RESEARCH OF GLYCAEMIC CONTROL AND ANEMIA PREVALENCE IN PEOPLE WITH TYPE 2 DIABETES MELLITUS

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Conflicts of Interest: Nil

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ABSTRACT

Background: India is known as the diabetes mellitus capital because the issue is so serious there. Industrialization and urbanization are to blame for the emergence of this lifestyle-related disease.

Aims and Objectives: to research the prevalence of anemia and glycaemic control in people with type 2 diabetes mellitus.

Methodology: This cross-sectional research was conducted from July 2021 to June 2022 at the pathology department of a tertiary care teaching hospital. All type 2 diabetes mellitus subjects who were either admitted to IPD or present at OPD had their anemia checked. The pilot research was place prior to the start of this investigation and lasted one month. The ultimate sample size was 912, and the 912 type 2 diabetes mellitus subjects with written informed consent were enrolled in our research at random over the course of a year. During this time, the prevalence of anemia was 18%. All subjects had their age, sex, and other pertinent information recorded, and all had HbA1C and Hb% tests. The SPSS software-calculated Chi-square test was used for the statistical analysis.

Results: According to our survey, the majority of subjects were between the ages of 40 and 50 (43.42%), followed by 30 to 40 (21.49%), 50 to 60 (14.69%), >60 (12.72%), and 20 to 30 (7.58%). Subjects were mostly male (55.70%) and female (44.30%). In contrast to 56.53% of subjects who had excellent glycaemic control, 27.84% of subjects with good control, 9.09% of subjects with moderate control, and 6.53% of subjects with poor glycaemic control, 43.27% of subjects with poor glycaemic control, 37.50% of subjects with moderate control, 14.42% of subjects with good control, and only 4.81% of subjects with excellent glycaemic control were anaemic. This makes it evident that the prevalence of anemia increases along with the level of HbA1C in relation to poor glycaemic control. This distinction is statistically significant (p 0.0001; df = 3, 2 = 168.1).

Conclusion: According to the results of our research, anemia was more common in subjects who had poor glycaemic control.

Key Words: Glycaemic control (HbA1C), type 2 Diabetes mellitus, Anemia(Hb).

INTRODUCTION

India is renowned as the diabetes mellitus capital because the issue is so serious there. Industrialization and urbanization are to blame for the emergence of this lifestyle-related disease[1]. Diabetes mellitus mellitus (DM) is a prevalent metabolic disorder that causes micro and macrovascular problems as well as a high rate of morbidity. Subjects with type 2 diabetes mellitus frequently get anemia[2]. This is a reflection of the renal's crucial role in the regulation of hemopoiesis, in detecting changes in tissue oxygenation, and ultimately in triggering the production of erythropoietin by peritubular interstitial fibroblasts of the renal cortex and outer medulla, which in turn stimulates the development of hemopoietic precursors in the bone marrow[3]. Numerous hemopoietic stresses, such as reduced red cell survival, covert blood losses, undernutrition, and systemic inflammation, are linked to uremia[4]. Renal anemia, however, appears to be primarily caused by the renal's inability to release more erythropoietin in response to a drop in hemoglobin (Hb) levels. According to several studies, diabetes mellituss get anemia twice as frequently as non-diabetes mellituss. One-

quarter of diabetes mellitus individuals have anemia that is undiagnosed[5]. Compared to subjects with renal impairment from other causes, subjects with diabetes mellitus also experience earlier onset and more severe anemia[6]. Recent research has demonstrated a relationship between anemia and relatively low serum erythropoietin levels in people with type 1 or type 2 diabetes mellitus, even in the absence of severe renal disease or overt uremia[7]. In addition to renal illness, the cause of anemia in diabetes mellitus is multifaceted and involves autoimmune diseases, medications, hormonal abnormalities, dietary deficits, and inflammation[8]. Anemia is now known to be a factor in the onset and progression of both microvascular and macrovascular problems of diabetes mellitus, which negatively affects subjects' quality of life and places additional strain on their health. In light of glycaemic control, we looked at the prevalence of anemia in type 2 diabetes mellitus subjects[9].

Aims and Objectives: to research the prevalence of anemia and glycaemic control in people with type 2 diabetes mellitus.

MATERIAL AND METHODS

This cross-sectional research was conducted in the Department of Pathology from July 2021 to June 2022 over a one-year span. All type 2 diabetes mellitus subjects who were either admitted to IPD or present at the OPD had their anemia checked. The pilot research was place prior to the start of this investigation and lasted one month. The final sample size was 456 and the 456 type 2 diabetes mellitus subjects with written informed consent were included, randomly, in our research over a one-year period. During this time, the prevalence of anemia was 18%. The sample size for the research was calculated using the formulas n=sample size, p=prevalence of anemia in type 2 diabetes mellitus, q=100-p, and l=allowable error 20% of p. All subjects had their age, sex, and other pertinent information recorded, and all had HbA1C and Hb% tests. The Chi-square test was used in the statistical analysis, which was conducted using SPSS 19 version software.

RESULTS

Table 1: Distribution of the subjects as per the Age

Age	No.	Percentage (%)
20-30	70	7.68
30-40	196	21.49
40-50	396	43.42
50-60	134	14.69
>60	116	12.72
Total	912	100.00

Subjects between the ages of 40 and 50 made up the majority (43.42%), followed by those between 30 and 40 (21.49%), 50 and 60 (14.69%), above 60 (12.72%), and 20 to 30 (7.38%).

Table 2: Distribution of the subjects as per the sex

Sex	No.	Percentage (%)
Male	508	55.70
Female	404	44.30
Total	912	100

Subjects were mostly male (55.70%) and female (44.30%).

Table 3: Distribution of the subjects as per the Glycaemic control and prevalence of Anemia

Glycaemic control	Anaemic	Normal	Total
Excellent control	10 (4.81)	398 (56.53)	408
Good control	30 (14.42)	196 (27.84)	226
Moderate control	78 (37.50)	64 (9.09)	142
Poor control	90 (43.27)	46 (6.53)	136
Total	208 (100)	704 (100)	512

($\chi^2 = 168.1$, df=3, p< 0.0001)

In contrast to 56.53% of subjects who had excellent glycaemic control, 27.84% of subjects with good control, 9.09% of subjects with moderate control, and 6.53% of subjects with poor glycaemic control, 43.27% of subjects with poor glycaemic control, 37.50% of subjects with moderate control, 14.42% of subjects with good control, and only 4.81% of subjects with excellent glycaemic control were anaemic. This makes it evident that the prevalence of anemia increases along with the level of HbA1C in relation to poor glycaemic control. This distinction is statistically significant (p 0.0001; df = 3, 2 = 168.1).

DISCUSSION

Numerous studies on the treatment of anemia in diabetes mellitus subjects have found that correcting anemia improves the quality of life for diabetes mellitus subjects. In our research, the same scenario was evident[10]. Diabetes mellitus frequently presents with anemia, which frequently goes undiagnosed. According to the WHO, the global prevalence of anemia in the general population is 24.8%. In terms of the overall prevalence, India will experience the largest absolute growth in the number of diabetes mellituss, rising from 171 million in 2000 to an estimated 366 million by the year 2030. Anemia is a chronic condition that also lowers quality of life[11]. Anemia in diabetes mellituss was once thought to be caused by renal pathology, but studies now reveal that anemia in diabetes mellitus subjects appears earlier than in people with renal involvement from other causes. Observational studies have also shown that diabetes mellituss with low hemoglobin levels may be at higher risk for renal disease development as well as cardiovascular morbidity and mortality[12-14]. In our research, we found that subjects aged 40 to 50 made up the majority (43.42%), followed by those aged 30 to 40 (21.49%), 50 to 60 (14.69%), >60 (12.72%), and 20 to 30 (7.58%). Male subjects made up 55.70% of the total population, while female subjects made up 44.30%. In contrast to 56.53% subjects who had excellent glycaemic control, 27.84% good control, 9.09% moderate control, and 6.53% subjects who had poor glycaemic control, 43.27% subjects with poor glycaemic control, 37.50% moderate control, 14.42% good control, and only 4.81% subjects with excellent control were anaemic. This shows that the prevalence of anemia increases along with the level of HbA1 C in relation to poor glycaemic management, and this difference is statistically significant (2 = 168.1, df=3, p 0.0001). These results are comparable to those of Gunvanti B. Rathod et al, who discovered that anemia was prevalent in 18% of diabetes mellitus subjects. Anemia was about equally prevalent in both men (17.54%) and women (18.60%). A estimated creatinine clearance of >60 ml/min was present in 72% of anaemic individuals and a serum creatinine level of 74% of anaemic subjects was 110 mol/l. If glycaemic management is insufficient, this supports the higher prevalence of anemia in Type 2 diabetes mellitus subjects. This may be caused by complications of diabetes mellitus that impact the renals in individuals with CRF because there is a shortage of erythropoietin, which inhibits heme production[15-18]. Additionally, Vitalis F. Feteh discovered that 263 out of the 636 individuals evaluated (prevalence rate: 41.4%) had anemia. Although up to 31.9% of subjects with normal renal function had anemia, the prevalence of anemia rose noticeably as renal function declined. Anaemic diabetes mellitus subjects differed from non-anaemic diabetes mellitus subjects in that they were older, had diabetes mellitus for a longer time, had a lower eGFR, had a greater prevalence of proteinuria, and had diabetes mellitus retinopathy (p 0.05)[19,20]. In multivariable logistic regressions, eGFR and the presence of retinopathy were the two independent predictors of pervasive anemia (p = 0.001 and p = 0.023, respectively).

CONCLUSION

According to the results of our investigation, anemia was more common in subjects who had poor glycaemic control. Numerous studies on the treatment of anemia in diabetes mellitus subjects have found that correcting anemia improves the quality of life for diabetes mellitus subjects. In our research, the same scenario was evident. Diabetes mellitus usually presents with anemia, which frequently goes undetected. According to the WHO, the global prevalence of anemia in the general population is 24.8%. (12.7 in males and 30.2 in females).

REFERENCES

1. Rathod GB, Rathod S, Parmar P, Parikh A. Research of knowledge, attitude and practice of general population of Waghodia towards Diabetes mellitus Mellitus. International Journal of Current Research and Review, 2014; 6(1): 63-68.

2. US Renal Data System. USRDS, 2002. Annual data report. National institutes of health, National institute of Diabetes mellitus and digestive and renal diseases, 2001.

3. Srinivasan AR, Niranjan G, KuzhandaiVelu V, Parmar P, Anish A. Status of serum magnesium in type 2 diabetes mellitus mellitus with particular reference to serum triacylglycerol levels. Diabetes mellitus MetabSyndr., 2012; 6: 187-189.

4. Thomas M.C., MacIsaac R.J., Tsalamandris C., et al. Unrecognized anemia in subjects with diabetes mellitus: A cross-sectional survey. Diabetes mellitus Care, 2003; 26(4): 1164–1169.

5. Thomas M.C. Anemia in diabetes mellitus: Marker or mediator of micro-vascular disease? Nature Clinical Practice. Nephrology, 2007; 3: 20–30.

6. Inomata S, Itoh M, Imai H, et al. Serum levels of erythropoietin as a novel marker reflecting the severity of diabetes mellitus nephropathy. Nephron, 1997; 75: 426-430.

7. Thomas MC, Cooper ME, Tsalamandris C, et al. Anemia with impaired erythropoietin response in diabetes mellitus subjects. Arch Intern Med, 2005; 165: 466- 469.

8. Wright JA, Oddy MJ, Richards T. Presence and characterisation of anaemia in diabetes mellitus foot ulceration. Anemia. 2014; 2014:104214. doi: 10.1155/2014/104214. Epub 2014 Jul 23.

9. Abate A, Birhan W, Alemu A. Association of anemia and renal function test among diabetes mellitus mellitus subjects attending FenoteSelam Hospital, West Gojam, Northwest Ethiopia: a cross sectional research. BMC Hematol. 2013 May 7; 13(1):6. doi: 10.1186/2052-1839- 13-6.

10. Thomas MC, Cooper ME, Rossing K, Parving HH. Anaemia in diabetes mellitus: Is there a rationale to TREAT? Diabetologia. 2006 Jun;49 (6) : 1151-7. Epub 2006 Apr 4.

11. El-Achkar TM, Ohmit SE, McCullough PA, Crook ED, Brown WW, Grimm R, Bakris GL, Keane WF, Flack JM; Renal Early Evaluation Program. Higher prevalence of anemia with diabetes mellitus mellitus in moderate renal insufficiency: The Renal Early Evaluation Program. Renal Int. 2005 Apr; 67(4):1483-8.

12. New JP, Aung T, Baker PG, Yongsheng G, Pylypczuk R, Houghton J, Rudenski A, New RP, Hegarty J, Gibson JM, O'Donoghue DJ, Buchan IE. The high prevalence of unrecognized anaemia in subjects with diabetes mellitus and chronic renal disease: a populationbased research. Diabet Med. 2008 May; 25 (5) : 564-9. doi: 10.1111 /j. 1464 - 5491. 2008. 02424. x.

13. Silverberg DS, Wexler D, Blum M, Tchebiner JZ, Sheps D, Keren G, Schwartz D, Baruch R, Yachnin T, Shaked M, Schwartz I, Steinbruch S, Iaina A. The effect of correction of anaemia in diabetes mellituss and non-diabetes mellituss with severe resistant congestive heart failure and chronic renal failure by subcutaneous erythropoietin and intravenous iron. Nephrol Dial Transplant. 2003 Jan;18(1):141-6.

14. World Health Organization. Haemoglobin concentrations for the diagnosis of anaemia and assessment of severity. Geneva: world health organization; 2010.

15. Wild S, Roglic G, Green A, Sicree R, King H. Global prevalence of diabetes mellitus: estimates for the year 2000 and projections for 2030.Diabetes mellitus Care.2004 May; 27(5):1047-53.

16. Thomas M, Tsalamandris C, MacIsaac R, Jerums G. Anaemia in diabetes mellitus: an emerging complication of microvascular disease. Curr Diabetes mellitus Rev. 2005 Feb; 1(1):107-26.

17. Osama El, MinshawyEman El. Anemia and Renal Dysfunction in Type 2 Diabetes mellitus Subjects. Nephrourology monthly. 2010 Sep; 02(04):543-52.

18. Cristoph H. Anaemia in Subjects with Diabetes mellitus Nephropathy – Prevalence, Causes and Clinical Consequences. European Cardiovascular Disease 2007.

19. Rathod GB, Parmar P, Rathod S, Parikh A. Prevalence of anemia in subjects with Type 2 Diabetes mellitus Mellitus at Gandhinagar, Gujarat, India. IAIM, 2016; 3(3): 12-16.

20. Vitalis F. Feteh, Simeon-Pierre Choukem, Andre-Pascal Kengne. Anemia in type 2 diabetes mellitus subjects and correlation with renal function in a tertiary care sub Saharan African hospital: a cross-sectional research. Feteh et al. BMC Nephrology (2016) 17:29