Effect of Obesity and Type II Diabetes on Oral Cancer Prognosis

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Aim

Oral squamous cell carcinoma (OSCC) is one of the highest-ranking cancers among both genders in Pakistan. Obesity is linked to a much higher risk for developing multiple cancer types. Individuals with Diabetes mellitus (DM) face an increased risk for developing oral cancer. Hence, the objective of this study was to identify the effect of obesity and DM on the prognosis of OSCC patients.

Methodology

This retrospective cohort analysis was conducted on 386 patients diagnosed and treated for OSCC at Aga Khan University Hospital, Karachi, Pakistan. Patient information was obtained from hospital medical records. Obesity was defined as having a body-mass-index (BMI) of ≥25 kg/m^2 according to the WHO Asian cut-offs for BMI. Patient BMI was correlated with diabetes status, clinicopathological features and overall survival. Kaplan-Meier survival analysis was performed, along with univariate and multivariate cox regression analysis to test the effect of obesity and diabetes on overall survival.
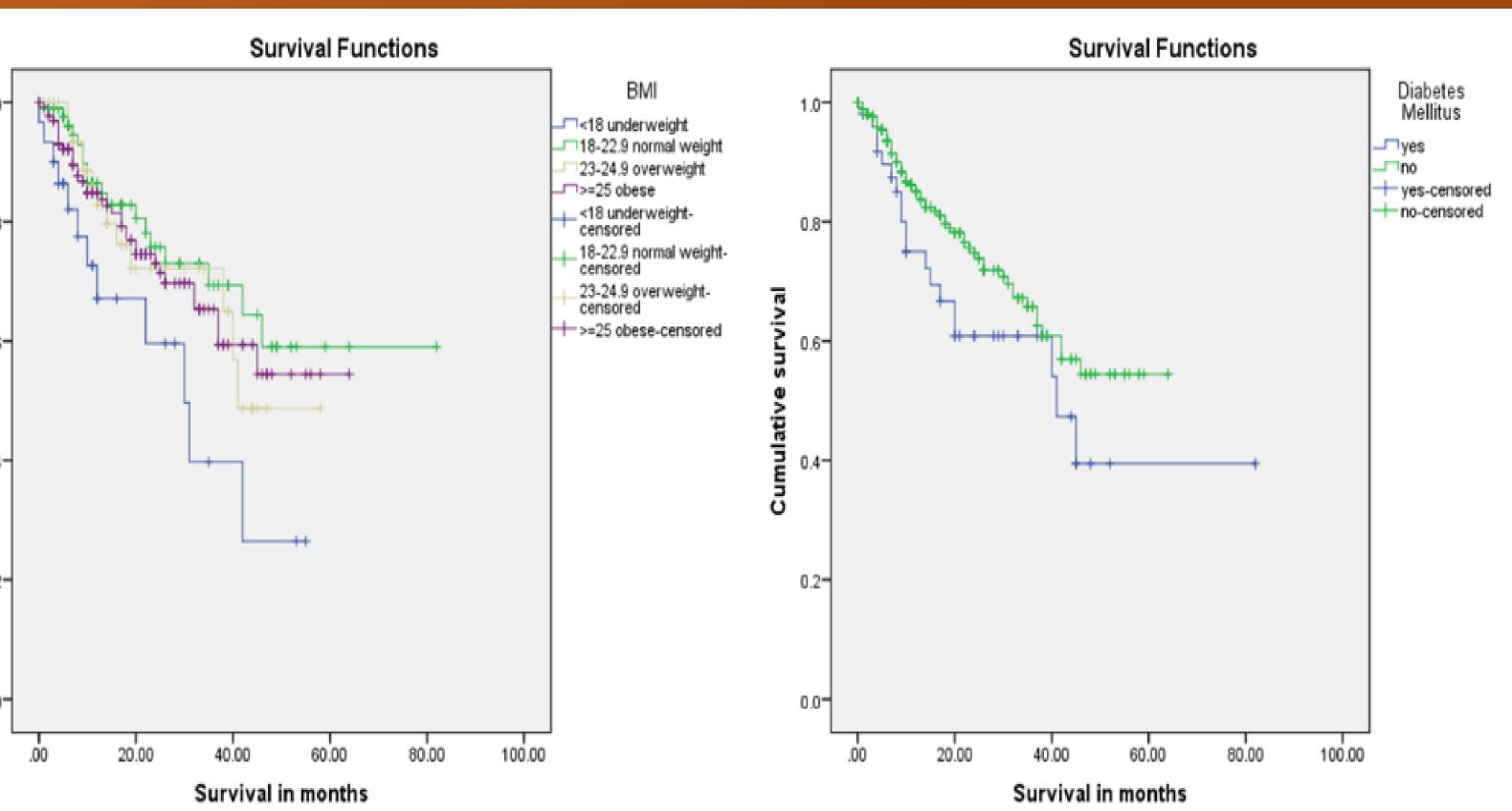
Results

In a set of 386 patients, there were 296 males (76.7%) and 90 females (23.3%). The mean BMI was 24.4 (SD±5.25) and 42.7% of patients were found to be obese (≥25 BMI). 64 patients (16.6%) were diabetic. The risk of death was significantly higher in underweight patients (P=0.035) as compared to normal weight individuals. Diabetics had a higher mean BMI as compared to non-diabetics. However, DM was not a statistically valid predictor of survival.

Conclusion

Underweight OSCC patients were at a higher risk of death as compared to normal weight OSCC patients.

Table 1. Mean survival time of OSCC patients compared with clinicopathological characteristics, BMI, and DM status.

	Mean Survival (months)	P value	95% Confidence Interval	
			Lower Bound	Upper Bound
Overall	52.988		47.751	58.225
Gender				
Male	56.374	0.195	50.468	62.281
Female	37.172		31.479	42.866
BMI				
<18.5 (Underweight)	29.901	.074	20.802	39.000
18.5-22.99 (Normal weight)	57.988		48.726	67.250
23.0-24.99 (Overweight)	40.845		33.597	48.092
≥25(Obese)	44.493		39.218	49.768
Tumour thickness				
< 5mm	44.010	0.796	35.601	52.420
>5mm	43.234		38.717	47.750
Histological classification				
Well differentiated	67.109	0.039*	56.831	77.388
Moderately differentiated	41.679		37.276	46.082
Poorly differentiated	32.493		24.362	40.623
Lymph node involvement				
No	46.454	≤0.001*	42.642	50.266
Yes	32.421		26.626	38.216
DM				
Yes	45.464	0.97	33.709	57.218
No	45.083		41.166	49.000

Table 2. Univariate analysis to assess the relationship of factors associated with survival of OSCC patients

		Univariate Unadjusted			
Variables	Reference value	HR	95.0% CI		P value
			Lower	Upper	
Gender	Male	1.36	0.84	2.19	0.199
	Female (ref)	1			
Age (in years)		1.01	1.00	1.03	0.046*
BMI (in kg/m2)	18.5-22.99 (Normal weight) (ref)	1			
	<18.5 (Underweight)	2.478	1.159	5.298	0.019*
	23.0-24.99 (Overweight)	1.350	0.655	2.784	0.416
	≥25 (Obese)	1.347	0.754	2.407	0.315
Tumour Size (mm)		1.24	1.10	1.39	<0.001*
Tumour classification	Well differentiated	1			0.055
	Moderately differentiated	2.69	1.226	5.903	
	Poorly differentiated	3.75	1.394	10.119	
Lymph Node Involvement	No (ref)	1			
	Yes	2.909	1.826	4.637	<0.001*
	Unknown	0.282	0.039	2.074	0.214
Diabetes Mellitus	Yes	1.54	0.918	2.58	0.102
	No	1			

Table 3. Multivariate analysis to assess the relationship of factors associated with survival of OSCC patients

Variables	Adjusted Hazard. Ratio	95% CI		P value
Diabetes				
No (ref)	1			
Yes	1.216	0.677	2.185	0.512
BMI				
18.5 - 22.99 (normal weight) (ref)	1			
<18.5 (underweight	2.523	1.066	5.969	0.035*
23.0 - 24.99 (overweight)	1.400	0.642	3.052	0.397
≥25 (obese)	1.566	0.843	2.910	0.156
Tumour Size (mm)	1.185	1.038	1.352	0.012*
Lymph Node Involvement				
No (ref)	1			
Yes	3.079	1.862	5.094	<0.001*
Unknown	0.473	0.064	3.522	0.465
Age (in years)	1.026	1.008	1.045	0.006*

Figure 1. Kaplan-Meir overall survival curves of oral squamous cell carcinoma patients according to (left) body mass index categories (underweight, normal weight, overweight and obese: P value = .74) and (right) diabetes mellitus status (Yes, No: P value = .97). BMI indicates body mass index.