



## Letter to the Editor

# Unknowledgment of the brain death concept among African immigrants resident in Spain. Multivariant analysis of related factors

## Desconocimiento del concepto de muerte encefálica entre los inmigrantes africanos residentes en España. Análisis multivariante de factores relacionados

Dear Editor,

The concept of brain death (BD) is accepted as synonymous with the death of a person and has been a turning point in the development of organ transplantation.<sup>1</sup> Despite this, the concept has not been well assimilated by the population and is often associated with reversible coma states, leading to people being against organ donation due to the fear of not actually being dead.<sup>2</sup> In recent decades, immigration has become an increasingly common phenomenon in Western society, with the African population being one of the largest immigrant groups. However, there are no data on awareness of BD in this population group, except for preliminary analysis data from projects presented at conferences.<sup>3-5</sup> Our aim was to analyse knowledge of BD and the factors associated with it among Africans living in Spain.

A Spanish national epidemiological study was conducted in the population  $\geq 15$  years old born on the African continent and living in Spain. To calculate the size of the study population, a distinction was made between residents who had official documentation (data from Spain's National Institute of Statistics:  $n = 1,017,441$ ) and those who did not (data obtained from information provided by 31 immigration support charities:  $n = 5,699,313$ ). The estimated sample size was 4145 for the study population ( $n = 6,716,754$ ), considering a favourable attitude of 50%, a confidence level ( $1-\alpha$ ) of 99% and a precision ( $d$ ) of 2%. The sample was stratified according to nationality of origin, age and gender.

The measuring instrument was a validated PCID-DTO Ríos questionnaire<sup>6,7</sup> on attitudes towards organ donation (total variance explained 63.203% and Cronbach's alpha reliability coefficient of 0.834). A pilot study with a random sample ( $n = 100$ ) confirmed the feasibility of the project and the need to translate the questionnaire into Spanish, English, German, French and Moroccan Arabic.

The assessment of the level of understanding of the concept of BD was established in the following terms: 1) Correct concept: the respondent accepts BD as death of the patient; 2) Wrong concept: the respondent does not accept BD as death of the patient; 3) Ignorance of the concept: the respondent states that he/she does not know the concept of BD.

In each of the population nuclei where sampling took place, it was confirmed that the potential respondent met the criteria for stratification by nationality, age and gender, and they were asked to give their verbal consent to take part. The questionnaire was self-completed anonymously.

The study was completed by 3618 respondents (87% completion rate), of whom 21% ( $n = 747$ ) were aware of the concept, 61% ( $n = 2230$ ) were unaware of it and the remaining 18% ( $n = 641$ ) had a misconception.

A bivariate analysis was performed to assess which factors were associated with knowledge of the concept of BD, these being the respondent's country of origin ( $p < 0.001$ ), gender ( $p = 0.007$ ), marital status ( $p = 0.003$ ), having children ( $p = 0.003$ ), level of education ( $p < 0.001$ ), having discussed transplantation in the family ( $p < 0.001$ ), partner's attitude towards organ donation ( $p < 0.001$ ) and the respondent's religion ( $p < 0.001$ ).

In the multivariate analysis, the following remained as independent variables associated with knowledge of the concept of BD (Table 1): 1) country of origin; 2) gender; 3) having children; 4) level of education; 5) having discussed organ donation and transplantation in the family; 6) the respondent's partner's attitude towards donation and transplantation; and 7) the respondent's religion.

The attitude towards own organ donation was favourable in 31% of respondents ( $n = 1112$ ), and there was a significant association with correct knowledge of the concept of BD, as can be seen in Table 2.

The African population living in Spain is an emerging and growing population group. The results of our study show that awareness and acceptance of the concept of BD is very low in this population, with only 21% accepting it. Using the same questionnaire as in this study, we analysed knowledge of the

**Table 1 – Analysis of factors related to knowledge of the concept of brain death among Africans living in Spain. Multivariate analysis.**

Variables	Regression coefficient ( $\beta$ )	Standard error	Odds ratio (confidence intervals)	p
<b>Country of origin<sup>a</sup></b>				
Guinea (n = 317)			1	
Algeria (n = 441)	0.803	0.196	2.233 (1.521–3.277)	<b>&lt;0.001</b>
Morocco (n = 1188)	0.329	0.178	1.390 (0.981–1.969)	0.064
Senegal (n = 468)	0.618	0.194	1.855 (1.268–2.712)	<b>0.001</b>
Nigeria (n = 362)	0.283	0.210	1.327 (0.880–2.003)	0.177
Ghana (n = 237)	0.257	0.226	1.293 (0.830–2.013)	0.256
Mali (n = 402)	0.507	0.200	1.661 (1.122–2.459)	<b>0.011</b>
Ivory Coast (n = 24)	0.323	0.543	1.381 (0.476–4.008)	0.552
Mauritania (n = 22)	0.580	0.540	1.786 (0.620–5.148)	0.283
Gambia (n = 30)	1.322	0.432	3.749 (1.608–8.744)	<b>0.002</b>
Cameroon (n = 41)	0.803	0.196	2.233 (1.521–3.277)	<b>&lt;0.001</b>
Other countries (n = 86)	0.154	0.368	1.166 (0.567–2.399)	0.676
<b>Gender</b>				
Female (n = 1221)			1	
Male (n = 2397)	0.186	0.095	1.205 (1.000–1.451)	<b>0.050</b>
<b>Having children</b>				
Yes (n = 2014)			1	
No (n = 1582)	0.211	0.097	1.235 (1.022–1.493)	<b>0.029</b>
<b>Level of education</b>				
No education (n = 1269)			1	
Primary (n = 1674)	0.198	0.102	1.836 (1.327–2.541)	0.052
Secondary (n = 580)	0.430	0.131	1.368 (0.914–2.049)	<b>0.001</b>
University (n = 95)	1.953	0.238	3.434 (2.028–5.815)	<b>&lt;0.001</b>
<b>Family discussion about ODT</b>				
No (n = 2550)			1	
Yes (n = 1068)	0.401	0.099	1.494 (1.231–1.813)	<b>&lt;0.001</b>
<b>Knowledge of partner's attitude towards ODT</b>				
Yes, against (n = 491)			1	
Yes, in favour (n = 619)	0.419	0.163	1.520 (1.104–2.092)	<b>0.010</b>
Not known (n = 1427)	0.061	0.145	1.062 (1.410–0.800)	0.674
No partner (n = 1003)	0.152	0.155	1.164 (0.859–1.578)	0.326
<b>Respondent's religion</b>				
Other religions (n = 80)			1	
Catholic (n = 475)	0.433	0.364	1.541 (0.755–3.147)	0.235
Atheist/agnostic (n = 247)	0.832	0.377	2.298 (1.098–4.810)	<b>0.027</b>
Muslim (n = 2816)	0.270	0.351	1.310 (0.659–2.605)	0.441

ODT: organ donation and transplantation.

In bold, significant p-values.

<sup>a</sup> Countries with fewer than 20 respondents have been excluded.**Table 2 – Relationship between attitude towards organ donation and knowledge of the concept of brain death (BD).**

	Concept known (n = 747; 21%)	Concept unknown or incorrect (n = 2871; 79%)	p
<b>Attitude towards organ donation</b>			
In favour (n = 1112)	325 (29%)	787 (71%)	<b>&lt;0.001</b>
Not in favour (n = 2506)	422 (17%)	2084 (83%)	

In bold, significant p-values.

concept of BD in the Latin American immigrant population in Spain, and found a similar level, where only 25% were aware of the concept.<sup>8</sup> It is noteworthy that this percentage is much lower than in the native Spanish population, where 51% claim to know and accept this concept as the death of a person.<sup>9</sup> It is important to acknowledge that the research population is very heterogeneous and that there are significant differences

between nationalities. For example, 37% of Guineans surveyed are aware of it and accept it, although that is still well below the levels recorded in Western societies.<sup>9</sup>

Most studies on this topic indicate a close relationship between knowledge and acceptance of the concept of BD and attitudes towards organ donation.<sup>2,9,10</sup> This study found that those who accepted the concept of BD were more in favour

of organ donation than those who did not. Overall, based on this association, it has been suggested that increasing awareness and acceptance of the concept of BD could contribute to improving attitudes towards organ donation and transplantation.<sup>2,6-10</sup>

In addition to nationality, awareness of this concept is mainly related to the level of education, religion and family background, especially the partner's attitude towards organ donation. It is therefore considered beneficial to encourage dialogue on the topic of organ donation in family circles and with partners.<sup>2,9</sup>

To conclude, we have found that knowledge of the concept of BD among Africans living in Spain is very low, with marked differences according to the African country of origin and other socio-personal factors.

### Authors' contributions

Conception and design: Ríos A.

Collection of a substantial part of the data: Ríos A, Carrillo J, López-Navas A and Ayala-García MA.

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Critical revision of the manuscript: Ríos A and López-Navas A.

Statistical review: Ríos A and López-Navas A.

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### Conflicts of interest

There are no conflicts of interest.

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### REFERENCES

1. Drake M, Bernard A, Hessel E. Brain death. *Surg Clin North Am.* 2017;97:1255-73, <http://dx.doi.org/10.1016/j.suc.2017.07.001>.
2. Ríos A, Cascales P, Martínez L, Sánchez J, Jarvis N, Parrilla P, Ramírez P. Emigration from the British Isles to south-eastern Spain: a study of attitudes toward organ donation. *Am J Transplant.* 2007;7:2020-30, <http://dx.doi.org/10.1111/j.1600-6143.2007.01879.x>.
3. Ríos A, Carrillo J, López-Navas AI, Martínez-Alarcón L, Ayala-García MA, Sánchez Á, et al. Does knowledge of the

concept of brain death affect the attitude toward donation of Algerians residing in Spain? *Transplant Proc.* 2020;52:465-8, <http://dx.doi.org/10.1016/j.transproceed.2019.12.020>.

4. Ríos A, Carrillo J, López-Navas AI, Ayala-García MA, Sánchez Á, Hernández AM, et al. Do the Senegalese who immigrate to southern Europe know about the brain death concept? *Transplant Proc.* 2019;51:280-2, <http://dx.doi.org/10.1016/j.transproceed.2018.10.011>.
5. Ríos A, Carrillo J, López-Navas AI, Ayala-García MA, Sánchez Á, Hernández AM, et al. Knowledge of brain death among the Nigerian residents in Spain. *Transplant Proc.* 2019;51:277-9, <http://dx.doi.org/10.1016/j.transproceed.2018.10.010>.
6. Ríos Zambudio A. Proyecto Colaborativo Internacional Donante (International Colaborative Donor Project). *Cir Esp.* 2018;96:69-75, <http://dx.doi.org/10.1016/j.ciresp.2017.11.009>.
7. Ríos A, López Navas A, de Francisco C, Sánchez A, Hernandez AM, Ramírez P, et al. Psychometric characteristics of the attitude questionnaire toward the donation of organs for transplant (PCID-DTO-RIOS). *Transplant Proc.* 2018;50:345-9, <http://dx.doi.org/10.1016/j.transproceed.2017.11.063>.
8. Ríos A, López-Navas A, Navalón JC, Martínez-Alarcón L, Ayala-García MA, Sebastián MJ, et al. The Latin-American population in Spain and organ donation. Attitude toward deceased organ donation and organ donation rates. *Transplant Int.* 2015;28:437-47, <http://dx.doi.org/10.1111/tri.12511>.
9. Conesa C, Ríos A, Ramírez P, Canteras M, Rodríguez MM, Parrilla P. Estudio multivariante de los factores psicosociales que influyen en la actitud poblacional hacia la donación de órganos [Multivariate study of the psychosocial factors affecting public attitude towards organ donation]. *Nefrologia.* 2005;25:684-97. Spanish. PMID: 16514910.
10. Irving MJ, Tong A, Jan S, Cass A, Rose J, Chadban S, et al. Factors that influence the decision to be an organ donor: a systematic review of the qualitative literature. *Nephrol Dial Transplant.* 2012;27:2526-33, <http://dx.doi.org/10.1093/ndt/gfr683>.

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