

Emotional memory in patients with agoraphobic panic disorder compared to a control group

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OBJECTIVES: Rational minds make logical connections between cause and effect, whereas emotional minds make no such distinctions, following instinctive logic. This paper investigates episodic emotional memory in patients with panic disorder with agoraphobia in comparison to a control group.

METHOD: Sixty volunteers, 30 patients with panic disorder with agoraphobia and 30 healthy controls were exposed to the same slideshow of 11 slides, but randomly exposed to two different narrated versions, namely one emotional and one neutral. Each group of 30 participants was randomly subdivided into two subgroups of 15; each subgroup of patients and controls was exposed either to the emotional or to the neutral narrative. One week later patients and controls returned to answer questionnaires about the slides and respective narrated stories.

RESULTS: Panic disorder patients exposed to the emotional content of the story showed a significantly enhanced emotional memory, evidenced by a better recollection of the emotional narration when compared to patients exposed to the neutral version. Compared to controls, panic disorder patients exhibited greater discrepancy between the emotional versus the neutral narrative.

CONCLUSION: Results showed that the panic disorder patients were significantly impacted by the content of the emotional version of the story, with respect to their emotional memory; the same was not observed for the control group exposed to the same emotional version of the story. We conclude that the characteristics of the panic disorder condition had an influence on emotional memory.

KEYWORDS: memory; panic; neuroscience; emotion.

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■ INTRODUCTION

The emotional mind seems to be quicker than the rational.¹ This speed excludes deliberate and analytical reflection that is the characteristic of rational minds. Individuals, indeed entire species, who were not capable of immediate reaction had little probability of passing on their genes. In 1920 Freud described how the emotional mind follows instinctive logic when he spoke of the “primary thought process”, whereby free associations determine the flow of a narrative, one object symbolizing another, namely, a sentiment comes in the form of another sentiment, which takes its place.² Everything is timeless, or, what is really relevant is the perception of things, in other words, things are what they seem to be: “Whilst the rational mind makes logical connections between cause and effect, the emotional mind does not make any discrimination”.³ The objective of this study was to investigate the Episodic Emotional Memory – EM⁴ of unmedicated patients with Panic Disorder – PD⁵ with agoraphobia and to compare

them with a control group of individuals with no mental disorder. We tested the hypothesis that PD patients with agoraphobia would exhibit an enhancement of the emotional content of the emotional version of a narrated story, which would differ from the control group exposed to the same version. As a justification for the study we considered it important to observe the influence of emotional components interfering with PD patients (due to the characteristics of the disorder condition itself) and compare them with healthy control volunteers with no mental disorder.

■ METHOD

60 volunteers of both sexes participated in the study, (a) 30 outpatients diagnosed with PD with agoraphobia, who were not taking any medication, and (b) 30 individuals with no psychiatric disorder, who functioned as controls.

Each group of 30 participants (PD or control) was randomly subdivided in two groups of 15 in order to present each of the groups with one of two versions of a slide show narrative, an emotional and a neutral story, presented in Table 1. Thus, patients and volunteers were

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Table 1 - A description of the 11 slides shown to the patients and controls

Slides with the same storyboard version in the Emotional and Neutral sequences (1,2,3,4)

Slide 1: Shows a mother leaving home with her son.

Storyboard: Narrator tells volunteers during the presentation of the slide that they are going to visit the boy's father.

Slide 2: Shows the mother taking her son to visit his father's workplace.

Storyboard: Narrator tells volunteers that they are going to visit the boy's father.

Slide 3: Shows the boy's father working as a laboratory technician at a bench with chemical products at Victory Memorial Hospital.

Storyboard: This is the father in his laboratory.

Slide 4: Shows mother and son looking around before crossing a busy street.

Storyboard: This is a very busy street

Slides with a storyboard narrative in the Emotional Version

Slide 5: Shows a crashed car on the pavement.

Storyboard: The boy sustained a terrible accident and is in a serious condition.

Slide 6: Shows the front of Victory Memorial Hospital, the street in front of it and some parked cars.

Storyboard: Inside a team is preparing an emergency room where the boy is being taken.

Slide 7: An operating room is shown with a surgeon using a jacket and protective cap in the foreground with two others behind him.

Storyboard: The surgery team fights to save the boy's life.

Slide 8: The legs of a boy are shown from the knee down, showing re-implanted feet at the level of the ankles.

Storyboard: Surgeons were capable of re-implanting the amputated feet of the boy.

Slides with a storyboard narrative in the Neutral Version

Slide 5: Shows a crashed car on the pavement.

Storyboard: The boy saw a crashed car and found it interesting.

Slide 6: Shows the front of Victory Memorial Hospital, the street in front of it and some parked cars.

Storyboard: Inside a team is preparing an emergency room for disaster training, the boy acting as "victim".

Slide 7: An operating room is shown with a surgeon using a jacket and protective cap in the foreground with two others behind him.

Storyboard: The surgery team goes through disaster training exercises.

Slide 8: The legs of a boy are shown from the knee down, showing re-implanted feet at the level of the ankles.

Storyboard: Makeup experts are capable of creating wounds with realistic appearance.

Slides with the same storyboard version in the Emotional and Neutral sequences (9,10,11)

Slide 9: Shows the boy's mother leaving the hospital looking shocked, to communicate the accident to her family.

Storyboard: Mom going toward a phone.

Slide 10: Shows the mother inside the telephone booth with her right elbow leaning on the ball and her right hand on her forehead.

Storyboard: The mother holds her son's ball in her hand.

Slide 11 - Shows a tree-lined paved avenue with cars and people in the background; in the foreground a road sign shows a speed limit of 30.

Storyboard: Shows a speed limit sign.

randomly distributed as follows: 1st group - 15 PD patients with agoraphobia exposed to the emotional version (PDE); 2nd group - 15 PD patients with agoraphobia exposed to the neutral version (PDN); 3rd group - 15 controls exposed to the emotional version (EC); 4th group - 15 controls exposed to the neutral version (NC).

The research consisted of a slideshow presentation of 11 slides as explained in Table 1. These slides were presented one by one on a computer screen by a trained psychologist researcher who maintained the same posture throughout the research study. In both the emotional and in the neutral version, the 11 slides contained the exact same photographic content. The difference was established by the storyboard which was narrated by the researcher to patient or control spectators. The visual material was identical from the beginning to the end for both versions of the story. The difference was the inclusion of components of tragedy in the emotional narrative versus a matter-of-fact neutral narrative. This differential storyboard only applied to the middle slides numbered 5 to 8.

In essence, the emotional storyboard told of a boy who had sustained a serious accident and had had his feet amputated and re-implanted; in the neutral version, the boy was participating a session of disaster training in a hospital and the wounds seen in the slide were, in fact, produced by makeup experts.

The outer slides, 1 to 4 and 10 and 11, were simply complements for the Emotional Memory study. They were related to details of colours, objects on scene and personal aspects related to the characters in the story.

Questions 5, 6, 7 contained few emotional aspects, but were related to the accident, for example: the recollection of

the crashed car, the operating room, the surgeons, and the name and the frontage of the hospital.

The most important slide for the EM study, slide 8, was intended to create a strong visual impact. It shows a photograph of the boy with re-implanted feet lying down on a hospital stretcher, stitches visible on his ankles. This photograph was intended to raise a peak of emotional remembrance that should definitely stand out as an Emotional Memory. The evaluation of EM was undertaken conjointly with data collected from slides 8 and 9.

The evaluation of the participants regarding psychiatric diagnosis was undertaken by psychiatrists from the Laboratory of Panic and Respiration of the Institute of Psychiatry of the Federal University of Rio de Janeiro, according to *Diagnostic and Statistical Manual of Mental Disorders* of the American Psychiatric Association.⁶ Using the International Neuropsychiatric Interview (M.I.N.I.) version 5.0.0 as the instrument of evaluation,⁷ the control volunteers were randomly selected among students and staff of the same Institute of Psychiatry. Participants were randomized by draw to be included in the two research versions, emotional and neutral, of their respective group (PD or control).

All participants signed a "Term of Informed Consent", according to the Declaration of Helsinki (1964). The Committee of Ethics for Research of the Institute of Psychiatry (IPUB) of the Federal University of Rio de Janeiro (UFRJ) approved the study.

The inclusion criteria were: (a) patients between 18 and 65 years old with a diagnosis of PD with agoraphobia who volunteered to be included; (b) volunteers participating as "controls" with no mental disorder and having schooling between Primary and University levels. The exclusion

criteria were: clinical comorbidities or serious psychiatric conditions, use of drugs or alcohol, use of benzodiazepines or other psychiatric medication, present mental retardation, and illiteracy.

The patients included in the study presented acute PD, had frequent (40%) panic or anxiety attacks and had not been taking psychiatric medication in the previous 30 days. All received guidance not to take benzodiazepines seven days prior to, or during, the week of the experiment.

The volunteers of the study of EM were informed of all the procedures for the undertaking of the research, and having confirmed their participation, two interviews were scheduled at an interval of exactly one week (7 days) each. All participants committed themselves to return the following week, on the programmed day and time.

At the 1st interview, participants were included in one of the four groups: Panic Disorder, Emotional storyboard (PDE); Panic Disorder, Neutral storyboard (PDN); Emotional storyboard, Control (EC); Neutral storyboard; Control (NC). Immediately after their interviews, participants signed the Term of Informed Consent, and agreed to return at a programmed date and time.

In this 1st interview, the 11 slides were presented individually and the participants were instructed to pay attention to the visual content and simultaneous narration of each slide. Immediately after the end of the slide show, an Emotional Reaction Scale was applied to each participant referring to the content of the slides, with a zero to ten scale, in order to evaluate the emotional impact: zero meant the slide story had no emotional content, while ten meant that the content was "highly emotional." A "highly emotional" marking would indicate that the participant had been highly impacted, impressed, shocked or had become anxious upon seeing the slides 5 to 8 and listening to the story of the accident of the boy who had had his feet amputated and re-implanted. We observe that the Emotional Reaction Scale was only applied to participants in the Emotional storyboard groups. At the end of the interview, we set a day and time for the return of each participant exactly one week after the slide show; we also provided a contact telephone number for any unexpected appointment impairment.

In the 2nd interview (7 days after the slide show) the narrative of the participants relating to the slide show was requested and recorded, and the information was later transferred to a specific form called "Free Recall". Imme-

diately following, a specific questionnaire with 76 items and sub-items about the content of the story was applied (and recorded in a scaled response sheet) to evaluate the impact and the recollections of the volunteers.

Using the same method as the slideshow, the questionnaire also had both an emotional and neutral version (using the variations relating to questions 5 and 8). It was given to the participants according to the following stipulated criteria. The questions were about the characters in the story, their characteristics, what they did, where they were going, facial expressions, facts that had occurred, and details of colours, as well as questions relating to the objects in the scenario, such as the hospital, the car in the scene and the environment. The corrections and errors in the patient and control responses to the questionnaires were measured. A template with the correct questionnaire responses was available to the psychologists performing the evaluation, allowing him or her to verify the right or wrong answers given by the participants.

After this second interview, psychiatric accompaniment was offered to the patients with PD, who were directed to Cognitive Behavioural Therapy – CBT.^{8,9} The individuals in the control group agreed to collaborate to benefit science and patients with psychiatric disorders.

■ STATISTICS

Statistical analysis was used to process the responses to the questionnaires. Data were registered and later analyzed using the SPSS statistical software, version 18.0 for Windows.

Descriptive statistics were used for the presentation of data referring to age (average and standard deviation), sex, schooling, and present illness (absolute values and percentages). The contingency tables were analysed using the chi-square, the Fisher exact and the *t*-student tests. The results of the application of the instrument (scales and questionnaires) are presented as averages and standard deviations, on the basis of the correct answers for each one of the slides.

The difference between the groups was evaluated by means of Multivariate Analysis of Variance (MANOVA). For supposition of homogeneity of the matrices of variance-covariance Box's M test was used and a Levene test was undertaken to guarantee that the hypothesis of equal variance between the groups was not violated. Should any significant statistical difference be noted between the groups, a *post hoc* Benferroni test would be carried out.

Table 2 - Descriptive data, presented as N (%) or Average (Standard Deviation)

	PD		Control		df	F or χ^2	p-value
	Emotional (n = 15)	Neutral (n = 15)	Emotional (n = 15)	Neutral (n = 15)			
Age	39.5 ± 12.9 Minimum=19 Maximum=59	40.0 ± 11.9 Minimum=23 Maximum=65	29.3 ± 10.1 Minimum=18 Maximum=50	39.27 ± 10.1 Minimum=26 Maximum=55	3	3.12	0.03
Sex					3	1.53	0.67
Female	12 (80.0%)	11 (73.3%)	9 (60.0%)	11 (73.3%)			
Male	3 (20.0%)	4 (26.7%)	6 (40.0%)	4 (26.7%)			
Schooling					3	1.19	0.75
Primary	5 (33.3%)	5 (33.3%)	2 (13.3%)	6 (40%)			
Secondary	6 (40.0%)	3 (20.0%)	7 (46.7%)	2 (13.3%)			
University	4 (26.7%)	7 (46.7%)	6 (40.0%)	7 (46.7%)			
Comorbidities					3	3.47	0.32
No	11 (73.3%)	12 (80%)	14 (93.3%)	14 (93.3%)			
Yes	4 (26.7%)	3 (20.0%)	1 (6.7%)	1 (6.7%)			

Table 3 - Correct answers are presented as average and standard deviation for the four groups in each one of the slides. Significant differences ($p < 0.05$) are indicated in the last column

Slide	Panic Disorder		Control		Significant Differences ($p < 0.05$)
	Emotional	Neutral	Emotional	Neutral	
1	44.7 ± 18.0	59.2 ± 19.7	74.2 ± 12.0	53.3 ± 22.4	PDE vs. EC; EC vs. NC
2	48.1 ± 10.8	40.7 ± 17.1	45.9 ± 17.7	40.74 ± 17.6	
3	44.4 ± 19.6	46.7 ± 31.6	57.8 ± 21.7	45.5 ± 26.3	
4	35.5 ± 16.5	36.7 ± 22.9	41.1 ± 16.5	30.0 ± 20.1	
5	51.8 ± 14.3	42.2 ± 15.8	61.5 ± 13.2	41.5 ± 18.0	PDN vs. EC; EC vs. NC
6	42.2 ± 18.8	46.7 ± 16.9	53.3 ± 23.7	47.8 ± 27.4	
7	44.8 ± 20.8	41.9 ± 22.6	54.3 ± 19.6	41.9 ± 23.2	
8	93.3 ± 10.5	62.2 ± 27.8	87.8 ± 19.4	68.9 ± 33.25	PDE vs. PDN; PDE vs. NC; PDN vs. EC
9	50.0 ± 20.6	45.8 ± 13.9	68.3 ± 11.4	50.8 ± 18.6	PDE vs. EC; PDN vs. EC; EC vs. NC
10	41.3 ± 22.0	40.0 ± 16.9	57.3 ± 18.3	36.0 ± 17.2	EC vs. NC
11	50.0 ± 14.1	48.9 ± 26.3	54.4 ± 27.8	40.00 ± 18.69	

For the purpose of this study the value of $p < 0,05$ to establish statistical significance was adopted.

■ RESULTS

Table 2 presents the descriptive data of the 60 participants of the study, already divided into groups, with 15 participants each, according to their clinical classification: Panic Disorder, Emotional (PDE) or Neutral (PDN) Emotional (EC) or Neutral (NC) healthy controls.

There were no cases on record of head trauma, cerebrovascular accident (CVA - stroke), epilepsy, convulsions, cardiovascular problems, hearing or sight problems, usage of illicit drugs or usage of psychopharmacs among any of the participants of the study.

Regarding other ongoing illnesses, two PDE and three PDN patients presented with arterial hypertension. Among the Control groups, only one declared having Polycystic Ovary Syndrome (EC group) and one reported gastritis (NC group).

Regarding the record of psychiatric disorders in the family, the following was found: two cases of panic (PDE group); one case of panic and one case of schizophrenia (PDN group); one case of panic and one of depression (EC group); one case of panic (NC group).

The Box's M test was used for homogeneity supposition of matrices of variance-covariance. The result was not significant ($F = 1,17$; $p = 0,06$), demonstrating that the condition was not violated. The value obtained for Wilk's Lambda was significant ($F = 1,71$; $p = 0,01$), showing evidence of differences between the groups.

In the pairwise comparison, by means of the *post hoc* Benferroni correction test, coherent with the previous analysis, significant statistical differences occurred between the groups in the slides 1 (PDE x EC and EC x NC), 5 (PDN x EC; EC x NC), 8 (PDE x PDN; PDE x NC; PDN x EC), 9 (PDE x EC; PDN x EC; EC x NC) and 10 (EC x NC). In the other slides (2, 3, 4, 6, 7 and 11), no significant statistical differences between any of the pairs of groups were found. These results are detailed in Table 3. The study focused on the results of slide 8 which showed that there had been a greater impact in the emotional PDE group with the remembrance of the boy in the accident with re-implanted feet, different from the PDN, which confirmed the hypothesis of the study immediately sequential. We observed that the characteristics of the PD condition had an influence on EM.

■ DISCUSSION

According to LeDoux,¹⁰ for a long time there was a belief in the existence of a sole learning system for the brain. Today we know about several memory systems, each of them responsible for different functions, as well as the different types of emotions and sensations that originate from several brain systems. There are two learning systems used by the brain to create "memories"¹⁰ of emotional experiences: (a) one of them in charge of the formation of recollections of experiences and the availability of these recollections for later remembrance; (b) another functioning externally to our conscious, responsible for the control of behaviour without explicit perception of previous learning.

Conscious recollection¹⁰ is the type of memory to which we refer to when we use the term "memory"¹¹: to remember is to have consciousness of some past experience, and to be able to verbally describe explicit or assertive memories. There is another form of remembrance, implicit or non-assertive, concerning dangerous or threatening situations, which is produced by means of conditioning mechanisms through fear and we have no control over these occurrences or conscious access to their functioning. Thus, we call it memory conditioned by fear (implicit), "EM"^{4,10} and assertive and explicit memory, that is, "memory of an emotion". In the present study, the purpose of slide 8, which showed the image of the boy who had had his feet amputated and re-implanted, was to observe EM as created through personified fear.

The methods used were based on a previous study⁴ which we considered efficient for the evaluation of EM. Here we endeavoured to improve the approach in some aspects, such as the non-usage of psychopharmacs in the patients with PD, to avoid possible influences on the final results.

In relation to the descriptive data, the groups were homogeneous as regards to sex, schooling and occurrence of present illness. Regarding the question of age, significant statistical difference was observed between the groups, which occurred because the average age of the EC group was approximately ten years younger than the other groups.

As for "present illness", two patients of the PDE group and three patients of the PDN group had arterial hypertension, compared to none in the control group.

According to Fonseca et al,¹² the association between emotional disturbances and alterations in visceral functions

can be perceived in the same manner as arterial hypertension in PD. When the limbic structures, responsible for emotions are put into action, they produce cardiovascular and respiratory responses common in the cases of arterial hypertension and in the case of PD.¹² In this study, the clinical illnesses were in medical accompaniment, under control, and for this reason were unlikely to have created any significant interference.

In relation to family history of PD we found two cases of PD in relatives in the PDE group, three cases of panic disorder, one each in the PDN EC and NC groups. One would have expected that the patients with PD would have a higher likelihood of having more relatives with PD than individuals in the control group, due to genetic factors¹³ and/or psychological structures. However, we observed in the result of the study that both PD and controls showed equivalent family histories of cases of PD.

According to Barlow,¹⁴ some signs of PD, such as respiratory alterations, heart palpitations and anxiety, indicate a singular genetic influence, but can also be present in people without PD in stressful situations.

We consider it important that the amygdala¹⁵ structures be evaluated in studies that use techniques involving neuro-image, since these structures are fundamental in the processing of emotions. The amygdala stores emotional memories, while the hippocampus stores contextual memory.¹⁶

The amygdala functions in an associative way, making comparisons with present and past situations. It is one of the first brain structures to be completely formed, and it stores the first emotional experiences. At times, present experiences and emotional states may generate anxious or impulsive responses because of an emotional experience stored in the amygdala.¹⁶

In a similar study about emotional memory⁴ related to bipolar disorder,¹⁷ the results suggested abnormalities in the amygdala circuit in the case of bipolar disorder. Another review study¹⁸ on neuroanatomy in panic disorder patients also indicated the existence of a "fear network", which has as its main point the central nucleus of the amygdala.

In this report, it was important to observe the influence of emotional components interfering in panic disorder patients, due the characteristics of the illness itself, without the interference of psychopharmacics and compared to healthy controls.

■ STUDY LIMITATIONS

We consider as limitations of the study the small sample of participants and the short time period of the study, which did not permit an ample evaluation towards obtaining more precise results between the groups.

■ CONCLUSION

Panic disorder patients suffered greater emotional impact in the remembrance of a tragically-charged story compared to patients who were exposed to a neutral version of the same story. Compared to healthy controls, we found that panic disorder influenced emotional memory. The absence of clinical comorbidities and the non-usage of illicit drugs or psychopharmacics in participants were fundamental criteria to minimize interferences. The study of emotional memory in individuals with PD or other anxiety disorders can bring

new clarifications concerning the pathophysiology and treatment of panic disorder.

Competing interests – Not declared.

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■ RESUMO

OBJETIVOS: Mentes racionais fazem conexões lógicas entre causa e efeito, ao passo que as mentes emocionais não fazem tais distinções, seguindo uma lógica instintiva. Este artigo investiga a memória emocional episódica em pacientes com transtorno de pânico com agorafobia, em comparação com um grupo controle.

MÉTODO: Sessenta voluntários, 30 pacientes com transtorno do pânico com agorafobia e 30 controles saudáveis foram expostos ao mesmo slide-show de 11 slides, mas narrados aleatoriamente em duas versões diferentes: uma narrativa emocional e uma neutra. Cada grupo de 30 participantes foi subdividido aleatoriamente em dois subgrupos de 15; cada subgrupo de pacientes e controles foi exposta à narrativa emocional ou à neutra. Uma semana depois, os pacientes e os controles voltaram para responder questionários sobre os slides e respectivas histórias narradas.

RESULTADOS: Pacientes com transtorno de pânico expostos ao conteúdo emocional da história exibiram memória emocional significativamente aumentada, fato evidenciado por uma melhor lembrança da narração emocional quando comparados aos pacientes expostos à versão neutra. Comparados aos controles, pacientes com transtorno de pânico apresentaram maior discrepância entre as narrativas emocional e neutra.

CONCLUSÃO: Os resultados mostraram que os pacientes com transtorno de pânico foram afetados significativamente pelo conteúdo da versão emocional da história, no que diz respeito à sua memória emocional. O mesmo não foi observado para o grupo de controle exposto à mesma versão emocional da história. Conclui-se que as características da condição transtorno do pânico tiveram influência na memória emocional.

■ REFERENCES

- Goleman D Emotional Intelligence. Revolutionary theory that redefines what it means to be smart. Rio de Janeiro: Objetiva, 1996.
- The interpretation of Dreams (Standard Edition of the Complete Psychological Works of Sigmund Freud, vol. V; Ed. Imago, R.J.) and formulations on the two principles of Mental Functioning. (Idem, vol. XII), 1920.
- Epstein S, Hoboken, NJ, Wiley & Sons. Cognitive-experiential self-theory of personality. In: Millon T & Lerner MJ (Eds). Comprehensive Handbook of Psychology, Personality and Social Psychology, 2003;5: 159-84.
- Kauer-Sant'Anna M, Yatham LN, Tramontina J, Weyne F, Cereser KM, Gazalle FK, et al. Emotional memory in bipolar disorder. The British Journal of Psychiatry. 2008;192:458-63.
- Lang AJ, Craske MG. Pânico e Fobia. In: White JR & Freeman AS (Eds). Cognitive-behavioral group therapy on populations and specific problems. Editora Roca, São Paulo, 2003; 71-107.
- American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders (4th edn, text-revision) (DSM-IV-TR). APA, 2000.
- Sheehan DV, Lecrubier Y, Sheehan KH, Amorim P, Janavs J, Weiller E, et al. The Mini-International Neuropsychiatric Interview (M.I.N.I.): the development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10. Journal of Clinical Psychiatry. 1998;59(Suppl 20):22-33; the complete M.I.N.I version 5.0.0 follows on pages 34-57.

8. Rangé B. *Cognitive-Behavioral Psychotherapies*. São Paulo: Artmed, 2001.
9. King ALS, Valença AM, Nardi AE. Hyperventilation: cognitive-behavioral therapy and the technique of induction exercises of symptoms in panic disorder. *Rev Port Pneumol*. 2007;XIV(2):303-8.
10. LeDoux J. *The emotional brain: the mysterious underpinnings of emotional life* - Rio de Janeiro: Objetiva, 2001. ISBN 85-7302-185-3.
11. Quevedo J, Feiera G, Agostinho FR, Martins MR, Roesler R. Memory consolidation and posttraumatic stress disorder. *Rev Bras Psiquiatr*. 2003;25(Supl 1):25-30.
12. Fonseca FCA, Coelho RZ, Nicolato R, Malloy-Diniz LF, Filho HCS. The influence of emotional factors on the arterial hypertension. *J Bras Psiquiatr*. 2009;58(2):128-34.
13. Angelotti G. *Cognitive-Behavioral theory of anxiety disorders*. São Paulo - Casa do Psicólogo, 2007. ISBN 978-85-7396-525-4.
14. Barlow DH. *Clinical Handbook of psychological disorders: a step-by-step treatment*. 4ª Edição. Artmed, 2009.
15. Sánchez-Navarro JP, Roman F. Amígdala, corteza prefrontal y especialización hemisférica en La experiencia y expresión emocional. *Anales de Psicología*. 2004;20(2):223-40.
16. Fleury HJ, Khouri GS, Hug E (organizers). *Psychodrama and neuroscience: contributions to therapeutic change*. São Paulo. Ágora, 2008. ISBN 978-857-183-045-5.
17. Nardi AE, Nascimento I, Freire RC, Veras AB, Melo-Neto VL, Valença AM, et al. Demographic and clinical features of panic disorder comorbid with bipolar I disorder: A 3-year retrospective study. *Journal of Affective Disorders*. 2008;(9):106-85.
18. Mezzasalma MA, Valença AM, Lopes FL, Nascimento I, Zin W, Nardi AE. Neuroanatomy of panic disorder. *Rev Bras Psiquiatr*. 2004;26(3):202-6.