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Perception of Brazilian medical students toward organ donation

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SUMMARY

OBJECTIVE: Brazil ranks second in gross numbers of kidney and liver transplantations, but deceased organ donation is still far below the national demand for organs. Apart from a high family refusal rate, another significant barrier is healthcare workers' inappropriate knowledge concerning organ donation and transplantation. Since most of them have recently graduated from university, this study aimed to evaluate the awareness and attitudes of medical students concerning organ donation.

METHODS: Between August and September 2021, a web-based survey with 10 overlapping questions was sent to medical students from several Brazilian universities after advertisements on social media.

RESULTS: A total of 391 (60% female, mean age: 23 [17–41] years) students answered the survey. Most of them (91%) would like to donate organs in case of death, and 75% have already notified their family. The main reasons for not becoming a donor were fear of body manipulation (n=3) or family reaction (n=2) and religious reasons (n=2). When inquired, 54% were unaware of brain death criteria, and half of them claimed to have never discussed the topic in medical classes. Except for Glasgow coma scale (97%), pupillary (72%), and corneal (53%) reflexes, less than 25% knew other reflexes required for brain death diagnosis.

CONCLUSION: Most medical students declared themselves as organ donors, and most informed their families. However, many students have never learned about crucial steps toward organ donation, which may impact their adequate recognition of potential organ donors later in life.

KEYWORDS: Organ transplantation. Medical Students. Knowledge. Attitudes.

INTRODUCTION

Brazil ranks second in gross numbers of kidney and liver transplantations worldwide after the United States (US), but performs far lower when compared to the US and Western Europe in terms of organ donation and transplantation per million people (pmp)[1]. According to data from the Brazilian Association of Organ Transplantation (ABTO), from January to September 2021, 25,912 subjects were placed on a waiting list for organ transplantation in Brazil. Likewise, 1,772 of them died in the same period waiting for an appropriate donor. Reports from the Brazilian Ministry of Health estimate that around 35,000 subjects are still waiting to be submitted, mainly for kidney and liver transplantation, with a long average waiting time due to organ shortage. Transplantation activity in Brazil is funded by the United Public Health System (SUS) and is mainly dependent on deceased organ donation. The country's donation rate from 2018 to 2019 varied from 15.8 to 18.1 effective donors pmp, with a considerable gap between the supply and demand for organs[1].

Brazil has opted for an opt-out donation system due to the requirement of family consent for donation[1]. There is a striking variability in donation and family refusal rates across the country, with frequencies approaching those seen in Spain and Croatia in the South and Southern regions, with a high human development index (HDI) compared to others with low HDI. Suboptimal identification of potential donors by healthcare personnel unaware of the brain death criteria adopted by the Brazilian legislation or without proper

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knowledge about notification and management of potential donors is also well recognized as a significant barrier to organ donation in Brazil and several other countries. Since most healthcare workers currently employed as physicians in Brazilian emergency departments or intensive care units are physicians who recently graduated from medical universities, the authors performed a web-based survey among medical students regarding knowledge and attitudes concerning postmortem organ donation (PMOD). This manuscript summarizes its major findings.

METHODS

This study was conducted between August and September 2021 using a web-based questionnaire sent to medical students by 15 leaders of scientific leagues through social media platforms.

The questions were divided into two blocks, comprising demographic variables and specific questions regarding the research subject.

Demographic variables included age, gender, type of medical school (MS), years of studying medicine, and affiliation in a medical student league.

The specific questions (Q) concerning attitudes toward organ donation and knowledge about brain death criteria and their possible answers (under parentheses) were as follows:

- Q1: In case of death, would you like to donate your organs (yes or no)?
- Q2: If your decision is not to become an organ donor in case of death, for which reasons below would you not want to donate your organs (religious beliefs; age; no interest in organ donation or lack of interest to talk about issues related to death; fear of physical mutilation after death; presence of comorbidities that could exclude organ donation; fear of body handling after death; fear of pre-mortem organ retrieval; concerns about human organ trafficking; concerns about family disapproval; no trust in brain death criteria; no trust in the organ donation and transplantation system; other reasons)?
- Q3: If your decision is to become an organ donor in case of death, do your relatives or offspring know about your will to donate your organs (yes or no)?
- Q4: Do you have any relatives who benefited from organ transplantation (yes or no)?
- Q5: Would you consent to an organ donation of a relative without knowledge concerning his or her previous will (yes or no)?
- Q6: Have you ever had any subject or class about brain death criteria in your MS (yes or no)?
- Q7: Are you aware of the brain death criteria adopted in your country (yes or no)?
- Q8: Do you know the steps required to consider the diagnosis of brain death (Glasgow coma scale; absence of pupillary response to bright light; absence of ocular movements using oculocephalic testing; absence of oculovestibular reflexes; absence of corneal reflexes; and absence of pharyngeal "gag" and tracheal "cough" reflexes)?

All participants gathered online informed consent prior to taking part in the study. All data were de-identified before further analysis.

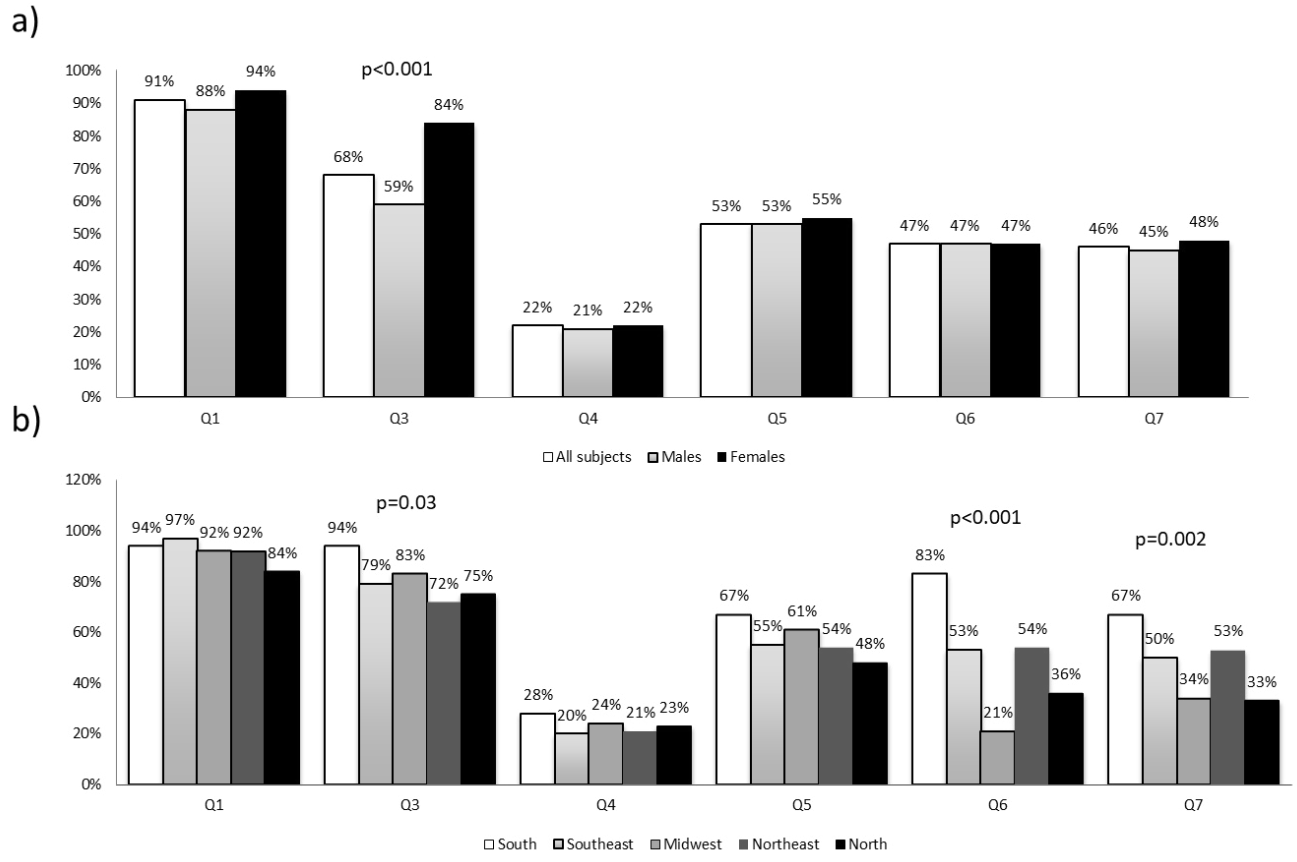
Statistical analysis

Data in text and tables are expressed as percentages or means and standard error. Demographics were compared to those answers to specific questions using the χ^2 test or Fisher's exact probability test when appropriate. Continuous variables were compared using the t-test. p-values ≤ 0.05 were considered significant.

RESULTS

A total of 382 medical students (235 females, 23±4 years) living in the southeast (n=119), northeast (n=112), north (n=102), midwest (n=38), and south (n=21) regions of Brazil answered the questionnaire. They were studying in 72 different MS. Most of them (n=219) were public MS funded by federal and state governments. Most of the participants were in the fourth year of MS (n=108). The remaining students were in the first (n=83), second (n=51), third (n=78), fifth (n=42), and sixth (n=30) years at their MS. Only 153 (39%) students declared to be studying in an institution linked to an organ transplantation program. The remaining students were either unaware (n=200) or enrolled in an institution without any transplantation activity (n=39). As expected, most students took part in one scientific academic league (n=239). The answers to Q1 and Q3 to Q7 are depicted in Figure 1 and Table 1. Briefly, 356 (91%) students were willing to donate their organs in case of death. Notably, 27 students did not know yet, and only 6 were not in favor of PMOD due to religious beliefs (n=1), religious beliefs and concerns about human organ trafficking (n=1), fear of body handling after death (n=3), no interest to talk about issues related to death (n=1), and unknown reasons (n=1). Most of the students (68%) have already informed their families about their will for PMOD. Few (21.5%) have one or more relatives who have benefited from organ transplantation, and half would consent to organ donation from a relative

without knowledge concerning his or her previous will. Almost half of the students claimed to have heard about organ donation in their MS or disclosed to be aware of the brain death criteria adopted in Brazil (Table 1). No differences in organ donation attitudes were observed according to gender, except for communication of donation willingness to a relative (Q3),



Q1: In case of death, would you like to donate your organs?; Q3: If your decision is to become an organ donor in case of death, does your family know about your will to donate your organs?; Q4: Do you have any next of kin who benefited from organ transplantation?; Q5: Would you consent for a next of kin organ donation without knowledge concerning his or her previous will?; Q6: Have you ever had any subject or content dealt in your medical school about brain death criteria?; Q7: Are you aware of brain death criteria adopted in your country?

Figure 1: Frequency (%) of positive answers to Q1 and Q3 to Q7 according to demographics: a) Gender and b) geographical region.

Table 1. Percentages of positive answers to questions concerning organ donation according to MS features.

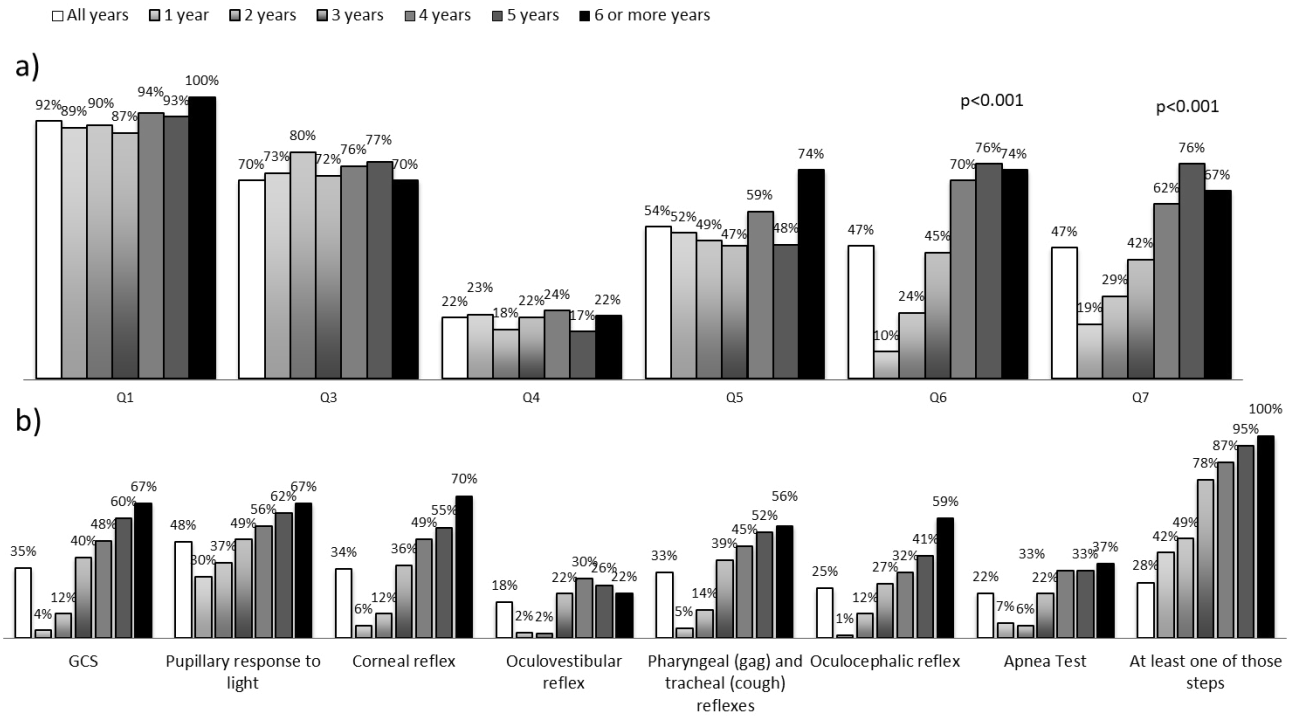
Question	Total	Public MS	Private MS	Partnership with transplantation center	No partnership with transplantation center
Q1 (%)	356 (90.8)	196 (90,7)	160 (92,5)	141 (92)	215 (91)
Q3 (%)	256 (67.9)	141 (71.9)	125 (78.1)	109 (77)	157 (73)
Q4 (%)	84 (21.5)	44 (20.4)	40 (20.3)	39 (25)	45 (19)
Q5 (%)	209 (53.3)	109 (50.5)	100 (57.8)	88 (57)	121 (51)
Q6 (%)	183 (46.7)	83 (38.4)[a]	100 (57.8)[b]	77 (50)	106 (45)
Q7 (%)	181 (46.2)	87 (40.3)[c]	94 (54.3)[d]	68 (44)	113 (47)

Q1: In case of death, would you like to donate your organs? Q3: If your decision is to become an organ donor in case of death, does your family know about your will to donate your organs? Q4: Do you have any relatives who benefited from organ transplantation? Q5: Would you consent to an organ donation of a relative without knowledge concerning his or her previous will? Q6: Have you ever had any subject or class in your medical school about brain death criteria? Q7: Are you aware of the brain death criteria adopted in your country? [a,b]p<0.0001; [c,d]p=0.004.

which was more frequently observed in women (84% vs. 59% in men, p<0.001). Heterogeneity in the positive answers to Q3 as well as to Q6 and Q7 (Table 1) was noted according to the place of living. In general, students from the south and midwest regions talked more to their relatives about their willingness to donate organs after death. Participants from the south, southeast, and northeast regions answered more frequently about learning brain death criteria in MS and about knowledge concerning brain death criteria (Figure 1). No differences regarding responses to Q1, Q3, Q4, and Q5 were disclosed according to years of medical studies. However, positive answers to Q6 and Q7 were more frequently observed in students from private MS when compared to their counterparts from public MS (Table 1). As expected, positive answers to questions Q6 and Q7 were directly related to years of schooling. Likewise, the ability to perform all clinical steps involved in brain death diagnosis was shown to increase over time significantly (Figure 2). All students with six or more years of school claimed to be used to at least one of those critical steps for brain death diagnosis, but 30–67% of them who were at the end of their medical studies were unaware of how to perform at least one of those steps (Figure 2).

DISCUSSION

Our results demonstrated that more than 90% of the Brazilian medical students would consent to PMOD. Approximately two-thirds of them have talked to their relatives about their decision, and more than half would also consent to donate organs of a relative even without knowledge about their will. Those attitudes were reported even though few declared to be acquainted with someone who benefited from an organ transplant and were not shown to vary according to the source of MS funding or partnership with a transplantation center. Those findings are different from those recently reported in a survey conducted on a representative sample of the Brazilian population (personal communication), which revealed that 67% of the students would consent to PMOD, and only half have talked about this issue with a relative. This is in accordance with some[2,3], but not all, reports[4] from Brazil and elsewhere[5,6]



Q1: In case of death, would you like to donate your organs?; Q3: If your decision is to become an organ donor in case of death, does your family know about your will to donate your organs?; Q4: Do you have any next of kin who benefited from organ transplantation?; Q5: Would you consent for a next of kin organ donation without knowledge concerning his or her previous will?; Q6: Have you ever had any subject or content dealt in your medical school about brain death criteria?; Q7: Are you aware of brain death criteria adopted in your country?

Figure 2. (a) Frequency (%) of positive answers to Q1 and Q3 to Q7 and (b) knowledge (%) about performance of different steps required for the diagnosis of brain death according to years of studying medicine.

indicating that knowledge of medical students is far better when compared to laypeople. Unlike other reports[7,8], years of school were not shown to influence attitudes toward organ donation, indicating positive attitudes toward donation from the beginning of MS studies in Brazil. Several previous studies have evaluated knowledge about organ transplantation, including potential deceased donors' identification and brain death criteria understanding[7-9]. Some have reported a lack of adequate information about donation and transplantation in MS curricula[10,11]. In the present study, less than half of the medical students claimed to have had classes regarding donation and transplantation or to know the brain death criteria adopted in Brazil. As expected[12], awareness was shown to increase according to school years, but it is troublesome to observe that one-quarter of the medical students are unaware of organ donation issues after 6 years of schooling in Brazil. Some steps involved in brain death diagnosis were more challenging to learn, particularly oculovestibular and oculocephalic reflexes and the apnea test. Lower awareness about transplantation issues and brain death criteria was observed more often in public MS when compared to their private counterparts, suggesting more room for improvement in Federal and State medicine universities. As previously reported, women were more prone to share their decision favoring PMOD when compared to men. Some attitudes and knowledge were shown to vary according to the geographical area. In general, students from the south and southeast were shown to have talked more frequently to a relative about organ donation, heard more about transplantation issues at MS, and have more knowledge concerning brain death criteria compared to their counterparts from other regions. This may reflect greater general awareness concerning donation and transplantation in those higher HDI regions with higher transplantation activity.

In accordance with previous reports from Brazil, the US, and Europe[5-7,13], most of the medical students who were not willing to PMOD were in doubt, and few reported religious or cultural beliefs to justify their decision. This is in contrast to several other reports from Asia and the Middle East, where religion, fear of body mutilation and/or handling, family reaction, and distrust in the transplantation system are the main reasons against PMOD[14].

CONCLUSION

Most medical students in Brazil have above-average attitudes toward organ donation but lack appropriate knowledge concerning brain death criteria to identify possible organ donors after graduation. Several gaps in curricula of MS in Brazil have to be addressed to improve the knowledge of future intensive care physicians about organ donation and, consequently, improve the transplantation activity in Brazil.

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AUTHORS' CONTRIBUTIONS

ELOB, MMPN, ARC: Data curation, Formal Analysis, Writing – original draft, Writing – review & editing. **JHPG:** Conceptualization, Formal Analysis. **EBH, LC, PLB:** Conceptualization, Data curation, Formal Analysis, Writing – original draft, Writing – review & editing.

REFERENCES

1. Brazilian Transplantation Registry, Official report of Brazilian Organ Transplantation Society. Organ Transplantation in Brazil (2012-2019). 2019; [cited on Oct 15, 2021];4:1-49. Available from: https://site.abto.org.br/publicacao/rbt-ingles-2019/
2. Galvao FH, Caires RA, Azevedo-Neto RS, Mory EK, Figueira ER, Otsuzi TS, et al. Conhecimento e opinião de estudantes de medicina sobre doação e transplante de órgãos. Rev Assoc Med Bras (1992). 2007;53(5):401-6. https://doi.org/10.1590/S0104-42302007000500015
3. Dutra MM, Bonfim TA, Pereira IS, Figueiredo IC, Dutra AM, Lopes AA. Knowledge about transplantation and attitudes toward organ donation: a survey among medical students in northeast Brazil. Transplant Proc. 2004;36(4):818-20. https://doi.org/10.1016/j.transproceed.2004.03.066
4. Ríos A, López-Navas A, López-López A, Gómez FJ, Iriarte J, Herruzo R, et al. A Multicentre and stratified study of the attitude of medical students towards organ donation in Spain. Ethn Health. 2019;24(4):443-61. https://doi.org/10.1080/13557858.2017.1346183
5. Edwards TM, Essman C, Thornton JD. Assessing racial and ethnic differences in medical student knowledge, attitudes and behaviors regarding organ donation. J Natl Med Assoc. 2007;99(2):131-7. PMID: 17366949
6. Martino RB, Guidotte DV, Waisberg DR, Santos AGD, Cassenote AJF, Arantes RM, et al. Attitude and knowledge of medical students toward donation after circulatory death. Rev Assoc Med Bras (1992). 2021;67(4):602-6. https://doi.org/10.1590/1806-9282.20210012
7. Batista CR, Kusterer LEFL. Conhecimento de estudantes de medicina sobre doação e transplantes de órgãos. Bras Transpl. 2010;13:1281-328.
8. Schaeffner ES, Windisch W, Freidel K, Breitenfeldt K, Winkelmayer WC. Knowledge and attitude regarding organ donation among medical students and physicians. Transplantation. 2004;77(11):1714-8. https://doi.org/10.1097/00007890-200406150-00015

9. Sampaio JE, Fernandes DE, Kirsztajn GM. Knowledge of medical students on organ donation. Rev Assoc Med Bras (1992). 2020;66(9):1264-9. https://doi.org/10.1590/1806-9282.66.9.1264
10. Reis FP, Gomes BH, Pimenta LL, Etzel A. Brain death and tissue and organ transplantation: the understanding of medical students. Rev Bras Ter Intensiva. 2013;25(4):279-83. https://doi.org/10.5935/0103-507X.20130048
11. Ríos A, López-Navas A, López-López A, Gómez FJ, Iriarte J, Herruzo R, et al. Do Spanish Medical Students Understand the Concept of Brain Death? Prog Transplant. 2018;28(1):77-82. https://doi.org/10.1177/1526924817746687
12. Robert P, Bégin F, Ménard-Castonguay S, Frenette AJ, Quiroz-Martinez H, Lamontagne F, et al. Attitude and knowledge of medical students about organ donation - training needs identified from a Canadian survey. BMC Med Educ. 2021;21(1):368. https://doi.org/10.1186/s12909-021-02736-2
13. Seetharaman RV, Rane JR, Dingre NS. Assessment of knowledge and attitudes regarding organ donation among doctors and students of a tertiary care hospital. Artif Organs. 2021;45(6):625-32. https://doi.org/10.1111/aor.13871
14. Soylu D, Özdemir A, Soylu A. Does religious attitude affect organ donation and transplantation? Transpl Immunol. 2022;71:101555. https://doi.org/10.1016/j.trim.2022.101555