Attitudes, Knowledge and Views of Portuguese Physicians regarding Complementary and Alternative Medicine: A Cross-Sectional Study

Atitudes, Conhecimentos e Perspetivas dos Médicos Portugueses acerca das Terapêuticas Não Convencionais: Um Estudo Transversal

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ABSTRACT

Introduction: The widespread use of complementary and alternative medicine and the fact that these are not innocuous makes it important for physicians to be familiar with it in order to properly advise their patients. The aim of this study was to identify attitudes, knowledge and views of Portuguese physicians about complementary and alternative medicine.

Material and Methods: An observational, analytical, cross-sectional study was performed. A questionnaire with dichotomous and multiple-choice answers on a 5-point Likert scale, was sent to all doctors registered in the Portuguese Medical Association. It included beliefs and convictions regarding complementary and alternative medicine; aspects related to the types of complementary and alternative medicine legally approved in Portugal; sources used to obtain information about complementary and alternative medicine; and questions about complementary and alternative medicine in the Portuguese context. The statistical analysis of the data was made using SPSS v.27.0 and all conclusions were taken at a significance level of 5%.

Results: From a total sample of 4334 doctors that fully completed the questionnaire, 45.5% reported not feeling comfortable talking, debating, and elucidating their patients about complementary and alternative medicine. The majority, 68.6%, considered that the competence in medical acupuncture of the Portuguese Medical Association should remain available. However, 72.4% believe that complementary and alternative medicine should not be included in the National Health Service.

Conclusion: Portuguese doctors seem to have a low level of knowledge about complementary and alternative medicine, and a relevant part of them does not feel prepared to advise their patients about it.

Keywords: Complementary Therapies; Education, Medical; Portugal

RESUMO

Introdução: A utilização significativa das terapêuticas não convencionais, e o facto de estas não serem inócuas, torna imperativo que os médicos as conheçam, de forma a melhor aconselharem os seus doentes. Este estudo visou identificar as atitudes, conhecimentos e perspetivas dos médicos portugueses relativamente às terapêuticas não convencionais.

Material e Métodos: Realizou-se um estudo observacional, analítico e transversal. Os médicos inscritos na Ordem dos Médicos portuguesa responderam a um questionário com respostas em escala de Likert de cinco pontos, dicotómicas e de escolha múltipla. As respostas às questões sobre crenças/convicções a respeito das terapêuticas não convencionais; aspetos relacionados com as terapêuticas não convencionais aprovadas pela Lei portuguesa; fontes usadas para obtenção de informação relativamente às terapêuticas não convencionais; e perguntas sobre as terapêuticas não convencionais no contexto nacional, foram analisadas com recurso ao SPSS v.27.0. Todas as conclusões foram tomadas ao nível de significância de 5%.

Resultados: Dos 4334 médicos que responderam na íntegra ao questionário, 45,5% não se sentem confortáveis para conversar, argumentar e esclarecer os doentes a respeito das terapêuticas não convencionais. A maioria, 68,6%, considera que a competência em acupuntura da Ordem dos Médicos deveria permanecer disponível. No entanto, 72,4% dos médicos consideram que as terapêuticas não convencionais não deveriam ser incluídas no Serviço Nacional de Saúde.

Conclusão: Os conhecimentos dos médicos portugueses relativamente às terapêuticas não convencionais parecem ser reduzidos, sendo que parte relevante dos inquiridos não se considera preparada para aconselhar os seus doentes.

Palavras-chave: Educação Médica; Portugal; Terapias Complementares

INTRODUCTION

'Traditional medicine', 'non-conventional medicine' or 'complementary and alternative medicine' are used similarly when referring to different elements, practices or products related to healthcare that are generally not part of the so-called conventional medicine.[1] In Portugal, '*terapêuticas não convencionais* – non-conventional therapies' (TNC) is the officially recognized terminology. According to Law #45/2003, when the legislation and framework for these practices were started, "non-conventional therapies are considered those that have a philosophical basis other than conventional medicine and apply specific diagnostic and therapeutic processes of their own".[2]

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There are different non-conventional therapies, including reflexology, reiki, ayurvedic medicine, aromatherapy, crystal therapy, urine therapy, ozone therapy, and others. However, traditional Chinese medicine, herbal medicine, homeopathy, acupuncture, naturopathy, osteopathy, and chiropractic were approved by Portuguese law.[3,4]

TNCs hold significant popularity worldwide. A report by the National Center for Health Statistics (NCHS) estimated that TNCs were used by 34% of American adults and 12% of American children in 2012.[5,6] Around $33.9 billion were spent in 2007 by 38.1 million Americans on consultations and products related to TNCs.[7] In Europe, TNCs were used by around 70% of European citizens and according to the European Observatory on Health Systems and Policies report, it is estimated that TNCs are regularly sought by more than two million Portuguese citizens.[8,9]

Despite their popularity, TNCs are not consensual among the medical and scientific community. The lack of sufficiently valid and robust scientific evidence to prove their efficacy is the major factor contributing to controversy.[10-14] In addition, the lack of legal regulation of these practices lead to fraudulent practice, misdiagnosis and delayed diagnosis, misinformation and harmful treatments.[4] The delay or withdrawal of conventional treatments, the direct adverse effects of some practices and the interaction with conventional pharmacological treatments are among the major causes of harmful cases described in literature.[15,16]

Due to the significant use of TNCs in several countries and the fact that they are not innocuous, it is imperative that healthcare professionals in general and physicians should have basic knowledge on these to appropriately advise and guide their patients.[17]

Although basic content regarding TNCs is currently addressed in some medical schools, the subject is not significantly represented in medical training curricula. This was found in different studies describing that most physicians feel that their knowledge regarding the safety and efficacy of TNCs is inadequate and that more training and education are required.[18-21]

Studies aimed at assessing the awareness and knowledge of physicians regarding TNCs have been conducted in United States, Mexico, United Kingdom, Germany, Poland and Sweden, among many other countries.[17-24] In Portugal, we are only aware of one study on the subject that assessed the perspectives of Portuguese general practitioners.[25] Therefore, this study was aimed at the assessment of attitudes, knowledge and perspectives of Portuguese physicians regarding legally regulated TNCs in Portugal. In addition, gender and age were described in international studies as significant factors with an impact on the respondents' opinions and therefore the impact of these variables was also an objective of this research.

MATERIAL AND METHODS

This was an observational, analytical, and cross-sectional study involving the application of a specifically designed questionnaire to assess the knowledge and perspectives of Portuguese physicians on TNCs.

The target population of the study included physicians registered with the Portuguese Medical Association. At the end of 2019, 56,200 physicians were registered with the Portuguese Medical Association, and data on how many of these were included in the electronic mailing list of the Portuguese Medical Association were unavailable.

A self-completed, two-phase questionnaire was developed. Initially, a review of the scientific literature on the different TNCs was conducted, in addition to a search in national and international medical databases for studies on the medical community's perspectives.

Questionnaires that were used in other studies were analysed in the next phase. As no standardised and validated questionnaires were found, and considering the objectives of this study, a questionnaire based on the guidelines of international studies on the same subject was used (Appendix 1: https://www.actamedicaportuguesa.com/revista/index.php/amp/article/view/16063/6544), focused on original items that were considered adapted to the Portuguese reality.[18,23,25,26]

The questionnaire included questions to be responded on a five-point Likert scale, with dichotomous and multiple choice, divided into six parts, included a brief presentation of the research, informed consent and four sections (A, B, C and D). Sociodemographic questions were included in section A. Statements regarding the beliefs/convictions of Portuguese physicians regarding TNCs were included in section B. Items related to legally approved TNCs, as well as questions related to the sources used by respondents to obtain information were included in section C. Finally, more specific statements on TNCs in the Portuguese context were included in section D.

The questionnaire was computerized with LimeSurvey® technology and was sent by e-mail to the mailing list of the Portuguese Medical Association, with no interference of the researchers in this process (this was organised by the Association services). The questionnaire was available online between 12 August 2020 and 4 September 2020.

SPSS v. 27 software was used for the statistical analysis.

The descriptive analysis was displayed by using frequency tables and charts of the distributions of the different statistical variables. Means (e.g., for items scored on a 1-5 scale, a score > 3 is higher than the scale midpoint), standard deviations and interquartile ranges were shown for quantitative statistical variables or Likert scale measures.

Even though we were dealing with Likert scales, i.e., with ordinal scale data, the inferential analysis approach of Sullivan and Artino (who have explained that parametric tests not only can be used with ordinal data but are in this case more robust than non-parametric, even when the hypothesis of normality is violated) has been followed.[27] When two or more population means were compared, the parametric Student's t-test and analysis of variance (ANOVA) were applied, respectively.

Based on the contingency tables, chi-square homogeneity test was constructed to check whether two or

more populations were homogeneous, i.e., to test whether the proportions of elements with certain characteristics are equal for all populations.[28]

In addition to the point estimates, the 95% confidence intervals were presented and a 5% chance of a Type I error was considered in the remaining inferences for the population of Portuguese physicians.

The study was approved by the Ethics Committee of the University of Beira Interior. The respondents' anonymity was ensured, as well as data confidentiality.

RESULTS

A percentage of 52.8% (2,287) of female respondents and a mean age of 46.8 years were found in our group of respondents (n = 4,334), with a standard deviation of 15.7 years (range 23-98). Two respondents were excluded from the study due to misreported data. A median age of 43 was found and the age distribution showed a positive asymmetry (asymmetry coefficient 0.332, standard error 0.037). Family medicine (22.4%), internal medicine (6.9%), paediatrics (4.6%) and anaesthesiology (4.6%) were the most frequently found medical specialties, with 17.7% of respondents describing no specific specialty.

As regards the statements associated with the respondent's beliefs on TNCs, the items with a mean agreement (M) above the scale midpoint included "3 - *as crenças, valores e expectativas dos doentes deverão ser integrados na prestação de cuidados médicos* (patients' beliefs, values and expectations should be integrated into healthcare provision" (M = 4.12) and "6 - *os tratamentos não testados cientificamente de forma rigorosa deverão ser desencorajados* (non-scientifically proven treatments should be discouraged" (M = 4.00), followed by "5 - *os efeitos das terapêuticas não convencionais são essencialmente resultado do efeito placebo* (the outcomes of non-conventional therapies are mainly related to the placebo effect)" (M = 3.43) and "7 - *as terapêuticas não convencionais incluem ideias e métodos que poderiam ser utilizados de forma benéfica pela medicina convencional* (non-conventional therapies include ideas and methods that could be useful in conventional medicine)" (M = 3.26) and "4 - *as terapêuticas não convencionais são uma ameaça à saúde pública* (non-conventional therapies are a threat to public health)" (M = 3.18). Finally, items "1 - *a saúde física e mental é mantida por uma energia ou força vital* (physical and mental health are maintained by an energy or vital force)" (M = 2.76) and "2 - *o corpo do ser humano é essencialmente auto-curativo sendo a tarefa do médico providenciar a harmonia necessária para esse processo* (the human body is mainly self-healing and the physician's task is providing the necessary harmony)" (M = 2.71) show a mean agreement below the scale midpoint (Table 1).

A higher agreement with the statement "Physical and mental health is maintained by an energy or vital force" was found in female respondents (M = 3.00) when compared to male respondents (M = 2.48), while the agreement with the statement "The outcomes of non-conventional therapies are mainly related to the placebo effect " was higher in male (M = 3.63) when compared to female respondents (M = 3.24), with statistically significant differences in both cases [t (4149.742) = 14.218, $p < 0.001$, 95% CI = (0.446; 0.589) and t (4332) = - 11.787, $p < 0.001$, 95% CI = (-0.456; -0.326)] even though the difference between the means was estimated at less than half a point on the scale from 1 to 5 (Table 1).

Three age groups were considered [< 35 (n = 1,469, 33.9%), 36 - 55 (n = 1,316, 30.4%) and > 55 (n = 1,547, 35.7%)]. A lower mean agreement with the statement "physical and mental health is maintained by an energy or vital force" has been found in the < 35 age group (M = 2.47), followed by 36 - 55 (M = 2.74) and was higher in > 55 (M = 3.04), showing statistically significant differences [F (2; 4329) = 86.682, $p < 0.001$]. In contrast, a higher mean agreement with the statement "the outcomes of non-conventional therapies are mainly related to the placebo effect" has been found in the < 35 age group (M = 3.71), followed by 36 - 55 (M = 3.40) and was lower in > 55 (M = 3.18), with statistically significant differences [F (2;4329) = 88.208, $p < 0.001$] (Table 1).

A higher level of knowledge of acupuncture has been found [M = 3.29; 95% CI = (3.26; 3.32)], the only TNC with a mean knowledge higher than the scale midpoint, followed by osteopathy [M = 2.76; 95% CI = (2.72; 2.79)] and homeopathy [M = 2.72; 95% CI = (2.68; 2.75)]. The lowest knowledge was found regarding chiropractic [M = 1.97; 95% CI = (1.94; 2.01)] (Table 2).

A higher perception of the effectiveness of TNCs by Portuguese physicians has been found regarding acupuncture [M = 3.24; 95% CI = (3.20; 3.27)], the only therapy with a mean perception of effectiveness higher than the scale midpoint and lower perception regarding naturopathy [M = 1.84; 95% CI = (1.80;1.88)] and homeopathy [M = 1.76; 95% CI = (1.73;1.80)] (Table 3).

The three factors with the highest influence on the beliefs associated with TNCs include "patient testimonials" [46.3%, 95% CI= (44.8%; 47.8%)], followed by "opinions of other healthcare professionals" [43.2%, 95% CI = (41.7%; 44.7%)] and "systematic reviews/meta-analyses" [42.1%, 95% CI = (40.6%; 43.6%)].

The proficiency in medical acupuncture within the Portuguese Medical Association should remain available, as considered by an estimated 68.6% [95% CI = (67.2; 70.0%)] of respondents [higher in female (74.3%) and lower in male respondents (62.2%)], as opposed to what was found regarding the opinion that it should be removed, showing statistically significant differences [chi-square test, χ (1) = 72.835; $p < 0.001$], in addition to a higher rate in respondents aged < 35 (44.6%), followed by 36 - 55 (34.3%) and lower in > 55 years (16.4%), as opposed to what was found regarding the opinion on whether it should remain available, with statistically significant differences [chi-square test, χ (2) = 286.368; $p < 0.001$].

It was found that 45.5% [95% CI = (44.0%; 47.0%)] of respondents do not feel comfortable talking, debating,

Table 1 – Section B: Which is your level of agreement with the following statements?

	1	2	3	4	5		
	n (%)	n (%)	n (%)	n (%)	n (%)	M (SD)	*p*-value
1 - *A saúde física e mental é mantida por uma energia ou força vital* (physical and mental health are maintained by an energy or vital force).	899 (20.7)	901 (20.8)	1171 (27.0)	1087 (25.1)	276 (6.4)	2.76 (1.22)	
Female	280 (12.2)	461 (20.2)	691 (30.2)	689 (30.1)	166 (7.3)	3.0 (1.13)	< 0.001
Male	619 (30.2)	440 (21.5)	480 (23.4)	398 (19.4)	110 (5.4)	2.48 (1.25)	
< 35	420 (28.6)	343 (23.3)	366 (24.9)	278 (18.9)	62 (4.2)	2.47 (1.21)	< 0.001
36 - 55	274 (20.8)	268 (20.4)	387 (29.4)	301 (22.9)	86 (6.5)	2.74 (1.21)	
> 55	205 (13.3)	289 (18.7)	418 (27.0)	508 (32.8)	127 (8.2)	3.04 (1.17)	
2 - *O corpo do ser humano é essencialmente autocurativo sendo a tarefa do médico providenciar a harmonia necessária para esse processo* (the human body is mainly self-healing and the physician's task is providing the required harmony).	646 (14.9)	1485 (34.3)	866 (20.0)	1164 (26.9)	173 (4.0)	2.71 (1.13)	
3 - *As crenças, valores e expectativas dos doentes deverão ser integrados na prestação de cuidados médicos* (patients' beliefs, values and expectations should be integrated into healthcare provision).	61 (1.4)	175 (4.0)	358 (8.3)	2324 (53.6)	1416 (32.7)	4.12 (0.83)	
4 - *As terapêuticas não convencionais são uma ameaça à saúde pública* (non-conventional therapies are a threat to public health).	290 (6.7)	1113 (25.7)	1098 (25.3)	1194 (27.5)	639 (14.7)	3.18 (1.17)	
5 - *Os efeitos das terapêuticas não convencionais são essencialmente resultado do efeito placebo* (The outcomes of non-conventional therapies are mainly related to the placebo effect).	160 (3.7)	907 (20.9)	924 (21.3)	1603 (37.0)	740 (17.1)	3.43 (1.11)	
Female	98 (4.3)	574 (25.1)	552 (24.1)	799 (34.9)	264 (11.5)	3.24 (1.08)	< 0.001
Male	62 (3.0)	333 (16.3)	372 (18.2)	804 (39.3)	476 (23.3)	3.63 (1.10)	
< 35	28 (1.9)	195 (13.3)	301 (20.5)	599 (40.8)	346 (23.6)	3.71 (1.03)	< 0.001
36 - 55	50 (3.8)	285 (21.7)	294 (22.3)	461 (35.0)	226 (17.2)	3.40 (1.12)	
> 55	82 (5.3)	427 (27.6)	329 (21.3)	542 (65.0)	167 (10.8)	3.18 (1.11)	
6 - *Os tratamentos não testados cientificamente de forma rigorosa deverão ser desencorajados* (non-scientifically proven treatments should be discouraged).	68 (1.6)	405 (9.3)	587 (13.5)	1688 (38.9)	1586 (36.6)	4.00 (1.01)	
7 - *As terapêuticas não convencionais incluem ideias e métodos que poderiam ser utilizados de forma benéfica pela medicina convencional* (TNCs include ideas and methods that could be useful for conventional medicine).	323 (7.5)	766 (17.7)	1071 (24.7)	1820 (42.0)	354 (8.2)	3.26 (1.07)	
8 - *As terapêuticas não convencionais são apenas um embuste com fins financeiros* (TNCs are just a scam for financial gain).	283 (6.5)	1252 (28.9)	1263 (29.1)	1039 (24.0)	497 (11.5)	3.05 (1.12)	

Scores are referred to the following scale: 1 – Strongly disagree; 2 – Disagree; 3 – Neither agree nor disagree; 4 – Agree; 5 – Strongly agree.
M: mean; SD: standard deviation

and clarifying their patients on TNCs, 57.0% [95% CI = (55.5%; 58.5%)] have considered that more training on TNCs should be provided in medical training curricula, at least one referral to TNCs was described by 29.3% [95% CI = (27.9%; 30.6%)] and 72.4% [95% CI = (71.1%; 73.7%)] have considered that TNCs should not be included in the Portuguese *Serviço Nacional de Saúde* (Table 4).

A higher percentage of those who have considered as feeling comfortable talking, debating, and clarifying their patients on TNCs was found in male respondents (69.4%) when compared to female respondents (41.2%), with statistically significant differences [chi-square test, χ (1) = 345.926; $p < 0.001$]. Statistically significant differences were also found as regards the age distribution [chi-square test, χ (2) = 9.292; $p = 0.010$] (Table 4).

At least one referral to TNCs was described by 31.4% of female and 27.1% of male respondents, showing statistically significant differences [chi-square test, χ (1) = 9.579; $p = 0.002$] (Table 4). This was described by a lower percentage of respondents aged < 35 (12.7%), followed by 36 - 55 (30.9%) and by > 55 years (43.9%), with statistically significant differences [chi-square test, χ (2) = 356.557; $p < 0.001$] (Table 4).

Only 34.3% of female and 20.1% of male respondents have considered that TNCs should be included in the Portuguese *Serviço Nacional de Saúde*. Statistically significant differences were found between genders [chi-square test, χ (1) = 109.010; $p < 0.001$] and age groups

Table 2 – Question: "9 – Please describe your level of knowledge on each of the following TNCs:"

	1	2	3	4	5		
	n (%)	n (%)	n (%)	n (%)	n (%)	M (SD)	95% IC
Acupuncture	269 (6.2)	827 (19.1)	967 (22.3)	1923 (44.4)	348 (8.0)	3.29 (1.06)	(3.26; 3.32)
Homeopathy	911 (21.0)	1074 (24.8)	928 (21.4)	1169 (27.0)	252 (5.8)	2.72 (1.23)	(2.68; 2.75)
Naturopathy	1636 (37.7)	1116 (25.7)	831 (19.2)	648 (15.0)	103 (2.4)	2.18 (1.16)	(2.15; 2.22)
Osteopathy	849 (19.6)	1063 (24.5)	921 (21.3)	1294 (29.9)	207 (4.8)	2.76 (1.21)	(2.72; 2.79)
Traditional Chinese medicine	1223 (28.2)	1184 (27.3)	918 (21.2)	904 (20.9)	105 (2.4)	2.42 (1.17)	(2.38; 2.45)
Phytotherapy	1610 (37.1)	1088 (25.1)	783 (18.1)	702 (16.2)	151 (3.5)	2.24 (1.21)	(2.20; 2.27)
Chiropractic	2066 (47.7)	999 (23.1)	671 (15.5)	520 (12.0)	78 (1.8)	1.97 (1.13)	(1.94; 2.01)

Scores are referred to the following scale: 1 – None; 2 – Very scarce; 3 – Scarce; 4 – Some; 5 – High.
M: mean; SD: standard deviation; 95% CI: 95% confidence interval for the mean.

Table 3 – Question: "10 – Please describe your perception on the efficacy of each of the following TNCs:"

	Do not know	1	2	3	4	5		
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	M (SD)	95% IC
Acupuncture	283 (6.5)	316 (7.3)	534 (12.3)	1222 (28.2)	1840 (42.5)	139 (3.2)	3.24 (0.99)	(3.20; 3.27)
Homeopathy	929 (21.4)	2067 (47.7)	470 (10.8)	508 (11.7)	326 (7.5)	34 (0.8)	1.76 (1.08)	(1.73; 1.80)
Naturopathy	1827 (42.2)	1339 (30.9)	505 (11.7)	404 (9.3)	240 (5.5)	19 (0.4)	1.84 (1.06)	(1.80; 1.88)
Osteopathy	997 (23.0)	588 (13.6)	565 (13.0)	940 (21.7)	1119 (25.8)	125 (2.9)	2.89 (1.16)	(2.85; 2.93)
Traditional Chinese medicine	1632 (37.7)	840 (19.4)	528 (12.2)	651 (15.0)	626 (14.4)	57 (1.3)	2.46 (1.21)	(2.41; 2.50)
Phytotherapy	1973 (45.5)	985 (22.7)	460 (10.6)	452 (10.4)	402 (9.3)	62 (1.4)	2.19 (1.22)	(2.14; 2.24)
Chiropractic	2341 (54.0)	860 (19.8)	369 (8.5)	405 (9.3)	331 (7.6)	28 (0.6)	2.15 (1.19)	(2.09; 2.20)

Scores are referred to the following scale: 1 – Not effective at all; 2 – Highly ineffective; 3 – Ineffective; 4 – Effective; 5 – Extremely effective.
M: mean; SD: standard deviation; 95% CI: 95% confidence interval for the mean.

[chi-square test, χ^2 (2) = 103.633; $p < 0.001$] (Table 4).

A lower mean agreement with the statement "The outcomes of TNCs are mainly related to the placebo effect" was found in respondents who have considered that TNCs should be included in the Portuguese *Serviço Nacional de Saúde* (M = 2.43) and higher in those who did not (M = 3.81), with statistically significant differences [t (4332) = -43.939, $p < 0.001$, 95% CI = (-1.437; -1.314)]. A lower mean agreement with the statement "non-scientifically proven treatments should be discouraged" was found in respondents who have considered that TNCs should be included in the Portuguese *Serviço Nacional de Saúde* (M = 3.28) and higher in those who did not (M = 4.27), with statistically significant differences [t (1771.775) = -28.995, $p < 0.001$, 95% CI = (-1.064; -0.929)]. A higher mean agreement with the statement "TNCs include ideas and methods that could be useful in conventional medicine" has been found in respondents who have considered that TNCs should be included in the Portuguese *Serviço Nacional de Saúde* (M = 4.07) and lower in those who did not (M = 2.95), with statistically significant differences [t (43345,228) = 42.160, $p < 0.001$, 95% CI = (1.074; 1.178)] (Table 5).

A higher mean agreement with the statement "physical and mental health is maintained by an energy or vital force" has been found in respondents who have considered that the proficiency in medical acupuncture should remain available within the Portuguese Medical Association (M = 3.10) and lower in those who have considered that it should be removed (M = 2.00), with statistically significant differences [t (4332) = 30.467, $p < 0.001$, 95% CI = (1.031; 1.173)]. A higher mean agreement with the statement "non-scientifically proven treatments should be discouraged" has been found in respondents who have considered that the proficiency in medical acupuncture should be removed from the Portuguese Medical Association (M = 4.54) and lower in those who have considered that it should remain available (M = 3.75), with statistically significant differences [t (3773,122) = -29.596, $p < 0.001$, 95% CI= (-0.840; -0.736)] (Table 6).

DISCUSSION

To our knowledge, this is the first Portuguese study on the attitudes, knowledge, and perspectives of Portuguese physicians with different specialties regarding TNCs. This subject was assessed in 2010 by Miranda[25] specifically on the perspectives of Portuguese general practitioners, so the assessment of the perspectives of all the Portuguese physicians was not possible. This work represents one of the largest studies ever carried out with the Portuguese medical community, and the questionnaire was fully completed by 4,334 physicians, which we believe showed their interest in the subject and the relevance of its discussion. However, it should be considered that, despite its size, this sample corresponds to approximately 8% of the potential universe of respondents and as the questionnaire was voluntary, the inferences for the population were based on a self-selected convenience sample. In addition, although the questionnaire was built with a computer tool preventing the questionnaire from being repeated on the same device, it was not possible to prevent that the questionnaire could

Table 4 – Statistical data and chi-square test, relationship of gender and age with statements 13 to 16

	No	Yes	
	n (%)	n (%)	*p*-value
13 - *Sente-se confortável para conversar, argumentar e esclarecer os seus doentes a respeito das terapêuticas não convencionais?* (Do you feel comfortable talking, debating and clarifying your patients on TNCs?)	1972 (45.5)	2362 (54.5)	< 0.001
Female	1345 (58.8)	942 (41.2)	< 0.001
Male	627 (30.6)	1420 (69.4)	
< 35	698 (47.5)	771 (52.5)	0.010
36 - 55	616 (46.8)	700 (53.2)	
> 55	656 (42.4)	891 (57.6)	
14 - *Considera que os currículos de formação médica deveriam incluir mais conteúdos sobre terapêuticas não convencionais?* (Do you consider that more contents on TNCs should be included in medical curricula?)	1863 (43.0)	2471 (57.0)	< 0.001
Female	809 (35.4)	1478 (64.6)	< 0.001
Male	1054 (51.5)	993 (48.5)	
< 35	767 (52.2)	702 (47.8)	< 0.001
36 - 55	600 (45.6)	716 (54.4)	
> 55	495 (32.0)	1052 (68.0)	
15 - *Alguma vez referenciou um doente para um profissional de terapêuticas não convencionais?* (Have you ever referred a patient to TNCs?)	3063 (70.7)	1271 (29.3)	< 0.001
Female	1570 (68.6)	717 (31.4)	0.002
Male	1493 (72.9)	554 (27.1)	
< 35	1283 (87.3)	186 (12.7)	< 0.001
36 - 55	910 (69.1)	406 (30.9)	
> 55	868 (56.1)	679 (43.9)	
16 - *As terapêuticas não convencionais deveriam ser incluídas no Serviço Nacional de Saúde?* (Should TNCs be included into the Portuguese *Serviço Nacional de Saúde*?)	3138 (72.4)	1196 (27.6)	< 0.001
Female	1502 (65.7)	785 (34.3)	< 0.001
Male	1636 (79.9)	411 (20.1)	
< 35	1194 (81.3)	275 (18.7)	< 0.001
36 - 55	940 (71.4)	376 (28.6)	
> 55	1002 (64.8)	545 (35.2)	

Table 5 – Statistical data and *t*-tests, relationship between statement no. 16 and statements no. 5 to 7

	16 - Should TNCs be included into the Portuguese *Serviço Nacional de Saúde*?		
	No **M (SD)** n = 3,138	**Yes** **M (SD)** n = 1,196	***p*-value**
5 - *Os efeitos das terapêuticas não convencionais são essencialmente resultado do efeito placebo.* (The outcomes of non-conventional therapies are mainly related to the placebo effect)	3.81 (0.93)	2.43 (0.90)	< 0.001
6 - *Os tratamentos não testados cientificamente de forma rigorosa deverão ser desencorajados* (Non-scientifically proven treatments should be discouraged).	4.27 (0.83)	3.28 (1.07)	< 0.001
7 - As terapêuticas não convencionais incluem ideias e métodos que poderiam ser utilizados de forma benéfica pela medicina convencional (TNCs include ideas and methods that could be useful for conventional medicine).	2.95 (1.04)	4.07 (0.67)	< 0.001

M: mean; SD: standard deviation

have been completed more than once by the same person on different electronic devices. Therefore, these results should be carefully considered.

Regarding the Portuguese physicians' knowledge on TNCs, acupuncture was the therapy with the highest perceived level of knowledge by respondents and was the only one with a perception of average knowledge higher than the scale midpoint. A low level of knowledge on TNCs was described by the respondents, in line with previous research carried out both in Portugal and internationally, showing the need for greater investment in medical training on this subject.[21,25]

"Patients' testimonies", followed by "opinions of other healthcare professionals", "systematic reviews/meta-analysis" were described as the factors with the highest impact on physicians' beliefs regarding TNCs. The

Table 6 – Statistical data and *t*-tests, relationship between statement no. 12 and statements no. 1 and 6

	12 - The proficiency in medical acupuncture in the Portuguese Medical Association shouldr:				*p*-value
	Remain M (SD) (n = 2,973)		Be removed M (SD) (n = 1,361)		
1 - *A saúde física e mental é mantida por uma energia ou força vital* (physical and mental health are maintained by an energy or vital force).	3.10	1.12	2.00	1.07	< 0.001
6 - *Os tratamentos não testados cientificamente de forma rigorosa deverão ser desencorajados* (Non-scientifically proven treatments should be discouraged).	3.75	1.03	4.54	0.69	< 0.001

M: mean; SD: standard deviation

importance of patients' reports in physicians' convictions had already been identified by Miranda, showing the importance of the doctor-patient relationship.[25]

A significant number of Portuguese physicians do not feel comfortable talking, debating, and clarifying their patients regarding TNCs. Patel *et al.*[18] had already found the lack of knowledge of doctors regarding these therapies in a study carried out in Ohio, in support to the need for increasing the knowledge on the efficacy and safety of TNCs so that doctors feel better prepared advising and guiding their patients. More training on TNCs was considered by most respondents in medical training curricula.

It was estimated that 29.3% of Portuguese physicians had at least referred one patient to a TNC professional. In contrast, in a study in a North American medical centre, it was found that 68% of the respondents had referred patients to these therapies.[17] These differences should be analysed taking into consideration the way the North American healthcare structures are organised, as some of these therapies are developed within the same settings as conventional medicine, which could favourably influence referrals. However, further studies are required to understand how referral takes place and its impact in different countries.

It was estimated that 68.6% of the respondents have considered that the proficiency in medical acupuncture should remain available within the Portuguese Medical Association, while 72.4% considered that this should be removed. These data showed that doctors are not in favour of the integrated exercise of these therapies together with conventional medicine within the Portuguese *Sistema Nacional de Saúde*, as suggested in the Basic Health Law of 4 September 2019.[29]

An association was found between respondents' gender and age and their attitudes, knowledge and perspectives regarding TNCs. Wahner-Roedler *et al.*[17] had already found a more frequent referral of patients by female doctors. An update of medical training curricula over the decades may explain the relevance of age in the beliefs of Portuguese physicians regarding TNCs; however, further studies are required to understand and clarify the effect of these variables.

CONCLUSION

This study has shown a low level of knowledge in Portuguese physicians regarding non-conventional therapies, while most physicians do not feel prepared to appropriately advise their patients on this subject. However, the significant presence of non-conventional therapies in Portuguese society, together with the fact that they are not innocuous, makes it imperative that doctors have adequate knowledge of TNCs aimed at an adequate patient guidance, as key agents in communication with the patients. In this sense, this study has shown that more training on the efficacy and safety of TNCs is required in medical training curricula. An improvement in undergraduate teaching of the scientific method and the principles of evidence-based medicine is also relevant for a better understanding and evaluation of the usefulness not only of TNCs but also of the different usual therapeutic methods.

Further research should be focused on the different regulated TNCs, not only for healthcare professionals, but also for their users. Understanding these will be important for a better transmission of information by physicians to the patients.

AUTHOR CONTRIBUTION

CN, ABS, APM: All the authors have equally contributed to the study design, data collection, storage and analysis, in addition to the questionnaire development, revision and discussion.

HUMAN AND ANIMAL PROTECTION

The authors declare that this project complied with the regulations that were established by the Ethics and Clinical Research Committee, according to the 2013 update of the Helsinki Declaration of the World Medical Association.

DATA CONFIDENTIALITY

The authors declare that they have followed the protocols of their work centre on the publication of patient data.

CONFLICTS OF INTEREST

The authors declare that there were no conflicts of interest in writing this manuscript.

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