





Influence of Clinical and Psychosocial Factors on the Acceptance of no Human Organs in Transplants: Xenotransplants


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ABSTRACT

Introduction: Xenotransplantation is defined as the transplantation of cells, organs and tissues between different species. It is studied as an alternative method to acquire an adequate supply of human organs, which imbalance in demand results in increased mortality on the transplantation waiting list. The aim of the present study was to deepen knowledge about the psychosocial aspects that influence the acceptance or refusal of xenotransplantation, seeking to add information that contributes to patients' decisions. **Methods:** A cross-sectional observational study was carried out on reports of the perception of potential recipients of a liver transplant treated at the referral center of a university hospital. Two groups of patients were selected for the study: 50 patients undergoing liver transplantation (transplant group = TxG) and 50 candidates on the waiting list (waiting list group = WLP). All of them were given a questionnaire that addresses the psychosocial aspects that led them to form their opinions about xenotransplantation. To compare the groups, parametric and/or nonparametric tests were used, according to the nature of the data, as well as association tests. **Results:** Among the interviewees, 91 (91%), being 46% in TxG and 45% in WLP believe that xenotransplants would be beneficial for patients on the waiting list and there was no significant difference between the two groups studied ($p = 0.8418$); 63 (63%) stated that religion influenced their opinions; 74 (74%) stated that their personal experiences, especially in relation to the suffering generated by their underlying diseases, influenced the way they answered the questionnaire. **Conclusions:** The acceptance of xenotransplantation is high among the studied groups, and advanced disease and its complications contribute to the acceptance of this treatment modality, both in patients who have already been transplanted and in those who are on the waiting list. Religion had a positive influence in the acceptance of the xeno-organ. None of the measured social and demographic factors scored a $p \leq 0.05$ when correlated as a factor for the decision of accepting a xeno-organ. The low number of patients who rejected this technique claimed that lack of information on the subject influenced in their decision. The results gathered indicate a high acceptance of xenografts among the studied groups, and that dissemination of information about xenografts can contribute to increased receptivity to this procedure, furthering its potential as a solution for human organ shortages.

Descriptors: Heterologous transplantation. Liver transplant. Graft. Liver disease. Histocompatibility.

INTRODUCTION

The reality of people who need transplants is permeated by anxiety and uncertainties, not only because it is the last curative therapeutic option following failure of conventional treatments, but also because of the limited supply of human organs

available for donation. In Brazil, the analysis of the Brazilian Registry of Transplants from January to June 2018 reveals that 15,593 patients joined the waiting list in this period, and 1,286 of them died while on the list.¹ This translates to a mortality rate of 8.24%, a higher result when compared to the same period in 2017, in which the mortality rate was 6.53%.²

In this context, xenotransplantation, defined as the transplantation of cells, organs, and tissues between different species, has gained prominence as a potential procedure capable of reducing waiting lists for transplants and, consequently, their mortality rates.³ The use of biological material from other species in human patients for medical treatments is a successful reality. The use of biological heart valves: transplants involving porcine and bovine valves are common in patients with heart disease, are good examples of the technique's viability. These valves have been shown to be long lasting, capable of reaching 20 years without need for substitution,⁴ thus offering a sizable upgrade in quality of life to patients.

There is investment in research and technology to make xenotransplantations of solid organs, such as the liver, a viable alternative to human organs.^{5,6} The main barriers for the success of said technique is related to the histocompatibility complex in humans, as it differs between species, resulting in biological rejection of unacceptable intensity in the receiver.⁵ One of the proposed solutions to this problem is the creation of genetically modified animals more suited to the human genome. As an example, genetically modified pigs, whose species naturally have anatomical and physiological similarities to humans, have already been shown to reduce the chances of the recipient immune system destroying the graft.⁶

However, the success of the xenotransplantation approach is also dependent on the individual and social acceptance of the procedure. The study by Rubaltelli et al.,⁷ published in 2008, demonstrated that a person's impressions and feelings regarding the animal involved in xenotransplantation strongly interfered in their decision to receive or reject the organ. It was shown that the rejection was correlated to the image the recipient had of the animal donor: if it was considered unhygienic, for example the way pigs are commonly seen by society, the patient would tend not to want to receive the organ.^{8,9}

Thus, if the viability of xenotransplantation is influenced by the social acceptance of it, a better understanding of patients' perception of the procedure is necessary. Aiming to increase its success, determining which psychosocial aspects could influence this decision becomes essential, much like assessing how this therapy could affect the individual and collective experience of target patients after nonhuman organ transplantation. The objectives of the present study were to assess the opinion of patients about the acceptance of xenografts, as well as the socioeconomical factors that may influence its acceptance, among patients waiting for a liver transplant and already liver-transplanted patients; to analyze the possible psychological impact xenotransplantation could have on this group of patients, and lastly to investigate how religion could affect the acceptance of this therapeutical method among the studied groups.

METHODS

A cross-sectional observational study was carried out on the report of the perception of accepting animal organs for transplantation. Potential recipients of liver transplantation were interviewed: patients already transplanted (TxG) and patients on the waiting list for transplants (WLP), treated at the reference center of a university hospital. A questionnaire with objective questions for binary answers (yes or no) designed by the researchers was used. The period of application of the questionnaires was from August 2019 to March 2020. The project followed all the ethical procedures necessary for good research practice and patients' well-being and obtained legal authorization from the Research Ethics Committee of the Medical School of São José do Rio Preto (CAAE: 05433119.0.0000.5415).

The inclusion criteria were: patients consecutively treated at the liver transplant outpatient clinics and wards, over 18 years old, and patients with cirrhosis or liver cancer on the waiting list for liver transplantation or patients undergoing this transplant in an outpatient follow-up. Exclusion criteria were: nonacceptance of the patient to sign the consent form to participate in the study, presenting encephalopathy or severe acute hepatitis. All patients were approached randomly during the waiting period for the outpatient consultation, when they received the researcher's invitation, and the explanation about the study, and were included in the research after accepting participation and signing the informed consent form. The questionnaires were applied until 50 transplant patients and 50 on the waiting list were reached. No patients refused to participate in the research. The variables studied were related to clinical and psychosocial aspects and patients' perceptions.

One hundred patients were included in two groups according to the period in relation to the transplant: 50 patients undergoing liver transplantation (TxG) and 50 candidates on the waiting list (WLP).

All patients answered the study questionnaire administered by a single researcher, a local academic.

Statistical analysis

Descriptive statistical analysis was performed from the calculations of measures of central tendency and dispersion and frequency counts.

For the inferential statistical analysis, the Kolmogorov–Smirnov test was used to verify the normality of the data, and the T and Mann–Whitney tests to compare quantitative data. For frequency comparison, Fisher’s exact test and the classical chi-square test were used.

In all analyses, $p \leq 0.05$ was considered statistically significant. The program used was StatsDirect Statistical Software Version 3.2.10.

RESULTS

Statistical analyzes of sociodemographic data obtained from the questionnaires showed that the studied groups are well distributed/homogeneous. Thus, there is no statistically significant difference between the groups regarding gender, age, skin color, education, marital status and religion (Table 1).

Table 1. Sociodemographic data of patients included in this study, separated into two groups: transplanted (TxG) and waiting list (WLP).

Variables	TxG	WLP	P value
Gender			
Female	20 (40%)	27 (54%)	0.2293
Male	30 (60%)	23 (46%)	
Total	50	50	
Age (years)			
Mean \pm SD	54.12 \pm 13.12	54 \pm 13.17	0.9604
Ethnicity			
Caucasoid	34 (64%)	26 (52%)	0.1025
Negroid	16 (32%)	24 (48%)	
Education level			
No education	1 (2%)	3 (6%)	0.7817
Elementary	18 (36%)	17 (34%)	
Middle	18 (36%)	18 (36%)	
Superior	13 (26%)	12 (24%)	
Marital status			
Stable union	28 (56%)	32 (64%)	0.2190
Not stable union	20 (40%)	13 (26%)	
Widowhood	2 (4%)	5 (10%)	
Religion			
Catholic	29 (58%)	31 (62%)	0.4111
Evangelical	13 (26%)	15 (30%)	
Spiritist	3 (6%)	3 (6%)	
Other	5 (10%)	1 (2%)	

SD: standard deviation.

Regarding the disease that led the interviewees to have an indication for transplantation, there was no significant difference between the two groups studied, as shown in the data analyzed in Table 2. There was also no significant difference on the length of the period the patient suffered (TxG) or suffers (WLP) with the disease. Regarding the manifestation of symptoms in the TxG, 48 patients (96%) suffered from symptoms of the disease. In the WLP group, this number was 45 (90% of respondents). The most mentioned symptoms were hepatic encephalopathy, jaundice, ascites and lower limb edema.

The severity of the disease that led the patients to the indication for transplantation was evaluated according to the Model for End-Stage Liver Disease (MELD) and Child–Pugh score values, analyzed on the date of transplantation for the TxG and on the date of evaluation for WLP. There was a significant difference in disease severity, being greater in TxG, as shown in Table 2. In the TxG group, 32 (64%) patients had MELD $>$ 15 and 34 (68%) patients Child–Pugh between B and C; in the WLP group, 31 (62%) of the patients had a MELD value $<$ 15, and 24 (48%) patients had Child–Pugh between B and C.

Table 2. Analysis of the severity of the disease that resulted in the need for a transplant.

Variables	TxG	WLP	P value
Etiology			
Cirrhosis and cancer	10 (20%)	10 (20%)	0.8229
Cirrhosis	34 (68%)	38 (76%)	
Others	6 (12%)	2 (4%)	
Time suffered with the disease (years)			
Mean ± SD	4.54 ± 4.56	7.09 ± 6.98	0.1159
Presence of symptoms			
Yes	48 (96%)	45 (90%)	0.2397
No	2 (4%)	5 (10%)	
Number of symptoms			
Up to 3	22 (44%)	30 (60%)	0.5403
More than 3	28 (56%)	20 (40%)	
MELD			
< 15	8 (16%)	31 (62%)	<0.0001
> 15	32 (64%)	17 (34%)	
Lost	10 (20%)	2 (4%)	
Child–Pugh			
A	5 (10%)	23 (46%)	0.0002
B	18 (36%)	17 (34%)	
C	16 (32%)	7 (14%)	
Lost	11 (22%)	3 (6%)	

SD: standard deviation; MELD: Model for End-Stage Liver Disease.

Patients were asked about their previous diagnosis of emotional comorbidities (depression, anxiety and bipolarity). In the TxG, 39 (78%) patients reported that they did not have any and did not use medication for this purpose. In WLP, this number was 47 (94%). In this question, there was homogeneity between the two studied groups ($p = 0.0871$).

Table 3 shows the respondents' answers when asked if they had any prior knowledge regarding xenotransplantation.

Table 3. Analysis of acceptance of xenotransplantation.

Variables	TxG	WLP	P value
Had any prior knowledge about xenotransplantation?			
Yes	3 (6%)	2 (4%)	0.6464
No	47 (94%)	48 (96%)	
Would accept receiving the xeno-organ?			
Yes	43 (86%)	38 (76%)	0.2025
No	7 (14%)	12 (24%)	
Would support a family member who needed to receive a xeno-organ?			
Yes	44 (88%)	40 (80%)	0.2752
No	6 (12%)	10 (20%)	

The importance of religion in the decision to accept or not xenotransplantation was also questioned, and there was a significant difference between the responses of the two groups ($p = 0.0227$). In the TxG, 26 (52%) patients stated that religion positively influenced their decisions, while 24 (48%) patients stated that religion had no interference. In the WLP, 37 (74%) patients stated that religion influenced their decision to accept xenotransplantation, and in only 1 (2%) of them this influence was negative. These data show a significant difference in the influence of religion on the decision to accept xenotransplantation between the two groups ($p = 0.0227$), being greater in the WLP.

Then, statements were created to analyze the preference of the interviewed patients in crisis situations, represented by the choice of the type of xenograft donor at the time of the life-threatening transplant (Table 4). In the first question of this part of the questionnaire, it was asked if, in a case of life or death, they would accept to receive a porcine organ to supply their metabolic need or if they would prefer to wait for the human organ. For this answer, there was a significant difference between the studied groups ($p = 0.0324$), and, among the TxG patients, 47 (94%) would accept the porcine organ; among the WLP patients, 40 (80%) would accept to receive the porcine organ, against 10 (20%) patients who, even in a moment of extreme gravity, would prefer to wait for a human organ.

Table 4. Respondents' opinions regarding the preference of the organ donor species, in view of different risk situations.

Variables	TxG	WLP	P value
Situation 1			
Porcine organ	47 (94%)	40 (80%)	0.0324
Human organ	3 (6%)	10 (20%)	
Situation 2			
Porcine organ	37 (74%)	34 (68%)	0.2696
Human organ	3 (6%)	8 (16%)	
Canine organ	10 (20%)	8 (16%)	
Situation 3			
Porcine organ	25 (50%)	16 (32%)	0.1783
Human organ	23 (46%)	32 (64%)	
Canine organ	2 (4%)	2 (4%)	

The second question was similar to the first one, with the difference that the patient could choose, in addition to the human and porcine options, a canine organ. This option was offered to assess whether receptivity to xenotransplantation would increase by offering patients more species choices.⁷ This time there was no significant difference between the studied groups ($p = 0.2696$). It is noteworthy that 18 patients (10 from TxG and 8 from WLP), among those who would accept the xeno-organ, showed preference for the canine organ over to the pig. Only 2 (4%) patients, both belonging to WLP, who previously would not accept the xeno-organ, started to accept it in this situation, in which, in addition to the porcine organ, a canine was also offered.

In the last question of this block, a third situation was presented: if the patient, unlike the previous situations, was not at imminent risk of death and could choose between a xenotransplantation to cure their comorbidities immediately or remain on the waiting list for an organ human, what would they rather do? In this case, there was also no statistically significant difference between the two groups studied ($p = 0.1783$), with 23 (46%) TxG patients and 32 (64%) WLP patients choosing to wait for a human organ to become available.

Next, patients were asked if they believed that having a xeno-organ could incite some form of prejudice in those around them. In the TxG, 46 (92%) patients believed that it would not influence, and among the 4 (8%) patients who voted against it, all believed that the influence of the xeno-organ would be positive. In the WLP, 36 (72%) patients believe that it would not influence, against 14 (28%) who think otherwise. Of these 14, 9 (64%) patients believe that the xeno-organ would negatively influence the judgment of people around them. These data show a significant difference between the TxG versus WLP groups ($p = 0.0092$), indicating a greater positive influence on the TxG, as it has a xenograft.

In order to continue to assess the possible sociocultural impact that xenotransplantation would have on the patient's life, they were asked about the intensity which bearing a xenograft could affect some aspects of their life, such as: their self-esteem, their relationships with family and friends, and their religious practice. The interviewees were also questioned if they believed that they could acquire personality traits and habits that they did not have before receiving the xeno-organ.

For all the questions mentioned above, there was no significant difference between the data obtained in TxG and WLP (include the p-value). For 41 (82%) of the patients belonging to TxG and 42 (84%) of WLP believe that xenotransplantation would not change anything in their self-esteem. In TxG, 49 (98%) believed that their family relationships would not be affected. In WLP this number was 46 (92%). Regarding friendships, 43 (86%) of TxG and 41 (82%) of WLP believe that friendship relations would not be affected. When asked about the practice of their religions, 49 (98%) of TxG and 44 (88%) of WLP believe that the xenograft would not affect the practice of their religion. In TxG, 43 (86%) believe that the xeno-organ would not change their personalities or make them acquire new habits. In WLP, this number was 40 (80%).

Among the interviewees, 40 (80%) patients from TxG and 34 (68%) from WLP stated that their personal experiences, especially in relation to the suffering that their comorbidities generated, greatly influenced the way they answered this questionnaire. There was no significant difference between the two groups ($p = 0.2884$).

Finally, respondents were asked if they believed that xenotransplantation would be beneficial to patients on the waiting list. In TxG, 46 (92%) said yes and, in WLP, this number was 45 (90%), with no significant difference between TxG and FG ($p = 0.8418$) on this opinion.

DISCUSSION

The most relevant finding of this study was the positive perception of transplant patients and candidates for liver transplantation on the possibility of using animal-derived organs for liver transplantation in humans. Most respondents in both groups studied would accept to receive the xenograft and would support that a family member also received the xenograft in case of need. This result

indicates a potential receptivity of this still under development technique by patients with end-stage chronic liver disease, for which there is no replacement therapy other than transplantation. Several aspects associated with respondents' opinions were researched and brought new insights into the patients perception of xenotransplantation.

It is important to note that when comparing the sociodemographic data obtained on the acceptance of xenotransplantation, factors such as gender, ethnicity, education and marital status do not generate disparity of opinion between the transplant group and the group of candidates on the waiting list, as these variables were evenly distributed among the studied groups, which were similar. Additionally, no publication was found in either Portuguese or English languages which related sociodemographic factors with acceptance of xenotransplantation. Unfortunately, due to the low number of patients who did not accept this form of therapy, it was not possible to assess specific sociodemographic factors with the rejection of xenotransplantation.

Regarding the religious influence, it was observed that it is greater in patients who are on the waiting list, and that it exerts a favorable influence on xenotransplantation. Other reports which corroborate the present study were found in the literature on the influence of spirituality on the opinion of patients in general in Brazil and other countries about xenotransplantation.^{7-9,12,13} Curiously, when it comes to regular human transplants, it is reported that patients on the waiting list seek reinforcement in religion to live with their comorbidities, as a positive coping strategy to deal with their difficulties.²⁰ Studies with patients after liver transplantation also demonstrate that spirituality is important for coping with the disease.^{13,21} When respondents were asked to lecture on this subject, they stated that their beliefs are in favor of life and, therefore, advocate good health. In other words, if the xeno-organ is the alternative to save their lives, the studied groups believed that religion would support this form of therapy. These opinions, however, contradict the data obtained by another study carried out in Brazil, in 2014, which indicated that religious leaders, including evangelicals and spiritists, are mostly against xenotransplantation.¹²

When asked about the severity of the liver disease that led them to need a transplant, most respondents said they suffered from symptoms of the disease, and most of them said they suffered from at least three different symptoms or decompensations. The most cited symptoms were those that usually appear in the clinical picture of patients with end-stage liver disease, such as ascites, hepatic encephalopathy, and jaundice.¹⁵ The number of patients who rejected xenotransplants is small, and thus it was not possible to extrapolate conclusions about them. It is noteworthy that only 9 patients rejected this treatment, and they did not present identifying characteristics that differentiated them from other interviewed patients in age, gender, religion and other sociodemographic factors. The results obtained may indicate that the number of symptoms presented by patients is correlated with the high rate of receptivity to xenotransplantation. This information was corroborated by 46 patients from the TxG and 45 from the WLP, totaling 91% of all patients studied. The literature also supports this extrapolation by demonstrating how the presence of symptoms negatively affects the quality of life of a patient with advanced liver disease.¹⁶

Regarding the MELD and Child-Pugh score values, the values of transplanted patients revealed greater disease severity in relation to data from patients on the waiting list, which was expected, since both scales aim to stratify the severity of the disease and establish who has priority to receive an organ.¹⁷ The higher rate of rejection of xenotransplantation of WLP patients on the waiting list (12; 24%) compared to the TxG (7; 14%) was unexpected, as the WLP group is the one that still suffers from the disease, and it was assumed it would feel pressured to get rid of the symptoms anyway they could. It may be that this rate is related to the severity of diseases in the WLP group, which is lower than the severity of the patients in the TxG group. However, as the difference in the rejection rate between the two groups is very small (only 5 patients) this is difficult to affirm, and no research in the scientific literature was found that addresses this topic.

The analysis of emotional changes showed the following: few respondents had chronic emotional illnesses (11 patients, 8 from the TxG and 3 from the WLP), and the only ones mentioned were anxiety and depression. This data reveals proportions smaller than expected when compared to previous research on the subject.^{11,13,14} Only one of these patients manifested against receiving a xeno-organ. However, as few patients interviewed had emotional problems, it was not possible to establish a relationship between psychological comorbidities and positive perception to xenotransplantation. Once again, no research in the scientific literature was found to assess this particular aspect.

Situations with different degrees of risk were created for patients to choose whether to receive the xeno-organ. In a situation of imminent risk of death if the patient did not receive a transplant, 47 (94%) of the TxG chose to receive the porcine organ, while in the WLP this number was reduced to 40 (80%). This was the only difference found in this crisis situation.

The greater acceptance of xeno-organs by patients already transplanted may be a consequence of contemplating the possibility of death while waiting for a donor, had they not received an organ in time. It is also possible that the time the patient spends waiting for a donor explain why the majority of both groups interviewed accepted the xenotransplantation.

The MELD and Child-Pugh values obtained in the research corroborate this theory: most members of the WLP group had MELD < 15 and Child-Pugh between A and B, indicators of lower disease severity when compared to the values of MELD and Child-Pugh of patients in the TxG group immediately before transplantation. In addition, these data show a discrepancy in relation to the data obtained in the question "would you accept to receive a xenotransplantation?"; which can be explained by the

fact that some respondents changed their opinion during the research: although at first, they did not accept the alternative therapy offered, when faced with an extreme risk situation, they decided to accept it so as not to die.

The second hypothetical situation proposed was similar to the first one, but now the patient would also have a canine organ available, and they could choose between porcine, canine or none. The number of people who chose not to receive the organs remained practically the same as in the previous situation, but some interviewees who previously opted for the porcine organ now opted for the canine organ—10 from the TxG and 8 from the WLP. They justified this decision by stating that closer proximity to the dog, which is a domestic animal, would make them more comfortable with the therapy. Most patients who continued opting for the pig used the opposite argument: for having less proximity to the pig, including the human diet be composed of pork, it would be easier to accept the xeno-organ.

The third hypothetical situation removed the patient from the situation of imminent risk, and they could opt for the porcine organ, that is, they could leave the waiting list. The patients were divided on this issue, with 23 from the TxG and 32 from the WLP preferring to continue waiting for a human organ, while 27 from the TxG and 18 from the WLP opted for the xeno-organ. This demonstrates that curing the disease, for almost half of the patients, is more important than the concern of the received organ being human or not.

The preference for the human organ is explained by the positive affective influence it generates in the patient, when compared to xeno-organs.⁷ The data obtained are in agreement with Rubaltelli et al.,⁷ whose study, involving 80 candidate patients for liver transplantation, demonstrated how the impressions and feelings of a person referring to the animal involved in the xenotransplantation interfere in the choice of a xeno-organ. Their study also agreed with this article by demonstrating that the patients' preference is to receive a human organ, followed by the pig and, finally, the canine.

Regarding the psychosocial factors that would affect the patients' opinion, the following were analyzed: self-esteem, relations with family and friends, religious practice and fear of behavioral change related to the xeno-organ. In these situations, the two groups were evenly divided and most respondents, both from the TxG and the WLP, stated that xenotransplantation would not interfere in any of these aspects. No other research in the Portuguese or English literature was found that associates these variables with xenotransplantation.

However, when it comes to homologous transplants (transplantation between the same species), these data differ from the literature, as it has been shown that some patients believe that liver comorbidity affects their self-esteem and interpersonal relationships, that is, they believe that there is a social stigma in the transplant scenario.¹⁴ When asked about the influence of personal experiences on the acceptance of xenotransplantation, 40 patients (80%) from the TxG and 34 (68%) from the WLP said that everything lived and suffered with the disease helped them to accept the idea of this type of treatment. This association has already been described in the literature when it comes to homologous transplants, demonstrating that there is a notable compromise in the quality of life of patients on the waiting list for liver transplantation, which affects the physical, psychological and social status of the interviewed patients.¹⁶

Among the interviewees, 47 from the TxG and 48 from the WLP had no prior knowledge about xenotransplantation and, at the end of the survey, 46 from the TxG and 45 from the WLP stated that this treatment would be beneficial for those on the waiting list. This data is in discordance to the percentage of patients who, at the beginning of the questionnaire, stated that they would not accept this therapy (7 from TxG and 12 from WLP). However, as previously mentioned, this can be explained by the change of opinion of some interviewees, between the beginning and the end of the application of the questionnaire, when they realized that receiving a xeno-organ is a more viable option than taking life risks in the waiting list. Respondents were asked, in this same questionnaire, what the benefits of xenotransplantation would be, and the most frequent answers were that this treatment would reduce the waiting list and, consequently, the high mortality rate of patients who are in it;¹² that the xeno-organ would improve the quality of life of the patient who was previously ill; that as many families choose not to donate the organs of their relatives in Brazil,¹⁸ xeno-organs would give more perspective to needy patients.

The reasons that led patients to be against this therapy were also questioned, and most of the justifications reported were the lack of information on the subject and the fear of the body rejecting it. Indeed, the rejection of the graft by the human body is a barrier to be overcome so xenotransplantation can become a viable treatment.²² One patient claimed that the use of xeno-organs would be unethical in relation to the welfare of the animals used, highlighting that bioethical issues are also relevant to be studied and discussed before xenotransplants can be effectively implanted as a therapeutic method.²³

CONCLUSION

Among the studied variables, the experience of suffering that the patients had with their underlying disease, demonstrated by the Child-Pugh, MELD and symptoms of the illness, showed a relationship with the acceptance of xenotransplantation.

Sociodemographic variables had no significance in the result of this research, and religion, when influential in the interviewees' considerations, is in favor of the xeno-organ. Regarding the psychosocial data, the research showed that the possibility of accepting an organ of another species would not have a bad impact on their psychosocial life.

There is agreement that xenotransplants, when available, are beneficial for patients on the waiting list. In the opinion of this research participants, xenotransplants would be well accepted by their target audience if the multidisciplinary transplant team provide information about their functioning and benefits.

AUTHORS' CONTRIBUTION

Substantive scientific and intellectual contributions to the study: Pavan CL, Silva RF, Silva RCMAS and Miyazaki ET; **Conception and design:** Pavan CL and Goes CH; **Data analysis and interpretation:** Castiglioni L and Godoy MF; **Writing of the article:** Pavan CL and Goes CH; **Critical revision:** Pavan CL, Silva RF and Silva RCMAS; **Final approval:** Silva RF and Silva RCMAS.

AVAILABILITY OF RESEARCH DATA

Data will be available upon request.

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