

doi: 10.13241/j.cnki.pmb.2023.07.036

失眠障碍患者脑部 CT 影像学变化与学习记忆功能变化、 临床特征相关性分析 *

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摘要 目的:探讨失眠障碍患者脑部 CT 影像学变化与学习记忆功能变化、临床特征相关性。**方法:**回顾性选择 2018 年 6 月至 2021 年 6 月来我院诊治的失眠障碍患者 50 例,选择同期来我院体检的健康人群 30 例。两组受试者均使用飞利浦 64 排 CT 进行扫描,检测计算额角指数与海马指数,对比两组受试者的额角指数、海马指数,对比两组受试者的临床记忆评分、睡眠质量评分、WCST 评分,分析两组受试者的临床症状,分析观察组患者额角指数、海马指数与临床记忆评分、睡眠指数评分、WCST 评分、临床症状评分的相关性。**结果:**观察组的额角指数、海马指数明显较对照组低($P<0.05$)。观察组的临床记忆评分明显较对照组低($P<0.05$)。观察组的睡眠质量评分明显较对照组低($P<0.05$)。观察组的完成测验数、选择错误率、完成第一个应答数、持续错误率、错误应答数明显较对照组高,完成分类数、概念化水平百分比明显较对照组低($P<0.05$)。观察组的躯体感觉评分及心理感觉评分明显较对照组高($P<0.05$)。额角指数、海马指数与临床记忆评分呈正比,与睡眠质量评分、临床症状评分呈反比,与 WCST 评分中的完成分类数、概念化水平百分比呈正比,与 WCST 评分中的完成测验数、选择错误率、完成第一个应答数、持续错误率、错误应答数呈反比($P<0.05$)。**结论:**脑部 CT 影像学结果发现,失眠障碍存在学习记忆功能变化,与患者的临床特征相关性、睡眠质量存在存在一定相关性。

关键词:失眠障碍;脑部 CT;影像学变化;学习记忆功能;临床特征

中图分类号:R445;R749.7;R749.057 **文献标识码:**A **文章编号:**1673-6273(2023)07-1385-06

The Correlation Analysis of Brain CT Imaging Changes with Learning and Memory Function Changes and Clinical Characteristics in Patients with Insomnia Disorder*

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ABSTRACT Objective: To investigate the correlation of brain CT imaging changes with learning and memory function changes and clinical features in patients with insomnia disorder. **Methods:** 50 cases with insomnia disorder from June 2018 to June 2021 and 30 healthy people who came to our hospital for physical examination during the same period were retrospectively selected. Both groups of subjects were scanned with Philips 64-slice CT, and the frontal index and hippocampal index were measured and calculated. The subjects of eminence, haima index in two groups were compared, the clinical memory score, sleep quality score, WCST scores in two groups were compared, the clinical symptoms in two groups were analyzed, the correlation of eminence, haima index and clinical memory score, sleep index score, WCST scores, clinical symptom scores in observation group was analyzed. **Results:** The frontal index and hippocampal index of the observation group were lower than matched group ($P<0.05$). The clinical memory score of the observation group was lower than matched group ($P<0.05$). The sleep quality score of the observation group was lower than matched group ($P<0.05$). Compared with the matched group, the number of completed tests, selection error rate, the number of completed first response, persistent error rate and false response in the observation group were higher, and the number of completed classification and the percentage of conceptualization level were lower in the observation group ($P<0.05$). The somatosensory and psychological scores of the observation group were higher than matched group ($P<0.05$). The eminence index, the index with clinical memory score was positively than hippocampus, and sleep quality score is inversely proportional, clinical symptom scores, and complete the classification number of WCST scores, percentage points higher than conceptual level, and the choice of number of WCST scores of completion test, error rate, the number of completed the

* 基金项目:河北省科技厅指令性计划项目(16277786D)

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(收稿日期:2022-09-04 接受日期:2022-09-29)

first response, the last error rate is inversely proportional, the number of error response ($P<0.05$). **Conclusion:** Brain CT imaging results show that there are changes in learning and memory function in insomnia disorder, which are correlated with clinical characteristics and sleep quality of patients.

Key words: Insomnia disorder; Brain computed tomography (CT); Imaging changes; Learning and memory function; Clinical signs

Chinese Library Classification(CLC): R445; R749.7; R749.057 **Document code:** A

Article ID: 1673-6273(2023)07-1385-06

前言

失眠障碍是一种常见的睡眠障碍,为患者长期睡眠时间或睡眠质量不满意的一种状态,多表现为睡眠维持困难、入睡困难或者早醒,患者同时会伴有主观感觉的日间功能障碍,其是持续性疾病,约有 50 % 患者其严重失眠时间会持续超过 10 年,是引起其他慢性疾病的一种危险因素^[1,2]。若患者长期失眠,其记忆力、注意力等认知功能均会降低。近年来,随着人们生活、工作压力的增加,失眠障碍的发病率不断增加,严重影响了人们的身体健康,而目前失眠障碍的神经、生理机制仍不清楚^[3,4]。多数学者认为^[5],失眠障碍的常见理论是过度觉醒理论,患者的生理、皮层觉醒干扰了患者的正常睡眠过程,其发病机制与认知、觉醒、情绪调节系统密切相关,也有学者认为^[6],失眠障碍中奖赏与突显系统、过度觉醒系统、认知控制系统会使得患者的觉醒-睡眠过渡期出现功能异常,引起认知受损及睡眠维持困难。目前多数学者对失眠障碍进行了广泛研究,而其神经生物机制尚不清楚^[7]。近年来,随着神经影像学技术的发展,使得神经影像学对失眠障碍患者不同脑区、功能结构变化分析成为了可能,其已广泛用于各种神经认知、心理领域的研究,可以间接、客观的反应大脑广泛区域的功能活动、解剖结构变化特点,神经影像技术可以反应机体脑组织的形态学特征^[8,9],其中 CT 是常用的影像学技术,因此本文回顾性分析了失眠障碍患者的 CT 影像学变化,以为临床上失眠障碍患者的神经病理机制提

供研究方向。

1 资料与方法

1.1 病例资料

回顾性选择 2018 年 6 月至 2021 年 6 月的失眠障碍患者 50 例。

纳入标准:所有患者均符合第五版美国精神障碍诊断与统计手册中对于失眠障碍的疾病诊断标准^[10];患者的年龄分布在 34~59 岁,汉密尔顿焦虑量表评分 <7 分,汉密尔顿抑郁量表评分 <7 分;患者受教育年限不低于 5 年,理解能力正常。

选择同期来我院体检的健康人群 30 例。纳入标准:所有患者不符合第五版美国精神障碍诊断与统计手册中对于失眠障碍的疾病诊断标准;汉密尔顿焦虑量表评分 <7 分,哈密尔顿抑郁量表评分 <7 分;两组成员间无血缘关系;身体无显著记忆力降低。

排除标准:两周前均无精神类、镇静类、安眠类及其他影响患者记忆力、睡眠的药物服用史者、存在慢性疼痛类严重躯体疾病者;感染、外伤较严重者;甲状腺疾病者、肿瘤类疾病者、心脏类疾病者;精神类疾病者(如精神分裂、抑郁症、焦虑障碍等);哺乳期女性者、怀孕者;因中枢神经异常出现的失眠障碍者(如帕金森者、脑外伤者、血管性痴呆者、阿尔兹海默病者等);本研究符合医学伦理。

两组受试者的一般资料对比无差异($P>0.05$),具体见表 1。

表 1 两组受试者一般资料对比

Table 1 The comparison of the general data between the two subject groups

Groups	n	Gender (male / female)	Age (year)	Years of education (years)	Hamilton Anxiety Scale Score (Points)	Hamilton Depression Scale score (score)
Observation group	50	28/22	46.56± 5.38	10.98± 2.81	2.84± 0.37	2.88± 0.52
Matched group	30	17/13	46.40± 4.33	11.07± 2.69	2.97± 0.32	2.87± 0.51
t/χ^2	-	0.003	0.138	-0.136	-1.556	0.112
P	-	0.954	0.890	0.884	0.124	0.911

1.2 方法

两组受试者均使用飞利浦 64 排 CT 进行扫描,参数设置如下:电流 260 mA,电压 120 kV,扫描层厚为 7 mm,按听眦线扫描,测量所有受试者的大脑横径、两额角最宽距离、海马回沟间距,计算额角指数、海马指数。额角指数=两额角间最大宽度/同水平颅内最大横径 $\times 100\%$;海马指数=海马回沟间距/大脑横径。用临床记忆量表(CMS)、匹兹堡睡眠质量指数量表(PSQI)、威斯康星卡片分类测试(WCST)、监测两组患者的睡眠呼吸监测事件。

1.3 观察指标

1.3.1 对比两组受试者的额角指数、海马指数;

1.3.2 对比两组受试者的临床记忆评分 使用 CMS 量表进行测量,其内容包括联想学习、指向记忆、无意义图形再确认、图像自由回忆、人像特点联想回忆及总记忆商 5 项,分值越低,患者的临床记忆水平越低^[11]。

1.3.3 对比两组受试者的睡眠质量评分 使用 PSQI 量表评定两组的睡眠质量评分,包括睡眠质量、入睡时间、睡眠时间、睡眠效率、睡眠障碍、日间功能障碍、总分 8 项,分值越高,患者睡

眠质量越差^[12]。

1.3.4 对比两组 WCST 评分 WCST 量表包括完成测验数、完成分类数、选择错误数、完成第一个应答数、持续错误率、错误应答数、概念化水平百分比等,可以反应受试者的工作记忆、抽象概括、工作记忆、注意、认知转移等情况^[13]。

1.3.5 分析两组受试者的临床症状 包括躯体感觉与心理感觉,躯体感觉包括出汗、潮热、心慌、心脏症状、睡眠障碍、心跳加快、关节与肌肉不适、心慌、风湿疼痛、关节疼痛;心理感觉包括情绪低落、心情抑郁、无精打采、易哭、激动不安、紧张、易激惹、急躁、喜怒无常、焦虑、心神疲惫、记忆力受损、健忘、精神不集中,由患者自行完成,每项分为无(0分)症状、轻度(1分)、中

度(2分)、重度(3分)、非常严重(5分),躯体感觉总分 50 分,心理感觉总分 70 分,分值越大,临床症状越严重^[14]。

1.3.6 分析观察组患者额角指数、海马指数与临床记忆评分、睡眠指数评分、WCST 评分、临床症状评分的相关性。

1.4 统计学方法

SPSS23.0 软件,计数资料频数表示,卡方检验分析,计量资料($\bar{x} \pm s$)表示,t 检验分析,使用 Spearman 分析进行相关性分析。

2 结果

2.1 对比两组受试者的额角指数、海马指数

观察组的额角指数、海马指数明显较对照组低($P < 0.05$)。

表 2 对比两组受试者的额角指数、海马指数($\bar{x} \pm s$)

Table 2 Compares the frontal horn index and hippocampal index of the two groups ($\bar{x} \pm s$)

Groups	n	Frontal index	Hippocampal index
Observation group	50	0.16± 0.03	0.21± 0.02
Matched group	30	0.18± 0.03	0.23± 0.03
t	-	-3.685	-3.014
P	-	0.000	0.003

2.2 对比两组受试者的临床记忆评分

观察组的临床记忆评分明显较对照组低($P < 0.05$)。

2.3 对比两组受试者的睡眠质量评分

观察组的睡眠质量评分明显较对照组低($P < 0.05$)。

表 3 对比两组受试者的临床记忆评分($\bar{x} \pm s$, 分)

Table 3 Compares the clinical memory scores ($\bar{x} \pm s$, points)

Groups	n	Associative learning	Point to memory	Revalidation	Image free recall	Portrait features associative memories	Total memory quotient
Observation group	50	10.68± 1.70	11.42± 1.47	17.14± 3.24	16.28± 2.68	15.12± 1.96	70.64± 10.88
Matched group	30	12.87± 2.96	16.87± 3.21	23.07± 4.11	19.90± 3.67	23.33± 5.25	96.03± 9.22
t		-4.211	-10.342	-7.153	-5.080	-10.003	-10.685
P		0.000	0.000	0.000	0.000	0.000	0.000

表 4 对比两组受试者的睡眠质量评分($\bar{x} \pm s$, 分)

Table 4 Compares the sleep quality scores ($\bar{x} \pm s$, points)

Groups	n	Sleep quality	Sleep time	Hour of sleep	Sleep efficiency	Dyssomnia	Day dysfunction	Total points
Observation group	50	1.96± 0.20	1.84± 0.39	1.82± 0.39	1.84± 0.42	1.76± 0.48	1.80± 0.40	11.02± 2.03
Matched group	30	0.93± 0.25	0.93± 0.25	0.70± 0.47	1.00± 0.00	0.90± 0.31	0.80± 0.41	5.27± 0.87
t	-	20.177	11.833	11.580	10.878	8.847	10.689	14.739
P	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000

2.4 对比两组 WCST 评分

观察组的完成测验数、选择错误率、完成第一个应答数、持续错误率、错误应答数明显较对照组高,完成分类数、概念化水平百分比明显较对照组低($P < 0.05$)。

2.5 对比两组受试者的临床症状评分

观察组的躯体感觉评分及心理感觉评分明显较对照组高($P < 0.05$)。

2.6 分析观察组患者额角指数、海马指数与临床记忆评分、睡眠指数评分、WCST 评分、临床症状评分的相关性

额角指数、海马指数与临床记忆评分呈正比,与睡眠质量评分、临床症状评分呈反比,与 WCST 评分中的完成分类数、概念化水平百分比呈正比,与 WCST 评分中的完成测验数、选择错误率、完成第一个应答数、持续错误率、错误应答数呈反比($P < 0.05$)。

表 5 对比两组 WCST 评分($\bar{x} \pm s$, 分)
Table 5 Compares the WCST scores of the two groups ($\bar{x} \pm s$, score)

Groups	n	Number of completed completed (n)	Classification completed (n)	Select error rate (%)	First number of responses completed(n)	Continuous error rate (%)	Number of error responses (n)	Conceptualization-level percentage (%)
Observation group	50	102.84± 15.78	2.96± 0.64	34.50± 4.29	17.74± 3.25	55.34± 5.74	40.42± 5.33	71.88± 9.55
Matched group	30	91.43± 13.06	3.90± 0.80	30.73± 3.55	13.30± 2.00	43.97± 10.22	36.40± 3.43	79.30± 7.58
t	-	3.331	-5.785	4.045	6.744	6.385	3.690	-3.624
P	-	0.001	0.000	0.000	0.000	0.000	0.000	0.000

表 6 对比两组受试者的临床症状评分($\bar{x} \pm s$, 分)
Table 6 Compares the clinical symptom scores of the two groups ($\bar{x} \pm s$, score)

Groups	n	Somatesthesia	Mental impression
Observation group	50	39.20± 4.54	58.92± 9.97
Matched group	30	21.50± 2.18	33.17± 3.76
t	-	19.982	13.552
P	-	0.000	0.000

表 7 分析观察组患者额角指数、海马指数与临床记忆评分、睡眠指数评分、WCST 评分、临床症状评分的相关性

Table 7 Analyzes the correlation of the frontal horn index, the hippocampal index and the clinical memory score, the sleep index score, the WCST score, and the clinical symptom score of the patients in the observation group

Indexs	Sub-index	Frontal index		Hippocampus index	
		r	P	r	P
Clinical memory score	Associative learning	0.983	0.000	0.964	0.000
	Point to memory	0.976	0.000	0.945	0.000
	Revalidation	0.987	0.000	0.971	0.000
	Image free recall	0.983	0.000	0.965	0.000
	Portrait characteristics association memories	0.980	0.000	0.952	0.000
	Total memory quotient	0.990	0.000	0.975	0.000
Sleep quality score	Sleep quality	0.339	0.016	0.347	0.014
	Sleep time	0.638	0.000	0.641	0.000
	Hour of sleep	0.671	0.000	0.669	0.000
	Sleep efficiency	0.700	0.000	0.696	0.000
	Dyssomnia	0.787	0.000	0.784	0.000
	Day dysfunction	0.693	0.000	0.697	0.000
WCST grade	Total points	0.796	0.000	0.795	0.000
	Number of quizzes completed	0.992	0.000	0.979	0.000
	Number of categories completed	-0.783	0.000	-0.809	0.000
	Select error rate	-0.991	0.000	-0.973	0.000
	First number of responses completed	-0.983	0.000	-0.979	0.000
	Continuous error rate	-0.990	0.000	-0.977	0.000
Clinical symptom score	Number of error responses	-0.989	0.000	-0.980	0.000
	Conceptualization-level percentage	0.991	0.000	0.978	0.000
	Somatesthesia	0.989	0.000	0.978	0.000
	Mental impression	0.988	0.000	0.980	0.000

3 讨论

失眠障碍会导致患者出现日间疲劳感、嗜睡、认知功能降低、情绪不稳等情况,其会增加患者罹患冠心病、高血压、自杀行为、抑郁症等精神、躯体疾病的风险,严重影响人们的工作、学习、生活,其会导致患者认知功能及学习记忆功能改变,临床上多用神经心理学测验判定患者的学习记忆功能改变,而多存在一定主观性,因此有学者指出用客观指标进行验证分析,目前前额叶、海马是认知、学习功能的一个研究热点^[15-17]。有研究发现^[18,19],失眠障碍患者大脑的前额叶脑区、海马区域均会出现异常改变,海马是对过去产生记忆、过去回忆及对未来畅想神经精神活动的大脑结构,认知缺陷者多会出现海马结构及其周边区域损伤,而长期周期性、慢性睡眠剥夺会降低患者的海马活性,抑制海马神经元细胞再生能力,从而影响其记忆、学习功能,额角指数可以反映患者的脑萎缩情况,萎缩越重,其额角指数越高;海马指数为大脑海马回沟间距与机体大脑横径比值,二者可客观反应机体大脑前额叶脑区、海马脑区的变化^[20,21],而CT可用于额叶脑区、海马区域的检测,因此本文分析了失眠障碍患者脑部CT影像学变化及其与学习记忆功能变化、临床特征相关性,以为临床上给失眠障碍治疗提供影像学依据。

CT影像结果显示,观察组的额角指数、海马指数明显较对照组低,表明失眠障碍患者与健康人群的海马区域及前额叶脑区均出现一定变化,表明CT可用于失眠障碍患者脑部影像学变化的监测,本文结果与邢曜耀等结果不同^[22],可能是由于入组对象的个体差异性导致的,不同个体对睡眠质量感受程度、主观体验不同,从而造成研究结果出现一定的差异。

本文结果表明,观察组的临床记忆评分、睡眠质量评分明显较对照组低,完成测验数、选择错误率、完成第一个应答数、持续错误率、错误应答数明显较对照组高,完成分类数、概念化水平百分比明显较对照组低,观察组的躯体感觉评分及心理感觉评分明显较对照组高,表明失眠障碍会严重影响患者的学习记忆功能、睡眠质量、躯体感受及心理感受,患者的抽象概括能力降低,指向记忆分值降低表明语言记忆能力等降低,联想回忆、联想学习等先需要编码学习记忆的材料,之后通过被动、主动方式提取所学材料,再加工后再输出,整个过程与大脑的顶叶、额叶密切相关^[23-25],而前额叶、颞叶海马是通过相互配合、协调的方式实现顺利记忆过程,因此前额叶、颞叶海马病理变化,会导致失眠障碍患者的语言记忆功能降低,使得联想学习、记忆学习等项目分值降低,其是患者学习记忆功能减退的一个主要指标^[26-28]。同时失眠障碍患者的睡眠质量较差,也使得患者睡眠节律紊乱,精力、体力严重不足,多会出现记忆力降低、注意力减退、焦虑、抑郁等躯体及心理状态的改变^[29,30]。

本文结果表明,额角指数、海马指数与临床记忆评分、WCST评分中的完成分类数、概念化水平百分比呈正比,与睡眠质量评分、临床症状评分、WCST评分中的完成测验数、选择错误率、完成第一个应答数、持续错误率、错误应答数呈反比,表明失眠患者的CT影像学变化与其学习记忆功能变化及临床特征均密切相关,其可用于失眠严重程度的评估,为临床诊断及治疗失眠障碍患者提供直观的影像学资料。

综上所述,脑部CT影像学结果发现,失眠障碍存在学习

记忆功能变化,与患者的临床特征相关性、睡眠质量存在存在一定相关性。

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