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Evaluation of haematological parameters as a risk factor for head and neck cancer

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ABSTRACT

Head and Neck Squamous Cell Carcinoma (HNSCC) is a major health problem, accounting for 30-40% cancers at all sites. As various substances alter quantitatively in the serum during tumour development, we intended to explore the changes in the haematological profile in cases of HNSCC. Moreover, such studies on HNSCC patients are scanty in the North Coastal Andhra Pradesh, India. The present study is all about assessing the variations of haematological parameters in HNSCC patients. Biochemical characterization was done using standard protocols. Results were statistical analysed using Graph pad prism 7 software. Our study confirmed among different haematological parameters that there was no statistical significance found for serum creatinine, total bilirubin, haemoglobin, neutrophils, lymphocytes, haematocrit (PCV), Mean Cell Volume (MCV), Mean Cell Haemoglobin (MCH) and Mean Cell Haemoglobin Concentration (MCHC) and the statistical significance observed only for RBC count.

Keywords: Head and Neck Squamous Cell Carcinoma, Haematological parameters, Larynx , Pharynx

INTRODUCTION

Head and neck cancer are a complex disorder that includes mostly squamous cell carcinoma that can develop in the throat, larynx, nose, sinuses and mouth. Head and Neck Squamous Cell Carcinoma (HNSCC) remains a major clinical challenge in oncology and represent the sixth most common neoplasm in the world today (Denaro *et al.*, 2011). About 6, 50,000 new cases in the world are reported every year (Wei Gao *et al.*, 2012). Despite advances in treatment methods for head and neck cancer, the survival rate has not been largely improved (Argiris & Karamouzis, 2008). The major reason is that conventional treatment regimens are non-selective and are related with systemic toxicities (Vissink *et al.*, 2003 and Argiris *et al.*, 2004).

The failure is essentially due to marked clinical heterogeneity of the accumulation of multiple gene mutations, often different from each other tumour. Aim of current research is to assess the variation of haematological parameters in HNSCC patients of North Coastal Andhra Pradesh.

MATERIAL AND METHODS

This study was carried out on 50 HNSCC patients at Mahatma Gandhi cancer hospital, Visakhapatnam, Andhra Pradesh, beginning from 2016 till 2017. The patients age ranging from 30-80 years were clinically diagnosed and HNSCC confirmed after histopathological confirmation. In the present study, HNSCC cases represented squamous cell carcinoma of site. The demographic information regarding age and gender were prospectively collected along with haematological data.

Blood samples were collected to quantity the serum creatinine, total bilirubin, haemoglobin, neutrophils, lymphocytes, RBC count, haematocrit (PCV), Mean Cell Volume (MCV), Mean Cell Haemoglobin (MCH) and Mean Cell Haemoglobin Concentration (MCHC) levels were measured in male and female patients of HNSCC. This study was carried out after obtaining approval of the institutional ethical committee of Andhra University, Visakhapatnam. Each HNSCC patient signed an informed consent form before participating in the study.

Sample collection and analysis: Blood sample were collected from arm vein of all the 50 subjects of HNSCC patients. Blood test for serum creatinine, total bilirubin, haemoglobin, neutrophils, lymphocytes, RBC count, haematocrit (PCV), Mean Cell Volume (MCV), Mean Cell Haemoglobin (MCH) and Mean Cell Haemoglobin Concentration (MCHC) followed by the enzymatic method, Azobilirubin/ dyphylline method, electrical impedance method, VCS technology and VCS / Light microscopy. Statistical analysis of data was done by using the Graph pad prism 7 software. The tests were used to compare differences between male and female HNSCC patients and the significance levels of $P<0.5$ was confirmed.

RESULT AND DISCUSSION

The prevalence of cancer is often strikingly dissimilar in different groups of populations, varies greatly from one community to another and differs in different communities in the same geographic location, depending on the practices and lifestyles of the people in that location. Moreover, differences have been observed in the etiological, clinicopathological and molecular pathological profile in the head and neck cancers, particularly in the Indian subcontinent (Addala *et al*., 2012).

To identify and quantify the etiological profile that might be implicated in a selected population, it is essential to determine the behavioural patterns, habits, customs, and environmental background of the group under study. It is necessary to identify the differences, if any, in the sites, patterns and incidence rates of the disease amongst various communities living in geographic areas having varying patterns of climate and physical environments by identifying dietary habits, social customs and such other factors. Many independent researchers (Addala *et al.,* 2012; Dikshit and Kanhere 2000; Khandekar *et al.*, 2006; Sherin *et al.,* 2008 and Beahrs *et al.,* 1992) had reported the wide ranged prevalence of HNSCC cancer and its risk factors in various parts of the country.

Biomarkers are valuable adjuncts in cancer treatment and as such many studies on blood biochemistry and haematology to explore etiology of cancer and to establish tumour markers have been undertaken.

The mean age values of males and females were 52.0 and 52.7 in HNSCC patients. The mean age values were almost similar in both males and females of HNSCC patients. The P-value was statistically insignificant for age of HNSCC patients. The present study correlates with the study of Herity *et al*., 1981, shows similar mean values in both males and females of HNSCC patients.

The mean values of gender in males and females were 6.30 and 4.90 in HNSCC patients. The higher mean value

Table 1: Age and Gender of HNSCC patients.

Age and Gender	Male Mean ± SD	Female Mean ± SD	Total Mean ± SD	P- value
Age	52.0± 13.7	52.7 ± 12.4	52.2 ± 13.17	0.478
Gender	6.30 ±2.30	4.90 ± 2.09	2.72± 4.90	<0.01**

Table 2: Age and Sex wise distribution of HNSCC patients.

Age group	Male n (%)	Female n (%)	Total n (%)
30-40	**8 (16.0%)**	**3 (6.0%)**	**11(22.0%)**
41-50	**12 (24.0%)**	**6 (12.0%)**	**18(36.0%)**
51-60	**6(10.0%)**	**3 (6.0%)**	**9(18.0%)**
61-70	**4 (8.0%)**	**4 (8.0%)**	**8(16.0%)**
71-80	**3 (6.0%)**	**1(2.0%)**	**4(8.0%)**
Total	**33 (66.0%)**	**17 (34.0%)**	**50 (100.0%)**

Table 3: Site and Sex wise distribution of HNSCC patients.

S. No	Site	Male n (%)	Female n (%)	Total n (%)
1	Larynx	12 (24.0%)	3 (6.0%)	15 (30.0%)
2	Oral cavity & oropharynx	6 (12.0%)	5(10.0%)	11 (22.0%)
3	Laryngopharynx	4 (8.0%)	3 (6.0%)	7 (14.0%)
4	Nasopharynx&Paranasal	4 (8.0%)	2(4.0%)	6 (12.0%)
5	Tongue	4 (8.0%)	2 (4.0%)	6 (12.0%)
6	Other	3(6.0%)	2 (4.0%)	5(10.0%)

Table 4: Haematological parameters mean values in HNSCC patients.

S.No	Haematological parameters	Normal range	Mean ± SD Head and neckcancer n=50
1	Serum creatinine	0.8-1.5 mg/dl	3.07 ± 13.9
2	Total bilirubin	1.71-20.5 umol/l	0.6±0.4
3	Haemoglobin	13.0-17.0 gms%	14.5±16.8
4	Neutrophils	40-70%	65.9±11.6
5	Lymphocytes	18-40%	22.9±8.2
6	RBC count	4.5-5.5 mil/ cumm	4.6±1.1
7	Haematocrit (PCV)	40-50%	38.1±5.3
8	Mean Cell Volume (MCV)	80-97%	79.4± 9.6
9	Mean Cell Haemoglobin (MCH)	26.5-33.5	25.6±5.2
10	Mean Cell Haemoglobin Concentration (MCHC)	31.5-35	31.4±4.1

Table 5: Sex wise distribution of haematological parameters mean value in HNSCC patients.

S.no	Haematological parameters	Male Mean ± SD	Female Mean ± SD	P- value
1	Serum creatinine	4.1±17.9	0.9±0.3	0.138
2	Total bilirubin	0.7±0.4	0.5±0.4	0.736
3	Haemoglobin	16.3±20.5	11.11±1.6	0.219
4	Neutrophils	64.9±12.6	67.9±9.4	0.111
5	Lymphocytes	23.03±8.8	22.8±7.2	0.260
6	RBC count	4.6±0.9	4.4±1.5	0.048
7	Haematocrit (PCV)	38.4±5.2	37.6±5.6	0.845
8	Mean Cell Volume (MCV)	80.5±9.2	77.3±10.4	0.798
9	Mean Cell Haemoglobin (MCH)	25.5±5.1	25.8±5.7	0.840
10	Mean Cell Haemoglobin Concentration (MCHC)	32.1±4.2	30.7±3.6	0.448

was observed in males than females for gender. The P-values shows statistical significance for gender. Males were more prone to cancer possibly as they were used to the risk factor habits over a long time and more quantity.

The frequency of males was 66.0% (33) and females 34.0 % (17) in HNSCC patients. The frequency of males was more than the females in HNSCC patients. The increased male frequency in HNSCC patients may be due to risk factor habits overlong time more quantity, when compared to females.

The highest frequency (36.0%) was seen with in the age group of 41-50 years in both males (24.0%) and females (12.0%) of HNSCC patients. In general, for the occurrence of HNSCC 40 years was the more common age. The lowest frequency in both male (6.0%) and female (2.0%) HNSCC patients was found in 71-80 years age group. Lowest frequency in 71-80 years age group may be attributed to the death rate occurs more in 71-80 age group.

The most common site of cancer in the overall study population was larynx (30.0%), oral cavity and oropharynx (22.0%), laryngopharynx (14.0%), nasopharynx and paranasal (12.0%), tongue (12.0%) and other (10.0%).

The most common site of cancer in male study population was larynx (24.0%), oral cavity and oropharynx (12.0%), laryngopharynx (8.0%), nasopharynx and paranasal (8.0%), tongue (8.0%) and other (6.0%).

The most common site of cancer in female study population was larynx (6.0%), oral cavity and oropharynx (10.0%), laryngopharynx (6.0%), nasopharynx and paranasal (4.0%), tongue (4.0%) and other (4.0%).

The mean serum creatinine value in HNSCC patients was 3.07. The present study not correlate with the study of Abhinandan Bhattacharjee *et al.,* 2015, as his study shows lowest serum creatinine mean value.

The mean total bilirubin value was 0.6 in HNSCC patients. The present study was not correlate with the study of Hongchaunge *et al.,* 2018, as his study shows elevated total bilirubin mean value.

The mean value of haemoglobin was 14.5 in HNSCC patients whereas, the study of Abhinandan Bhattacharjee *et al.,* 2015 shows lower mean value.

The mean value of neutrophils and lymphocytes were 65.9 and 22.9 in HNSCC patients. The study was not correlate with the study of Abhinandan Bhattacharjee *et al.,* 2015 as, his study shows lower mean values.

The differences between the two studies may be attributed to the geographical or sample size variations. The mean values of RBC count, haematocrit, Mean Cell Volume (MCV), Mean Cell Haemoglobin (MCH) and Mean Cell Haemoglobin concentration (MCHC) were 4.6, 38.1, 79.4, 25.6 and 31.4 respectively in HNSCC patients. The present study was concomitant with the study of Abhinandan Bhattacharjee *et al.,* 2015, as nearly similar mean values were found in both studies.

The mean values of serum creatinine, haemoglobin and Mean Cell Volume were more in males than in female HNSCC patients. Elevated neutrophil mean value was observed in females. The other parameters mean value were almost equal in both male and female HNSCC patients. The RBC count shows statistical significance whereas, other haematological parameters were statistically insignificant in HNSCC patients.

CONCLUSION

Mean age values were almost similar in both males and females of HNSCC patients.

Males were more prone to cancer, when compared to females. More number of males and females were found in 41- 50 years age group category. Larynx and pharynx were common sites for males and females of HNSCC patients respectively. Except RBC count, other haematological parameters were statistically insignificant in HNSCC patients.

The variations in these parameters may be useful in the prediction of malignant transformation, prognosis or in treatment progress. Further study on a larger population and its response to anticancer therapy needs to be pursued before establishing these parameters as HNSCC biomarkers.

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