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Impact of Phase Angle in Quality of Life and Mortality in Male With Head and Neck Cancer

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Introduction

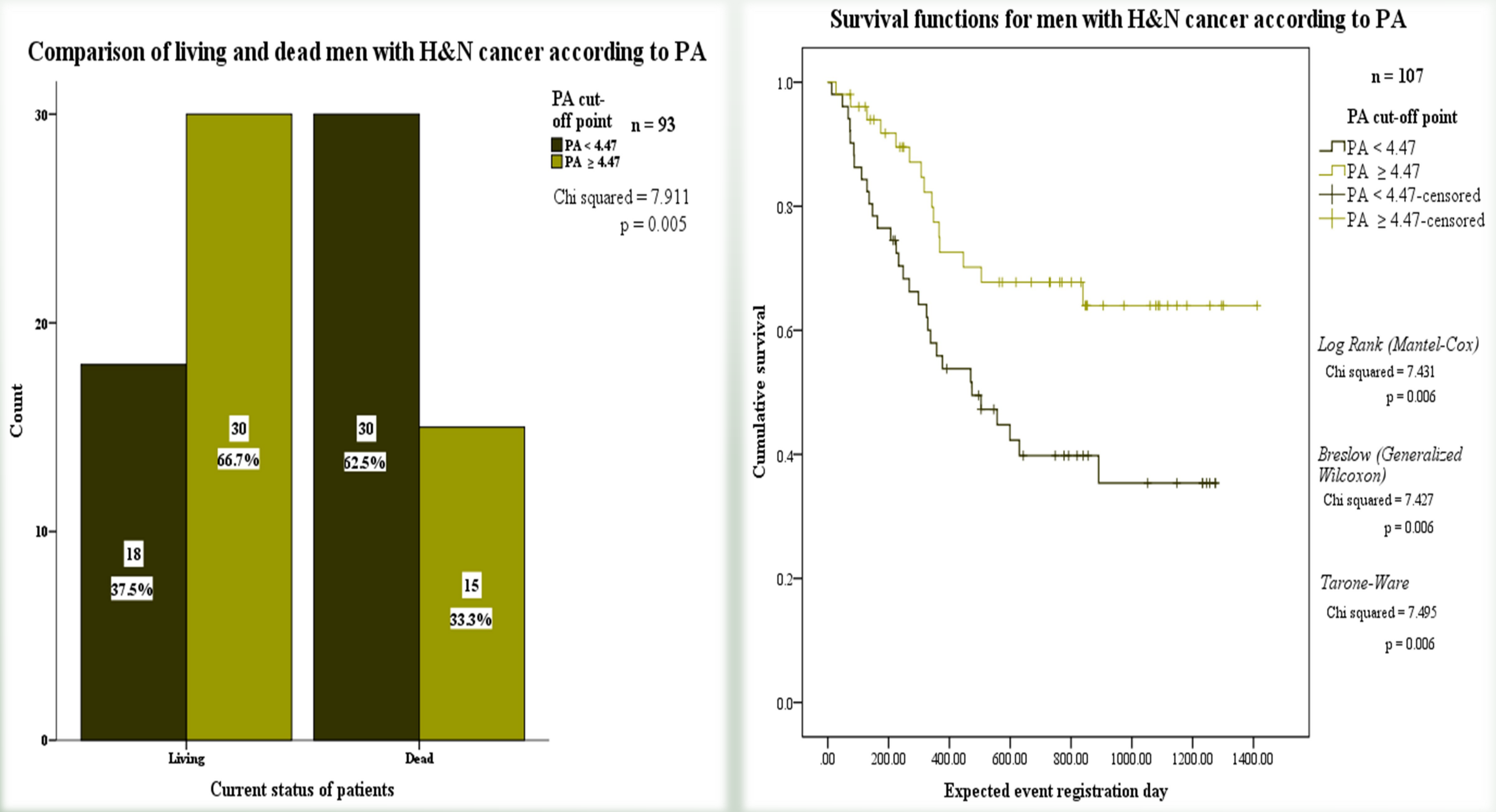
The quality of life (QoL) of patients with head and neck cancer (H&NC) is related to their nutritional status at the time of diagnosis. Bioelectric impedance analysis an instrument used in the clinical setting to assess body composition, which indirectly measures the integrity of cell membranes by means of the phase angle (PA)¹⁻³. Studies evaluating PA as a prognostic tool in clinical practice have demonstrated its effectiveness, however there is no clear cut-off point^{4,5}. In this report health-related QoL survival and risk of death and their relationship to PA were studied. **Objective:** To determine the role of PA in survival and QoL in a men population with H&NC.

Materials & Methods

- Retrospective cohort study with a sample to estimate a relative risk. The universe of study was men with H&NC sent for interdisciplinary management (107 patients aged > 20 and < 90 years) to the Division of Oncology and Hematology of the High Specialty Medical Unit *Hospital de Especialidades del Centro Médico Nacional de Occidente*. The selected subjects were divided into two groups: men with PA < 4.47° and men with PA ≥ 4.47°. Both of them were followed up for at least two years, we evaluated survival and quality of life.
- The Seca 213 height scale measured the height. The bioelectrical impedance analysis multisegmental and multifrequency device mBCA Seca 514 was used to obtain the patients' weight, PA total skeletal muscle mass, and total body fat percentage. The EORTC QLQ-C30 v.3 and the EORTC QLQ-H&N35 complementary module for H&NC (validated for Mexican population) was used to evaluate the QoL. The analysis of both EORTC questionnaires' items required the linear transformation of each item or multi-item scale to get a range of scores from 0 to 100.
- Statistic analysis: Calculation of t-Test or Mann Whitney U in quantitative variables and Chi squared in qualitative variables, p-value ≤ 0.05 was considered significant. The Kaplan-Meier curve method for survival analysis with Mantel-Cox, Breslow and Tarone-Ware tests for contrasting survival functions of two populations. And the ROC curve analysis for the estimation of diagnostic sensitivity and specificity.

Results & Discussion

- Sample studied of 107 patients with a mean age of 65.4 years.
- The ROC curve to estimate mortality in men with H&NC according to PA showed a cut-off point of 4.47° with a sensitivity of 67% and a specificity of 62%, with an area under the curve of 0.656. (p = 0.010).
- Patients with a PA equal to or greater than the cut-off point showed a cumulative survival of approximately 65% at two years, while those with a PA less than this were approximately 35%.
- Patients with a PA ≥ 4.47° had an ≈ 30% higher probability of survival at two years with a better quality of life compared to patients with a PA< 4.47°. The cumulative risk of death in patients with a PA < 4.47° at two years is estimated to be approximately 40% higher.
- Median survival was 21.8 months for those with PA <4.47° versus 34.3 months for those with PA ≥ 4.47° (p < 0.006).
- The percentage of deceased subjects was 62.5 % (p = 0.005), with high mortality rates in patients with PA <4.47° and in patients with PA ≥ 4.47 the mortality rate was 33.3%.
- We observed a relationship between a PA < 4.47° and a low score in global health status as well as in two of the five functional scales of the EORTC QLQ-C30 questionnaire. In addition, a relationship was found with fatigue, pain and loss of appetite.
- A significant difference was found between both groups of patients in the symptom scales of the EORTC QLQ-H&N35 questionnaire, patients with a PA < 4.47° showed higher scores in 12 of 18 symptoms.
- No studies were found other than those of our team that have investigated the relationship of PA with QoL and mortality in Mexican patients with head and neck cancer.
- A systematic review of 48 studies carried out in 2018 explains the importance between PA and mortality in cancer and other chronic diseases, however, it concludes with the need to continue conducting studies to understand its prognostic influence⁵.
- In the study by Norman K. (2010) it was observed that in cancer patients who obtained a PA below the 5th percentile of reference, four of five functionality scales of the EORTC QLQ-C30 questionnaire were affected, in addition only three of nine scales of symptoms had no significant increase, average phase angle of 4.59° ± 1.12°⁶.



Relationships between scores on EORTC QLQ-C30 and EORTC QLQ-H&N35 questionnaires and phase angle in male							
	PA ≥ 4.47°		n = 54	PA < 4.47°		n = 53	p [#]
	Mean	SD	CI 95%	Mean	SD	CI 95%	
Scores on the EORTC QLQ-C30 questionnaires							
Global Health Status / Quality of Life	76.08	22.67	69.89 - 82.27	63.01	25.38	56.02 - 70.01	0.006
Physical functioning	86.91	16.93	82.29 - 91.54	64.91	26.58	57.58 - 72.23	< 0.001
Role functioning	82.72	30.71	74.33 - 91.10	64.46	38.82	53.77 - 75.16	0.008
Cognitive functioning	73.92	27.57	66.40 - 81.45	67.61	27.18	60.12 - 75.10	0.236
Emotional functioning	83.64	20.85	77.95 - 89.33	81.52	18.11	76.52 - 86.51	0.575
Social functioning	82.10	32.03	73.36 - 90.84	72.96	29.82	64.74 - 81.17	0.130
Fatigue*	11.11	33.33	0.00 - 33.33	44.44	44.45	22.22 - 66.67	< 0.001
Pain	20.06	27.16	12.65 - 27.47	31.48	31.45	22.81 - 40.15	0.047
Appetite loss	9.88	23.91	3.35 - 16.40	28.30	37.21	18.05 - 38.56	0.003
Scores on the EORTC QLQ-H&N35 questionnaires							
Pain	22.47	25.62	15.48 - 29.47	36.60	32.01	27.77 - 45.42	0.013
Swallowing	20.96	27.31	13.51 - 28.41	33.47	26.54	26.15 - 40.78	0.018
Sensitivity problems	17.51	26.66	10.24 - 24.79	33.39	32.62	24.40 - 42.38	0.007
Social difficulty eating	17.90	26.69	10.61 - 25.18	30.29	29.23	22.23 - 38.35	0.024
Sexual interest	40.12	11.47	36.99 - 43.25	44.82	12.96	41.25 - 48.39	0.049
Mouth opening	15.51	28.28	7.79 - 23.22	36.75	39.48	25.87 - 47.63	0.002
Dry mouth	31.13	32.73	22.20 - 40.06	46.51	36.96	36.32 - 56.70	0.025
Thick saliva	29.28	33.50	20.13 - 38.42	46.51	38.10	36.01 - 57.02	0.015
Sick feeling	18.20	25.18	11.32 - 25.07	35.05	36.45	25.00 - 45.10	0.007
Use of analgesics	41.82	46.97	29.00 - 54.64	64.88	46.23	52.14 - 77.63	0.012
Food supplements	26.40	42.34	14.84 - 37.95	47.25	48.80	33.80 - 60.71	0.020
Feeding tube	4.04	19.02	-.116 - 9.23	15.32	36.05	5.38 - 25.26	0.047
SD: Standard deviation. CI: Confidence interval. * Non-parametric quantitative data (Mann-Whitney U). [#] t-Test for independent samples (parametric quantitative data); statistical significance p ≤ 0.05							

SD: Standard deviation. CI: Confidence interval. * Non-parametric quantitative data (Mann-Whitney U), [#] t-Test for independent samples (parametric quantitative data); statistical significance p ≤ 0.05

Conclusions

Phase angle was the most important predictor of improved QoL, survival, and a risk factor for death in men with H&NC. For this reason, it is important to determine the body composition as well as the nutritional status at the time of diagnosis to carry out a multidisciplinary approach to improve the prognosis of patients using the PA as a reference tool. However, it’s relevant to point out the need to continue with studies to determine cut-off points in other pathologies and populations.

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