

## ORIGINAL ARTICLE

# IMPACT OF HEMOGLOBIN LEVEL ON FATIGUE, PHYSICAL PERFORMANCE AND QUALITY OF LIFE IN UNIVERSITY STUDENTS

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## ABSTRACT:

To determine the impact of hemoglobin on the physical performance, fatigue, and quality of life of university students. **Methods:** Descriptive correlational research was conducted from March 2023 to August 2023 in Lahore, Pakistan. A sample of 300 students from a variety of universities in Lahore was used to obtain data. The Fatigue Severity Scale and the International Physical Activity Questionnaire were implemented to assess the influence of hemoglobin levels on the quality of life, physical performance, and fatigue of university students. The Statistical Package for Social Sciences (SPSS) version 21 was employed to analyse the data. **Results:** Number of participants who encountered was i.e. N=300, while female were 274 (91.33%). The mean age of students was 20.73 (1.899) years. The mean weight of students was 56.75 (10.676) kg, while the mean of BMI was 22.17 (14.16) kg/m<sup>2</sup>, its means all students was in normal range. The average hemoglobin level of students was 11.61(1.55) mg/dL, that was also in normal ranges. The study concluded after analyzed the data there was statistically low positive correlation between hemoglobin level and SF-36 ( $r = .349$ ) and with FSS was negative low ( $r = -.313$ ) but highly significant association. The relationship between physical activity status and METs was negligible ( $r = -0.46$ ) and ( $r = -0.60$ ), respectively, and there was no significant association with hemoglobin levels. **Conclusion:** This study showed that hemoglobin had strong correlation and high association on quality of life while weak or negligible correlation and highly significant association with fatigue and have negligible correlation and non-significant association with physical performance among students. **Key Words:** Anemia, physical performance, fatigue, Health related quality of life, red blood cells.

## INTRODUCTION:

Red platelets contain hemoglobin, an iron-rich protein that facilitates the transportation of oxygen. (1) Sickness is a condition that is distinguished by the presence of red blood cells (RBCs) or hemoglobin concentrations that are abnormally low. (2) Pallor is a clinical condition that is distinguished by a reduction in the quantity of red blood cells (RBCs) as a result of the breakdown processes associated with the age, guideline, or reusing of RBCs. The blood's ability to transport oxygen is reduced as a result of a decrease in the convergence of hemoglobin (Hb). (3) Anemia is a hematological disorder that is prevalent and affects approximately one-third of the global population. (4) Pallor, a condition that affects approximately one billion individuals worldwide, is primarily caused by a deficiency of iron. (5) A hemoglobin concentration of less than 13 g/dL in men and less than 12 g/dL in women is the definition of illness, according to the World Health Organization (WHO). Debilitation is frequently attributed to a fundamental condition, such as starvation, iron deficiency, injury, or irresistible illness. In approximately 20% of the instances, it is unlikely that an immediate connection between fragility and these elements will be demonstrated. (6) Using complete blood count (CBC) testing is an advantageous approach for diagnosing anemia,

and the physical examination can also yield substantial information. (7) Fatigue is a common feeling of extreme tiredness, weakness, and decreased energy that can affect both the body and mind, leading to lower energy levels and reduced ability to operate efficiently. Anemia is mostly characterized by the symptom of fatigue. (8) An action that assesses the impact of wellbeing status is wellbeing-related personal satisfaction (HRQOL). medical care, and health interventions on an individual's overall well-being. (9) Individuals whose hemoglobin level is 10 g/dL or lower have a decrease in their subjective well-being. Furthermore, this decline was also noted in those with mild to moderate anemia (hemoglobin 10-12 g/dL) in comparison to those with hemoglobin levels beyond 12 g/dL. (10) Anemia, the most prevalent hematological disorder, is linked to a decrease in physical performance. Insufficient amounts of hemoglobin can lead to insufficient oxygen transport to the skeletal muscles, resulting in reduced muscular performance. (11) A direct relationship exists between the improvement of the blood's ability to carry oxygen and both O<sub>2</sub>max and endurance capacity. (12) This investigation was conducted with the following objectives to ascertain the hemoglobin levels and assess if therapy can enhance the standard of living among youthful adults. The objective of this inquiry is to investigate the correlation between

hemoglobin levels and wellness-related quality of life (HRQOL), with a particular emphasis on the effects on actual work, disposition and the capacity to engage in daily activities, as well as the alleviation of fatigue.

**METHODS:**

The Descriptive and co-relational research was conducted in Undergraduate university students of the private and public sectors. The sample size was 300. The data was collected by using the standardized assessment tools after taking their consent form. The study protocol was in accordance with the principles outlined in the Statement of Helsinki and was approved by the Morals Board of Trustees of Riphah Global College. The 300 participants were included with Age between 18 to 25 years (13) Each gender was included (14) The excluded participants have hematological blood disorders. Under any Psychotic treatment or medication. Any treatment procedure or taking medication for anemia (15) Hemoglobin level was diagnosis by CBC. Fatigue severity scale – (FSS) for measuring fatigue in Participations.

Krupp et al. created the first FSS, a nine-item questionnaire. (16) Short form 36 health survey- (SF36) The brief form is a frequently used questionnaire for assessing self-reported HRQOL in eight distinct health areas. Subscales of the health domain of the SF 36v2. The International Physical Activity Questionnaire-Short Form (IPAQ) is one of the most frequently used self-report questionnaires for evaluating physical activity levels. The questionnaire comprises four distinct categories of physical activity: transportation, work-related exercise, housework/gardening, and leisure activity. Furthermore, it assesses sedentary behaviors, with a particular emphasis on the duration of time spent seated, during durations of moderate and intense physical activity that occurred within the previous week. (43) The SPSS form 21 was employed to analyse the information that was collected. The mean and standard deviation of the socioeconomic characteristics of each member were determined. In order to examine the correlation between hemoglobin and a wide range of variables, the chi-square test was implemented. The mean ± standard deviation of each factor was ascertained.

**RESULTS:**

**Table 1: Demographics and Participants**

	Mean± Standard Deviation	n (%)
<b>Gender:</b> Male/ Female		26 (8.67%)/ 274 (91.33%)
<b>Age</b>	20.73±1.89	
<b>Weight</b>	56.75±10.67	
<b>Height</b>	5.35±.36	
<b>BMI</b>	22.17±14.16	
<b>Hemoglobin Level</b>	11.61±1.55	
<b>Marital status</b> Married/ Unmarried		14(4.67%)/286 (95.33%)

Number of participants who encountered the inclusion conditions were i.e. N=300. According to gender distribution Male was 26 (8.67%) while female was 274 (91.33%). The mean weight of students was 56.75 (10.676) kg, and average height was 5.35(.36), while the mean of BMI was 22.17 (14.16) kg/m2. The average haemoglobin level of students was 11.61(1.55) mg/dL, that was also in normal ranges. (Table 1)

**Table 2: Mean and standard deviation of assessment tools.**

Assessment Tools	Mean± Standard deviation
<b>FSS</b>	38.33±11.28
<b>IPAQ: (physical activity status)</b> <b>(Physical activity status with METs)</b>	1.65±.813 2.60±.88
<b>SF36</b>	93.44±8.44

The mean of FSS was 38.33±11.28. The mean of physical activity status and physical activity status with METs was 1.65±.813 and 2.60±.88 respectively. The mean of SF36 was 93.44±8.44. (Table 2)

**Table-3: Correlation between Assessment tools and hemoglobin level**

Assessment Tools	Correlation “r” with Hemoglobin Level	p-value
<b>Hemoglobin level with FSS</b>	-.313	.000
<b>Hemoglobin level with SF36</b>	.349	.000
<b>Hemoglobin level with physical activity status</b>	-.046	.429
<b>Hemoglobin level with physical activity status METs</b>	-.060	.301

There was statistically low positive correlation between haemoglobin level and SF-36 (r =.349) but highly significant association. Pearson correlation of haemoglobin level with FSS was negative low (r=-.313) but significant association with it, physical activity status and physical activity status with METs was negligible (r=-0.46) and (r=-0.60) respectively and have no significant association with haemoglobin level. (Table 3)

**DISCUSSION:**

The present study included a cohort of 300 participants, comprising individuals from both the male and female sexes. The relationship between hemoglobin levels and SF-36 and FSS can be

characterized as a mild positive correlation with SF-36 and a robust negative correlation with FSS. The correlation between the degree of physical activity and the concentration of hemoglobin, as well as the association between physical activity status and METs

with hemoglobin level, was shown to be modest. However, these findings did not show any statistical significance. Like the aforementioned study, a cross-sectional analysis was carried out on 981 young Saudi university students who displayed indications of being in good physical condition. According to a study, 98.5% of females and 99% of males exhibited Hb-A2 levels that fell within the normal range, confirming the presence of a normal type of hemoglobin. (19) W. Carlisa's research indicates a weak negative association between hemoglobin levels and the Fatigue sub score. Nevertheless, the data did not demonstrate statistical significance. (20) In order to assess the influence of fatigue on a diversity of aspects of health-related quality of life (HRQOL), including mental, social, and physical well-being, a comprehensive assessment was conducted. A robust correlation between reductions in infirmity and improvements in health-related quality of life (HRQOL) was illustrated in an experimental investigation. Additionally, these improvements impacted the economic, social, and domestic well-being of individuals. (21) The research conducted in the present study indicated that all 8 domains exhibited normal scores. Therefore, the study concluded that individuals who were in good physical health enjoyed a higher standard of living. Furthermore, it was shown that fatigue was not associated with the severity of anemia. (22) The Administrations Establishment of Clinical Sciences conducted a cross-sectional evaluation in which members were administered the SF-36 survey to evaluate their wellbeing-related personal satisfaction (HRQOL). The ratings for the 8 spaces, as well as the synopses for the physical and mental components, were obtained through computations. The analysts concluded that students who achieved exceptional academic performance also exhibited exceptional physical health in a variety of regions. The mental health of clinical students, particularly female students, falls short of the standard norm. (9) A self-directed investigation was conducted at Jazan University in Gizan, Saudi Arabia. In order to ascertain the serum ferritin levels, serum iron levels, and a comprehensive blood count, a comprehensive examination of the specimens was conducted. The total number of male members was 81, which accounts for 95.3% of the total. had hemoglobin levels that fell within the normal range of  $14.99 \pm 1.11$  g/dl and were not affected by anemia. There were only four males who had low levels of hemoglobin, specifically below 13.0 g/dl, and they were categorized as anemic. The user's input comprises the integer value 14. An extensive inquiry has determined that individuals afflicted with chronic anemia may experience an extensive array of physical, social, practical, and personal challenges that may arise during the course of routine activities. Fatigue can be associated with emotional disruptions, sleep disruptions, and increased susceptibility to infectious diseases. (3) A further investigation discovered that heightened susceptibility to fatigue is also linked to a decrease in hemoglobin levels and exerts a substantial influence on the overall quality of life. The numerical value is 23. Contrarily, based on the present investigation, the majority of the persons evaluated for Anemia were females who exhibited regular levels of hemoglobin and displayed no indications of anemia. Unlike the findings of this study, W. Hanneke et.al determined that The Health-Related Quality of Life (HRQoL) of individuals aged 60 and older is adversely affected by anemia, but not younger individuals. The specialists discovered a negative relationship between hemoglobin levels and overall endurance, particularly in relation to actual labor, in terms of wellbeing related personal satisfaction (HRQoL). (24) Unlike this study, earlier inquiries exclusively involved individuals with hemoglobin levels that fell within the normal range. Taibah College utilized an examination study that included 268 female students. A total of 171 children, which accounted for 64% of the total population, were identified as fragile. The pervasiveness of fragile (10-11 g/dL), moderate (7-10 g/dL), and serious (Hb <7 g/dL) delicacy was 45%, 49%, and 6%, individually. (15)

#### CONCLUSION:

This study showed that hemoglobin had strong correlation and high association on quality of life while week or negligible correlation and highly significant association with fatigue and have negligible correlation and non-significant association with physical performance among students.

#### Author Contributions:

**Conception and design:** *Tehreem Mukhtar*

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**Drafting of the article:** *Amna Ali*

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**Conflict of Interest:** *None declared*

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