustion, declining muscle strength and diminished quality of life^[5].

Good nutritional health is critically important for the prevention and management of nutrition-related health conditions as well as the prevention of cognitive and physical functional decline. The achievement and maintenance of good nutritional health is particularly challenging for the older population^[6].

The overall goal in gerontological nursing interventions for anemic elderly focus on dietary management to maintain nutritional status, maintain the balance between activity and rest to preserve the normal activity of daily living and enhance functional ability^[7].

Significance of the study:

Anemia is very common in elderly individuals and associated with numerous health consequences, representing a significant economic burden for society^[8]. WHO showed that anemia affects 1.62 billion people globally and suggested that 23.9% (164million) of elderly (≥ 60 years) were affected by anemia^[9]. Additionally, The prevalence of anemia in rural elderly higher(60.7%) when compared with urban elderly(38.4%)^[10].

Anemia has been associated with a higher incidence of cardiovascular diseases, cognitive impairment, decreased physical performance, quality of life and increased risk of falls and fractures^[11].

Aim of the study:

The aim of the current study was to investigate the association between anemia and physical activity among elderly in rural areas, Sharkia governorate.

Study Questions:

1. What is the prevalence of anemia among elderly in rural areas?
2. What is the association between anemia and physical activity among elderly in rural areas?

Subjects and Methods:

A descriptive cross-sectional design was utilized in the study. Multistage technique was used in the recruitment of the study setting. The study was conducted at Sharkiat Mobasher Village, Elibrahemya District, Sharkia governorate.

Study subjects:

Systematic random sampling technique was used to recruit 150 elderly in the study.

Inclusion criteria were the elderly above the age of 60 years of both the sexes who were able to communicate and accept to participate in the study who were included. The elderly who were have major diseases causing disability (e.g. Stroke, Parkinson disease) and elderly with active bleeding who were excluded.

Tools of data collection:

Four tools were used for data collection,

Tool I- A structured interview sheet was developed by the researcher. **It consisted of five parts:**

Part 1: personal data of the studied elderly.

Part 2: Medical history of the studied elderly.

Part 3: Health care behaviors of elderly.

Part 4: Risk habits in the elderly's daily life .

Part 5: Daily dietary habits among the studied elderly.

Tool II- A Mini Nutritional Assessment short form (MNA) for nutritional assessment: This tool was developed by (Vellas et al., 2006)^[12].

Scoring system:

1-Normal nutritional status: 12 to 14 points. **2-**At

risk of malnutrition: 8 to 11points. 3- Malnourished: 0 to 7 points.

Tool III- Assessment of elderly's activity level:consisted of:

(A) Assessment of daily living activities(ADLs): This tool was developed by Katz & Akpom, (1976) ^[13] to assess activities of daily living. **Scoring system:**

- Totally dependent: 13-18points;
- Need assistant: 7-12points;
- Totally independent: 6 points.

(B)International physical activity questionnaire (IPAQ) short form:

This tool was developed by Craig et al., (2003) ^[14] to assess the level of physical activity of the elderly

Scoring system: According to IPAQ the elderly's level of physical activity was classified into three categories:

- 1) **Inactive:** This was the lowest level of physical activity. Those individuals who don't meet the criteria for minimally active or HEPA active categories.
- 2) **Minimally Active:** any one of the following three criteria:
 - a) Three or more days of vigorous activity of at least 20 minutes per day OR
 - b) Five or more days of moderate intensity activity or walking of at least 30 minutes per day OR
 - c) Five or more days of any combination of walking, moderate intensity or vigorous intensity activities achieving a minimum of at least 600 metabolic equivalents (MET) minutes/week.
- 3) **HEPA Active:** The two criteria for classification are:
 - a) Vigorous intensity activity on at least three days achieving a minimum of at least 1500 MET-minutes/week OR
 - b) Seven or more days of any combination of walking, moderate intensity or vigorous intensity

activities achieving a minimum of at least 3000 MET-minutes/week.

Tool IV: Laboratory investigations:

1-Complete blood count (CBC):

Anemia was considered if hemoglobin level < 13 g / dL in men and < 12 g / dL in women (Calleraa et al., 2015) ^[15]. Also, the severity of anemia was divided according to hemoglobin level as the following:

- Mild (10 g/dL to below cut-off level);
- Moderate (7- <10 g/dL);
- Severe (<7 g/dL)(Mann et al., 2014) ^[16].

2-Stool analysis: Stool was investigated for the presence of RBC's, parasites infestations and undigested food.

Content validity:

The tools were checked before the pilot study through the distribution of it's to three experts in the field of study with the covering letters and explanation sheet that explains the study, purpose and other related information to ensure appropriateness , relevancy, clarity and completeness of the tools.

Field work:

The field work was executed over a period of three months. It extended from the beginning April 2016 up to the end of June 2016; three days per week from 3 pm to 8 pm .

Once permission was granted to proceed with the study, the researcher started to prepare a schedule for collecting the data.The questionnaire was filled out in 15 to 25 minutes. Each elderly was interviewed individually at the elderly's home. Blood & stool samples were collected by the researcher and sent to the laboratory for investigation. The nutritional guidelines were given for the anemic elderly, which include the following instructions:

- ✓ Definition of anemia.

- ✓ Causes & types of anemia.
- ✓ Clinical presentations of anemia.
- ✓ Complications of anemia.
- ✓ Diagnosis & treatment of anemia.
- ✓ A healthy diet for nutritional deficiency anemia.

Administrative and ethical considerations:

Firstly, the study protocol was approved by the pertinent committee (Research Ethics Committee) at Faculty of Nursing, Zagazig University. Then, at the time of data collection, a verbal informed consent for participation was taken from each of the elderly subjects after full explanation of the aim of the study. Participants were given the opportunity to refuse participation, and they were notified that they could withdraw at any stage of the data collection without giving any reason.

Statistical analysis:

Data were organized, categorized, tabulated and statistically analyzed using SPSS 20.0 statistical software package. Data were presented using descriptive statistics in the form of frequencies and percentages for qualitative variables, means and standard deviations, medians and interquartile ranges for quantitative variables. Comparison between Qualitative variables was done by chi-square test(X^2). Spearman rank correlation was used to examine the correlations among quantitative variables. In order to identify the independent predictors of the risk of anemia, multiple logistic regression analysis was used. $P < 0.05$ was considered to be statistically significant.

Results:

- **Table (1)** shows that, the studied elderly's age ranged between 60 - 95 years, with median 65.0 years, 52.7% of the studied elderly were male, 60.7 % were married, 58.7 % of them were illiterate and 67.7% weren't working. Concerning their income, it came mainly from the pension or work 90%,

and was mostly sufficient 58.7%. The majority 90.0% of the studied elderly were lived with their family.

- **Figure (1)** reveals that 81.3% of the studied elderly were independent. At the other extreme, only 8.7% of them were dependent according to Katz index.
- **Figure (2)** illustrates that 45.3% of the studied elderly were inactive in their physical activity, while 42.7% of them were moderately active. Moreover, the remaining 12.0% of them were highly active according to IPAQ.
- **Figure (3)** indicates that 36.7% of the studied elderly were suffering from anemia.
- **Table (2)** There were a statistically significant relation between anemia and Katz score of independence in activities of daily life $P < 0.001$, as well as elderly's physical activity $P < 0.001$.
- **Table (3)** indicates statistically significant positive correlation was found between anemia and elderly's age. Conversely, anemia had negative correlation with their educational level, income, Katz score and activity score.
- **Table (4):** indicates that level of education, enough vegetables/fruits, and Katz score were the statistically significant independent negative predictors of anemia. Conversely, a number of diseases and number of medications were positive predictors

Discussion:

Anemia is a worldwide public health problem; it is one of the main conditions that impose an adverse effect on the socioeconomic state of any country and adverse impact on mental health, physical activity and work capacity, which require a careful assessment of anemia in any population to control it^[17].

Concerning the prevalence of anemia, the result of the current study showed that one-third (36.7%) of the studied elderly were anemic. This result might be attributed to that the investigations

performed to accomplish the purpose of the study were the first time to screen anemia among many of the studied elderly due to multiple factors as high rural illiteracy, socio economic factors, lack of awareness regarding anemia and the majority of elderly were unaware of being anemic. Also, the presence of multiple chronic diseases which limit elderly's food intake and affect their nutritional status. Additionally, the presence of parasites infestation which is considered as an important cause of iron deficiency anemia.

The current study results were congruent with the finding of an Egyptian study conducted in Mansoura city by Ibrahim et al., (2013) ^[18] who found that the prevalence of anemia was 30% among elderly. These findings were in agreement with Al Riyami et al., (2012) ^[19] in Oman, reported that the prevalence of anemia was 36% among Omani older adults. On the contrary, Al Zenki et al., (2015) ^[20] in Kuwait, who found that the prevalence of anemia among the elderly was (5.5%).

Regarding personal characteristics of the studied elderly, according to table (1), the present study revealed that, approximately three- quarters of the studied elderly's were in the age group 60 to less than 70 years old; this might be due to that presence of larger number of individuals of this age group in our country. Additionally, more than half of the studied elderly were illiterate; this finding might be attributed to living in rural areas associated with lack of interest in education thus the education is still low in many rural areas. Moreover, more than half of the studied elderly weren't working; such results might be attributed to the elderly's beliefs about old age is the time to relax, worship and draw closer to God. These results were in harmony with, Thakur et al., (2013) ^[10] in India, reported that the majority of the participants were in the age group 60 -69 years old, more

than half of them were illiterate and not working.

On the same point ,the majority of the studied elderly were lived with their family could be explained by that Middle-Eastern cultures are considered to possess more collectivist values where societies tend to encourage interdependence and therefore traditionally provide support and care for older people within their families. These findings were in agreement with, Ehmouda, (2014) ^[21] in Libya, who found that most of the elderly were living with their families.

Furthermore,more than half of the studied elderly had sufficient income. This finding might be due to strong family ties and social integration among the inhabitants of the village and majority of them depend on agriculture as a source of their income . This finding in accordance with Sgnaolin et al., (2013) ^[22] in Brazil,who reported that the majority of the participants had sufficient income.

According to the present results, there was a statistically significant positive correlation between anemia and age. These findings might be due to that, old age is associated with decline in hematopoietic stem cell (HSC) function or decrease in bone marrow (BM) cellularity and impaired function of several organ systems. Also, nutritional deficiency and increase the presence of chronic inflammatory disorders with aging might be contributed to anemia(Kuranda et al., 2011) ^[23].

These findings in accordance with previous studies, which demonstrated that the prevalence of anemia increases proportionately with age such as Kamel et al., (2015) ^[2] in Egypt. Furthermore, Zhai et al., (2010) ^[24] in China found that elderly's age was the main risk factor related to anemia among the studied elderly.

Apart from personal characteristics, the current study revealed that, there was a

statistically significant negative correlation between anemia and each of the following; income and education. Moreover, the negative relation between anemia and education was confirmed in multivariate analysis. This might be attributed to low education levels among the studied elderly, which result in a lack of information about anemia and delay in the referral to the physician, therefore the symptoms progress to become more severe. Furthermore, insufficient income didn't only affect the purchasing power and health care utilization but also influenced the role of the elderly in the family, which indirectly affected the elderly's nutritional status which contributes to the occurrence of anemia.

In agreement with these foregoing present study findings, Mamani et al., (2015)^[25] in Peru, demonstrated that the elderly income was negatively correlated to anemia.

The current study assessed elderly's abilities in the performance of their activities of daily life (ADL) using Katz scale. The results indicated that the majority of the studied elderly were independent and only 8.7% of them were dependent. This result might be due to that, in general, the majority of elderly prefer to become independent and avoid indigence to their caregiver which permits their satisfaction of being self-sustained. These results were congruent with Sudarshan & Chethan, (2016)^[26] in India, pointed that about three-quarters of participants were independent in their daily life activities.

The present study results showed that about half of the studied elderly were inactive in their physical activity, while more than one-third were moderately active, and only about one-fifth of them were highly active. This could be explained by the fact that decrease in hemoglobin levels, with a consequent decrease in the number of red blood cells,

causes a reduction in the oxygen flow to all organs, which has clinical manifestations, these symptoms increase with physical activity, which requires a greater oxygen supply. As a consequence, the elderly progressively decrease their levels of physical activity and routine activities until become asymptomatic leading to a progressive level of functional dependency. Additionally, sedentary life style or number of physiological, psychological, sociological and nutritional changes in the body related to aging changes which hinder the elderly to perform physical activity.

In congruence with these foregoing findings, a study conducted in Saudi Arabia by Al-hazzaa, (2007)^[27] found that more than half of Saudis were inactive, one-third of them was minimally active and only 11.2% were physically active. On the same line, Jaspinder et al., (2014)^[28] in India, reported that more than half of the elderly were performed an inadequate physical activity.

In total, the results of the present study showed a statistically significant relation between anemia, elderly's abilities in the performance of their activities of daily living and physical activity level. These are further supported by the findings that Katz score and activity score had significant negative correlations with anemia. Nonetheless, multivariate analysis identified Katz score as the significant independent negative predictor for anemia.

A possible explanation for these findings was that mentioned by Turusheva et al., (2015)^[29], that there are some mechanisms that can explain the role of anemia in the development of low physical activity; First: associated symptoms of anemia such as fatigue, exhaustion and are associated with difficulty in the activities of daily living. Second: decreased hemoglobin level can diminish muscular oxygenation which may affect muscle strength, muscle mass and subsequently

physical activity. Third: this association may also indirectly reflect the effect of low-grade inflammation, which has long been accepted to play a major role in the development of chronic anemia in older adults, which can adversely affect muscle mass and muscle strength. Furthermore, this pathway can be confirmed with the present results that show that anemia was associated with low physical activity and multiple chronic diseases.

The preceding present study findings were in agreement with the findings of studies which evaluated anemia and functional capacity among the elderly, such as Bang et al., (2013)^[30] in Korea, Terekeci et al., (2010)^[31] in Istanbul, who found a significant association between anemia, dependency in activities of daily life and lower physical activity performance at base line.

In the same line, Dehghankar et al., (2016)^[32] in Iran, found that there was a negative significant correlation between nutritional status and ADL scores.

Conclusion:

In the light of the study findings, it can be concluded that, anemia is a common, multifactorial condition in elderly. The prevalence of anemia among the studied elderly was 36.7%, so anemia representing

an important health problem among older individuals. Anemia had several adverse consequences; it had a negative impact on the elderly's physical activity and lower functional abilities of the elderly. Furthermore, improved functional status of the elderly can lower risk for anemia, thus anemia can lead to physical impairment and vice versa.

Recommendations:

- ✓ Health education programs for the elderly about:
 - The importance of periodic medical check-up & healthy lifestyle.
 - The importance to avoid ignoring the non-specific symptoms like fatigue and weakness as they could be important pointers towards the presence of anemia in old age.
- ✓ Generalized the guidelines used in the study and similar illustrative pamphlets for older adults to improve their nutritional status.
- ✓ Further researches are suggested to examine the impact of anemia's preventive programs & develop more effective interventions to reduce its adverse effects among this vulnerable elderly.

Table 1: Personal characteristics of the studied elderly (n=150):

| Personal characteristics | N | % |
|------------------------------|-----------|------|
| Age(y): | | |
| 60 <70 | 106 | 70.7 |
| 70+ | 44 | 29.3 |
| Range | 60.0-95.0 | |
| Mean±SD | 66.7±6.6 | |
| median | 65.00 | |
| Sex: | | |
| Male | 79 | 52.7 |
| Female | 71 | 47.3 |
| Marital status: | | |
| Married | 91 | 60.7 |
| Unmarried | 59 | 39.3 |
| Education: | | |
| Illiterate | 88 | 58.7 |
| Read/write | 30 | 20.0 |
| Basic & Preparatory | 20 | 13.3 |
| intermediate (secondary) | 12 | 8.0 |
| Occupation: | | |
| Not Working | 115 | 67.7 |
| Working | 35 | 23.3 |
| The source of income: | | |
| Self (pension/ work) | 135 | 90.0 |
| support | 15 | 10.0 |
| Income: | | |
| Sufficient | 88 | 58.7 |
| Insufficient | 62 | 41.3 |
| Living situation: | | |
| With family | 135 | 90.0 |
| Alone | 15 | 10.0 |

Figure 1: Activities of daily life (ADLs) among the studied elderly (n=150):

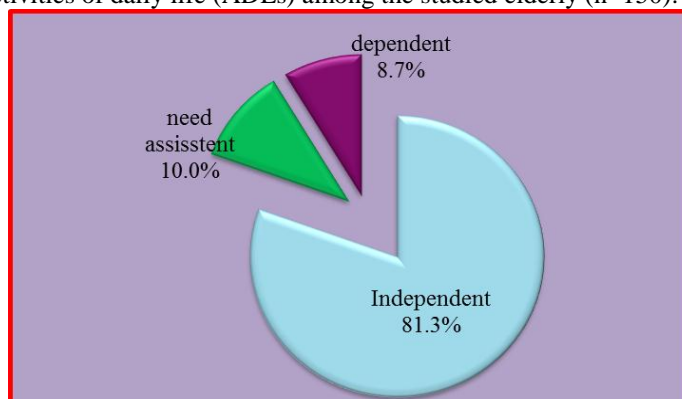


Figure 2: Practice of physical activity among the studied elderly (n=150):

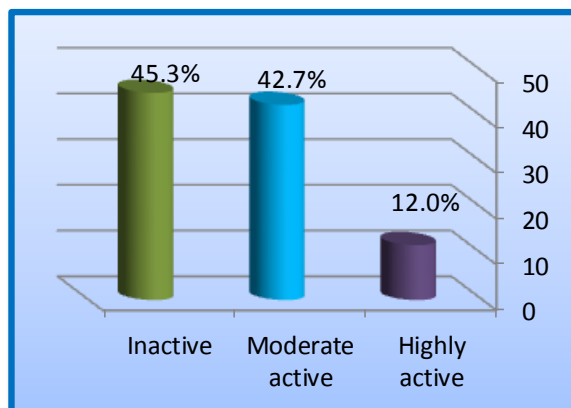


Figure 3: prevalence of anemia among the studied elderly:

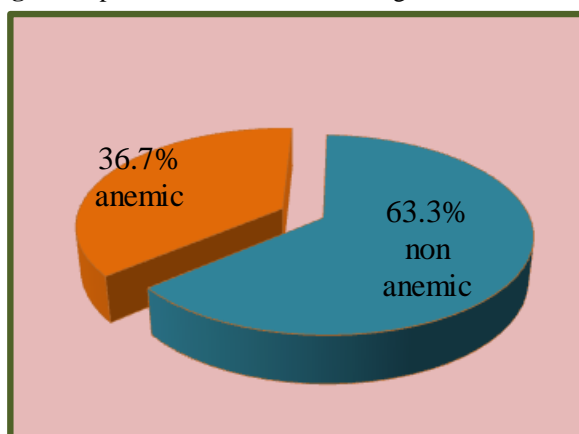


Table 2: Relation between anemia among the studied elderly and their activity:

| Elderly's activity | No anemia (n=95) | | Anemia (n=55) | | X ² test |
|--------------------|---------------------|------|------------------|------|---------------------|
| | No. | % | No | % | |
| Katz scale: | | | | | |
| Independent | 93 | 67.8 | 1 | 2.2 | 0.001* |
| Dependent | 2 | 15.4 | 45 | 97.8 | |
| IPAQ: | | | | | |
| Inactive | 28 | 41.2 | 1 | 2.2 | 0.001* |
| Moderate | 54 | 84.4 | 32 | 69.6 | |
| HEPA active | 13 | 72.2 | 13 | 28.3 | |

(*)Statistically significant at p<0.05

Table 3: Correlation between anemia indices and the studied elderly 's characteristics:

| Elderly's characteristics | Spearman's rank correlation coefficient | | | |
|---------------------------|---|---------|---------|--------------------------------------|
| | RBCs | Hb | Hct | Abnormal biochemical indices(anemia) |
| Age | -.334** | -.328** | -.327** | .329** |
| Education | .190* | .349** | .244** | -.296** |
| Income | 0.10 | .201* | 0.13 | -.215** |
| Katz score | .424** | .598** | .528** | -.692** |
| Activity score | .553** | .580** | .579** | -.486** |

(*) Statistically significant at p<0.05

(**)statistically significant at p<0.01

Table 4: Best fitting multiple logistic regression models for the factors affecting the occurrence of anemia:

| Item | Wald | Df | P | OR | 95.0% CI for OR | |
|--------------------------|-------|----|------|-------------|-----------------|-------|
| | | | | | Upper | Lower |
| Education | -.85 | 1 | .008 | 0.43 | 0.23 | 0.80 |
| No. of diseases | .98 | 1 | .044 | 2.67 | 1.02 | 6.97 |
| No. of medications | .63 | 1 | .015 | 0.53 | 0.32 | 0.88 |
| Enough vegetables/fruits | -2.68 | 1 | .001 | 0.07 | 0.01 | 0.34 |
| Katz score | -1.20 | 1 | .001 | 0.30 | 0.15 | 0.61 |
| <i>Constant</i> | 17.17 | 1 | .000 | 28602737.43 | | |

Nagelkerke R Square: 0.61

Hosmer and Lemeshow Test: p=0.909

Omnibus Tests of Model Coefficients: p<0.00

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