

Comparison of Haemoglobin, Red Cell Distribution Width and RBC Value in Normal and Oral Carcinoma Patients: A Retrospective Study

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ABSTRACT

Introduction: Oral squamous cell carcinoma is a cancer of the head and neck region affecting the various parts of the oral cavity such as the lining of the lips, mouth, upper part of the throat etc. Anaemia due to cancer comes under the category of anaemia caused due to chronic disease. Red Blood Cells are also known as erythrocytes, in most cancer patients are damaged due to the cancer treatments such as cancer chemotherapy, radiation therapy which damages and kills cancer cells. Studies regarding red cell count have concluded that there is a positive correlation between RBC count and cancer survival. Thus, this study aims at comparing and correlating the haemoglobin, RDW and RBC values of normal and oral squamous cell carcinoma patients.

Materials and methods: Haematology reports of 10 normal patients and 10 oral squamous cell carcinoma patients were collected from Saveetha Dental College and Hospitals, Chennai from the patient record management system. The values of the parameters (haemoglobin, red cell distribution width and red cell value) were entered in an excel sheet and were imported to SPSS software for statistical analysis. The statistical test done was an independent t-test.

Results and discussion: The data from the present study was collected and was statistically analysed using SPSS software. Inferring from the results of this study, the mean value of haemoglobin in the control group is 13.93 ± 2.8 , the mean value of haemoglobin in the cancer group is 12.97 ± 5.0 , the mean value of RDW in the control group is 12.51 ± 1.44 , the mean value for RDW in cancer group is 12.86 ± 1.4 , the mean value of RBC in the control group is 4.84 ± 0.9 and the mean value of RBC in cancer group is 4.59 ± 1.54 . The P-value of haemoglobin is 0.135 (>0.05); p-value of RDW is 0.843 (>0.05) and p-value of RBC is 0.429 (>0.05).

Conclusion: This study showed no statistical significance among the haemoglobin, RDW and RBC values among cancer and control patients.

Key words: Haemoglobin, RDW, RBC count, Novel method, Oral squamous cell carcinoma

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INTRODUCTION

Oral squamous cell carcinoma is a cancer of the head and neck region affecting the various parts of the oral cavity such as the lining of the lips, mouth, upper part of the throat etc [1]. The carcinoma originates as a painless whitish patch which eventually develops to form a thickened red patch which continues to grow [2]. The main risk factors for oral cancer include tobacco, alcohol consumption, HPV infection, chewing betel nut and excess sun exposure. The treatments for oral cancer depend on the size of cancer, location and spread of cancer and it includes a combination of various surgeries such as radiation therapy, chemotherapy or targeted therapy [3]. Based on the epidemiology studies in 2012, more than three hundred patients have been affected with carcinoma in the oral cavity and the lip region which makes oral cancer one of the most prevalent cancers to occur [4].

Anaemia is the most related complication in all types of cancer and is known to reduce the quality of life [5]. Anaemia due to cancer comes under the category of anaemia caused due to chronic disease and this is a result of the production of disease-stimulated inflammatory cytokines such as interleukin-1, TNF (tumour necrosis factor), interferons etc. which leads to the inhibition of erythropoiesis due to the reduction in erythropoietin production and impairing the use of iron [6]. Increasing evidence has been obtained which suggests the correlation of anaemia and poor prognosis in cancer patients [7].

Red Cell Distribution Width (RDW) is a parameter that gives the size heterogeneity of the red blood cell and usually helps in differentiating the various types of anaemia [8]. RDW is also known to primarily reflect impaired erythropoiesis and abnormal red cell survival. It also correlates with other factors such as inflammation, nutritional disorders, impaired kidney function and prediction of various forms of carcinoma [9]. Studies conducted regarding the association of RDW with cancer resulted that there exists a positive correlation between a

higher RDW value and increased mortality risk (for every 1% increase in RDW, the mortality rate increased by 14%) [10]. Red Blood Cells are also known as erythrocytes, in most cancer patients are damaged due to the cancer treatments such as cancer chemotherapy, radiation therapy which damages and kills cancer cells. Low levels of RBC often show symptoms like fatigue, shortness of breath, light-headedness, increased heart rate, headaches etc. Studies regarding red cell count have concluded that there is a positive correlation between RBC count and cancer survival [11]. Our team has extensive knowledge and research experience that has translated into high quality publications [12-31]. Thus, this study aims at comparing and correlating the haemoglobin, RDW and RBC values of normal and oral squamous cell carcinoma patients.

MATERIALS AND METHODS

Haematology reports of 10 normal patients and 10 oral

squamous cell carcinoma patients were collected from Saveetha Dental College and Hospitals, Chennai from the patient record management system. Before the initiation of the study, clearance was obtained by the Scientific Review Board with ethical approval number IHEC/SDC/BDS/1996/01. The values of the parameters (haemoglobin, red cell distribution width and red cell value) along with the age, gender, treatment is given, grading and staging of the cancer patients were entered in an excel sheet and were imported to SPSS software for statistical analysis. The statistical test done was an independent t-test.

RESULTS

Table 1: Table showing the haemoglobin, RDW, RBC and P values obtained from previous literature.

Literature	Haemoglobin	RDW	RBC	P-Value
Qin, al. [34]	-	13.78 ± 2.38	-	P<0.05
Lind et al. [32]	10.66 ± 2.08	-	-	P<0.05
Brundha et al. [36]	-	-	4.35 ± 1.1	P>0.05
Groopman et al. [33]	12.56 ± 8.6	-	4.66 ± 15.2	P>0.05
Montagnana et al. [35]	-	13.89 ± 1.34	-	P<0.05
Present Study	12.97 ± 5.0	12.86 ± 1.4	4.59 ± 1.54	P>0.05

Table 2: showing the group statistics for haemoglobin, RDW and RBC value. The mean value of haemoglobin in the control group is 13.93 ± 2.8, the mean value of haemoglobin in the cancer group is 12.97 ± 5.0, the mean value of RDW in the control group is 12.51 ± 1.44, the mean value for RDW in the cancer group is 12.86 ± 1.4, the mean value of RBC in the control group is 4.84 ± 0.9 and the mean value of RBC in cancer group is 4.59 ± 1.54.

		Group statistics			
Groups		N	Mean	Std. Deviation	Std. Error mean
HB	Control	10	13.93	1.40004	0.44273
	Cancer	10	12.97	2.59746	0.82139
RDW	Control	10	12.51	0.72946	0.23068
	Cancer	10	12.86	0.70427	0.22271
RBC	Control	10	4.849	0.45598	0.14419
	Cancer	10	4.595	0.77855	0.2462

Table 3: Shows the P-value of the parameter's haemoglobin, RDW and RBC value. The P-value of haemoglobin is 0.135, the p-value of RDW is 0.843 and the p-value of RBC is 0.429.

Parameter	Independent T Test (P Value)
Haemoglobin	0.135
RDW	0.843
RBC	0.429

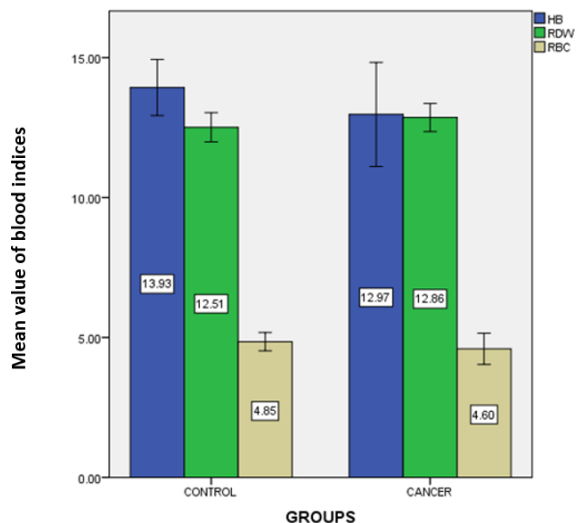


Figure 1: Bar chart representing the correlation between the groups (control and cancer) and the parameters where blue denotes 'haemoglobin', green denotes 'RDW' and yellow denotes 'RBC'. The X-axis represents the groups and Y-axis represents the percentage distribution of the mean (%). The mean value of haemoglobin in the control group is 13.93 ± 2.8 , the mean value of haemoglobin in the cancer group is 12.97 ± 5.0 , the mean value of RDW in the control group is 12.51 ± 1.44 , the mean value for RDW in the cancer group is 12.86 ± 1.4 , the mean value of RBC in the control group is 4.84 ± 0.9 and the mean value of RBC in cancer group is 4.59 ± 1.54 .

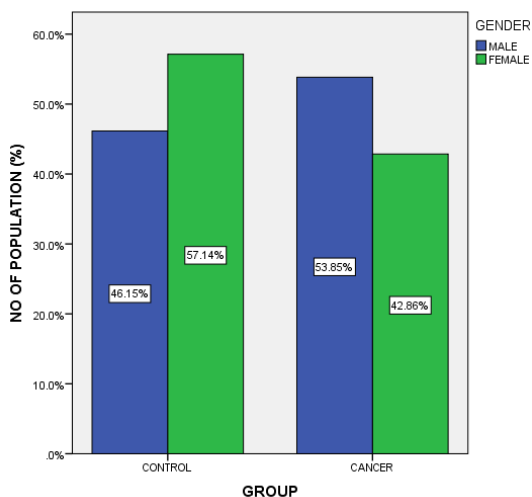


Figure 2: Bar chart representing the percentage of population in the groups (control and cancer) and the genders where blue denotes 'male' and green denotes female. The X-axis represents the group and the Y-axis represents the percentage distribution of the population (%).

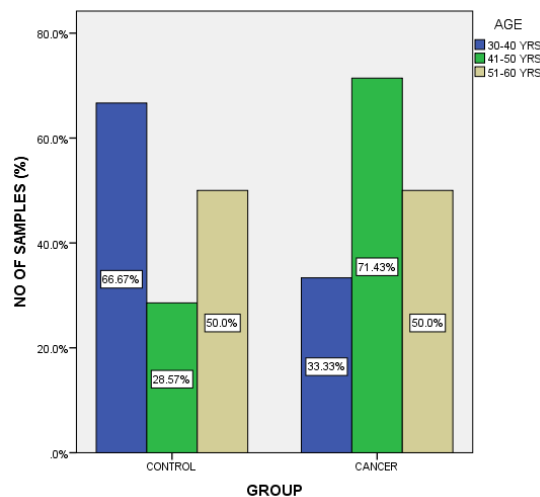


Figure 3: Bar chart representing the percentage of samples in each group and the age and the study population where blue denotes '30-40 years', green denotes '41-50 years' and yellow denotes '51-60' years. The X-axis represents the control and cancer group and Y-axis represents the percentage distribution of the number of samples (%).

DISCUSSION

The data from the present study was collected and was statistically analysed using SPSS software. Inferring from the results of this study, the mean value of haemoglobin in the control group is 13.93 ± 2.8 and the mean value of haemoglobin in the cancer group is 12.97 ± 5.0 (Table 2) The mean difference is -0.960 . Since there exists a mean difference between the control and the cancer groups, an independent t-test was done which revealed the p-value to be $0.135 (>0.05)$ (Table 3). Therefore, it is statistically insignificant. A study done by M Lind et al., comparing the haemoglobin level in cancer and control patients revealed that there is a marked reduction in the haemoglobin level of the cancer group compared to the control group (mean= 10.66 ± 2.08) and the P-value <0.05 , proving it statistically significant [32]. Groopman et al. conducted a similar study but concluded with contrasting results. The mean value of haemoglobin in cancer patients was found to be 12.56 ± 8.6 and the p-value was greater than 0.05 deeming it statistically insignificant [33]

The mean value of RDW in the control group is 12.51 ± 1.44 and the mean value for RDW in the cancer group is 12.86 ± 1.4 . The mean difference is 0.350 . Since there exists a mean difference between the control and the cancer groups, an independent t-test was done which revealed the p-value to be $0.843 (>0.05)$ (Table 3). Hence, it is statistically insignificant. In a study on the value of red cell distribution width in patients with ovarian cancer and compared the RDW value of the cancer group and control group which resulted in the mean value of 13.78 ± 2.83 and a p-value of < 0.05 hence, statistically significant. [34]. (Table 1) A study by Martina Montagnana et al. done regarding the RDW in cancer and control patients resulted in a mean value of 13.89 ± 1.34

and p-value < 0.05. [35]. Hence, the RDW value among cancer and control group in both previous studies were statistically significant which is contrasting from the results obtained in this present study.

The mean value of RBC in the control group is 4.84 ± 0.9 and the mean value of RBC in the cancer group is 4.59 ± 1.54 (Table 2). The mean difference is -0.250. There exists a difference, hence an independent t-test was done which revealed the p-value to be 0.429 (>0.05). Hence, it is statistically insignificant. A study by M.P. Brundha et al. about the red cell count in cancer patients, resulted in a mean value of 4.35 ± 1.1 and p-value >0.05. Hence, it is statistically insignificant [36]. (Table 1) The mean value of RBC count in a study by Groopman et al. was found to be 4.66 ± 15.2 and a p-value >0.05 therefore it is statistically insignificant [33]. Hence, both the previous literature had concluded that the RBC value in cancer and control group was statistically insignificant.

Association between the group (control and cancer) and the parameter, age and gender was done. The independent-sample t-test done between the groups and the parameters (haemoglobin, RDW, RBC) showed that haemoglobin value was slightly increased among the control groups compared to the cancer groups and the other two parameters, RDW and RBC did not show much difference among the two groups (Figure 1) and the p-value of all the parameters analysed were more than 0.05. Comparing the gender and the groups, it was found that the male population (53.85%) were more affected by cancer than the female population (42.86%). The age group that was most affected by cancer among the study population was found out to be 41-50 years of age (71.43%).

This present study compared the values of the parameters, haemoglobin, RDW and RBC of cancer and control groups whereas the previous literature has discussed only any one of the parameters. This study had a smaller sample size of only 20 patients among which only 10 were oral cancer patients which is a limitation. Further, the surgical and chemotherapeutic details were not included in this study. In the future, further studies regarding these parameters and their significance in cancer patients could be done with a bigger sample size which could provide better and more accurate results.

CONCLUSION

In this study, the haemoglobin and RBC count of the cancer patients were decreased compared to the control group but were statistically insignificant. The RDW value of cancer patients was increased compared to the control group but also showed no statistical insignificance. In conclusion, this study showed no statistically significant difference among the haemoglobin, RDW and RBC values between cancer and control patients.

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