

北京市某区制造业工人抑郁、焦虑症状调查

张文丽, 张丽, 胡在方, 周国伟, 胡洁

北京市顺义区疾病预防控制中心职业与放射卫生科, 北京 101300

摘要: **目的** 了解北京市某区制造业工人抑郁、焦虑症状检出情况及影响因素, 为该行业工人抑郁、焦虑的预防及干预提供依据。**方法** 采用分层随机抽样方法抽取北京市某区大、中、小微型15家制造业的一线工人为调查对象, 采用《全国重点人群职业健康素养监测调查个人问卷》调查人口学信息和职业信息; 采用《9项患者健康问卷》和广泛性焦虑量表分别评估抑郁、焦虑症状; 采用多因素logistic回归模型分析抑郁、焦虑症状的影响因素。**结果** 发放问卷759份, 回收有效问卷748份, 问卷有效率为98.55%。调查大型企业3家372人, 占49.73%; 中型企业3家167人, 占22.33%; 小微型企业9家209人, 占27.94%。男性584人, 占78.07%。年龄 $M(Q_R)$ 为39.00(11.00)岁。工龄 $M(Q_R)$ 为8.50(11.00)年。检出抑郁、焦虑症状分别175和68人, 检出率分别为23.40%和9.09%。多因素logistic回归分析结果显示, 文化程度(初中, $OR=0.305$, $95\%CI: 0.129\sim 0.723$)、周均工作时间(≥ 55 h, $OR=1.727$, $95\%CI: 1.026\sim 2.906$)和睡眠障碍($OR=3.062$, $95\%CI: 2.127\sim 4.407$)是工人抑郁症状的影响因素; 文化程度(初中, $OR=0.196$, $95\%CI: 0.074\sim 0.523$; 高中/职高/中专, $OR=0.171$, $95\%CI: 0.064\sim 0.452$; 大专及以上学历, $OR=0.187$, $95\%CI: 0.066\sim 0.527$)、工作班制(上夜班, $OR=2.369$, $95\%CI: 1.344\sim 4.177$)和睡眠障碍($OR=5.411$, $95\%CI: 3.076\sim 9.519$)是工人焦虑症状的影响因素。**结论** 制造业工人抑郁、焦虑症状主要受到文化程度、周均工作时间、工作班制和睡眠障碍的影响。

关键词: 制造业工人; 抑郁; 焦虑; 影响因素

中图分类号: R135 文献标识码: A 文章编号: 2096-5087(2024)09-0796-05

Depression and anxiety symptoms among manufacturing workers in a district of Beijing Municipality

ZHANG Wenli, ZHANG Li, HU Zaifang, ZHOU Guowei, HU Jie

Department of Occupational and Radiological Health, Shunyi District Center for Disease Control and Prevention,
Beijing 101300, China

Abstract: Objective To investigate the symptoms of depression and anxiety and their influencing factors among manufacturing workers in a district of Beijing Municipality, so as to provide insights into prevention and intervention of depression and anxiety among workers in this industry. **Methods** Frontline workers from 15 manufacturing enterprises including large, medium, and small/micro sizes were selected using the stratified random sampling method. Demographic and occupational information were investigated using the Chinese National Occupational Health Literacy Monitoring Questionnaire among Key Populations. The symptoms of depression and anxiety were assessed by the 9-item Patient Health Questionnaire and the Generalized Anxiety Disorder Scale, respectively. The influencing factors for depression and anxiety symptoms were analyzed using a multivariable logistic regression model. **Results** A total of 759 questionnaires were allocated and 748 valid questionnaires were recovered, with an effective recovery rate of 98.55%. The respondents included 372 people (49.73%) from 3 large enterprises, 167 people (22.33%) from 3 medium enterprises, and 209 people (27.94%) from 9 small/micro enterprises. There were 584 males, accounting for 78.07%. The median age was 39 (interquartile range, 11.00) years, and the median duration of employment was 8.50 (interquartile range, 11.00) years. Depres-

DOI: 10.19485/j.cnki.issn2096-5087.2024.09.014

作者简介: 张文丽, 硕士, 医师, 主要从事职业卫生工作

通信作者: 张丽, E-mail: 416183337@qq.com

sion and anxiety symptoms were detected in 175 and 68 cases, with the detection rates were 23.40% and 9.09%, respectively. Multivariable logistic regression analysis showed that the educational level (junior high school, $OR=0.305$, $95\%CI: 0.129-0.723$), weekly working duration (≥ 55 h, $OR=1.727$, $95\%CI: 1.026-2.906$) and sleep disorders ($OR=3.062$, $95\%CI: 2.127-4.407$) were influencing factors for depression symptoms; educational level (junior high school, $OR=0.196$, $95\%CI: 0.074-0.523$; high school/vocational high school/technical secondary school, $OR=0.171$, $95\%CI: 0.064-0.452$; junior college and above, $OR=0.187$, $95\%CI: 0.066-0.527$), work shift (night shift, $OR=2.369$, $95\%CI: 1.344-4.177$) and sleep disorders ($OR=5.411$, $95\%CI: 3.076-9.519$) were influencing factors for anxiety symptoms. **Conclusion** The symptoms of depression and anxiety among manufacturing workers are mainly affected by educational level, weekly working duration, work shift and sleep disorders.

Keywords: manufacturing worker; depression; anxiety; influencing factor

抑郁和焦虑是工人较为常见的心理问题^[1], 不仅影响自身身心健康、人际关系和谐, 也影响企业的可持续发展, 导致每年全球经济生产力损失达1万亿欧元^[2]。近年来, 我国精神障碍和心理问题患病人数逐年增多, 抑郁症患病率达2.1%, 焦虑障碍患病率达4.98%^[3]。对工人的研究主要集中在职业暴露对健康的危害^[4-5], 而忽视了工人的心理健康状况。研究显示, 工人抑郁、焦虑症状的发生与缺勤增加、工作绩效受损、医疗费用增加和生产力下降等因素相关^[6-7]。早期识别抑郁、焦虑症状, 促进心理健康可改善负性情绪^[8], 减少严重精神障碍的发生, 从而减轻心理问题造成的心理和经济负担。本研究了解北京市某区制造业工人的抑郁、焦虑症状检出情况及影响因素, 为该行业工人抑郁、焦虑的预防及干预提供依据。

1 对象与方法

1.1 对象

根据《2023年北京市重点人群职业健康素养监测与干预工作抽样实施方案》, 采用分层随机抽样方法抽取北京市某区大、中和小微型15家制造业的一线工人为调查对象。纳入标准: 年龄为16~59岁; 工龄6个月及以上。一线工人指从事生产制造的生产工人及相关人员, 不包括行政管理人员。调查对象均知情且自愿参与。

1.2 方法

采用国家卫生健康委员会制定的《全国重点人群职业健康素养监测调查个人问卷》调查工人的性别、年龄和文化程度等人口信息, 以及工龄、企业规模、工作班制、周均工作时间和月均收入等职业信息。抑郁症状采用《9项患者健康问卷》^[9]调查, Cronbach's α 为0.860。该量表包含9个条目, 所有条目选项采用Likert 4级赋0~3分, 总分27分, 得分 ≥ 10 分为存在抑郁症状。焦虑症状采用广泛性

焦虑量表^[10]调查, Cronbach's α 为0.892。该量表包含7个条目, 所有条目选项采用Likert 4级赋0~3分, 总分21分, 得分 ≥ 10 分为存在焦虑症状。睡眠障碍采用《自填式睡眠问卷》^[11]评估, Cronbach's α 为0.721。该量表包含入睡时间、持续睡眠和晨醒过早3个条目, 满足任意一项即为存在睡眠障碍。

1.3 统计分析

采用SPSS 25.0软件统计分析。定量资料不服从正态分布的采用中位数和四分位数间距 [$M(Q_n)$] 描述; 定性资料采用相对数描述, 组间比较采用 χ^2 检验。抑郁、焦虑症状的影响因素分析采用多因素logistic回归模型。以 $P<0.05$ 为差异有统计学意义。

2 结果

2.1 基本情况

发放问卷759份, 回收有效问卷748份, 问卷有效率为98.55%。调查大型企业3家372人, 占49.73%; 中型企业3家167人, 占22.33%; 小微型企业9家209人, 占27.94%。其中汽车制造业7家279人, 占37.30%; 通用、专用设备及铁路等运输设备制造业3家143人, 占19.12%; 家具制造业5家326人, 占43.58%。男性584人, 占78.07%。年龄 $M(Q_n)$ 为39.00(11.00)岁。初中和高中/职高/中专学历为主, 546人占72.99%。工龄 $M(Q_n)$ 为8.50(11.00)年。存在睡眠障碍248人, 占33.16%。

2.2 抑郁、焦虑症状检出情况

抑郁症状得分 $M(Q_n)$ 为7.00(4.75)分, 检出抑郁症状175人, 检出率为23.40%; 性别、文化程度、工作班制、周均工作时间和睡眠障碍不同的工人抑郁症状检出率差异有统计学意义(均 $P<0.05$)。焦虑症状得分 $M(Q_n)$ 为2.00(6.00)分, 检出焦虑症状68人, 检出率为9.09%; 文化程度、工作班制和

睡眠障碍不同的工人焦虑症状检出率差异有统计学意义 (均 $P < 0.05$)。见表 1。

2.3 抑郁、焦虑症状影响因素分析

分别以抑郁、焦虑症状 (0=否, 1=是) 为因变量, 以表 1 中有统计学意义 ($P < 0.05$) 的变量为自

变量进行多因素 logistic 回归分析 (逐步法, $\alpha_{入} = 0.05$, $\alpha_{出} = 0.10$)。结果显示, 小学及以下学历、周均工作时间 ≥ 55 h 和存在睡眠障碍的工人抑郁症状风险较高; 小学及以下学历、上夜班和存在睡眠障碍的工人焦虑症状风险较高。见表 2。

表 1 制造业工人抑郁、焦虑症状检出率比较

Table 1 Comparison of the detection rates of depression and anxiety symptoms among manufacturing workers

| 项目 | 调查人数 | 抑郁症状 | | | | 焦虑症状 | | | |
|---------------|------|------|-------|------------|--------|------|-------|------------|--------|
| | | 检出人数 | 检出率/% | χ^2 值 | P值 | 检出人数 | 检出率/% | χ^2 值 | P值 |
| 性别 | | | | 6.667 | 0.010 | | | 0.078 | 0.780 |
| 男 | 584 | 149 | 25.51 | | | 54 | 9.25 | | |
| 女 | 164 | 26 | 15.85 | | | 14 | 8.54 | | |
| 年龄/岁 | | | | 5.115 | 0.164 | | | 1.056 | 0.788 |
| 16~ | 94 | 24 | 25.53 | | | 11 | 11.70 | | |
| 30~ | 325 | 83 | 25.54 | | | 28 | 8.62 | | |
| 40~ | 239 | 55 | 23.01 | | | 22 | 9.21 | | |
| ≥ 50 | 90 | 13 | 14.44 | | | 7 | 7.78 | | |
| 文化程度 | | | | 14.309 | 0.003 | | | 21.046 | <0.001 |
| 小学及以下 | 31 | 12 | 38.71 | | | 10 | 32.26 | | |
| 初中 | 269 | 44 | 16.36 | | | 21 | 7.81 | | |
| 高中/职高/中专 | 277 | 76 | 27.44 | | | 23 | 8.30 | | |
| 大专及以上 | 171 | 43 | 25.15 | | | 14 | 8.19 | | |
| 企业规模 | | | | 2.459 | 0.292 | | | 1.530 | 0.465 |
| 大 | 372 | 88 | 23.66 | | | 30 | 8.06 | | |
| 中 | 167 | 45 | 26.95 | | | 19 | 11.38 | | |
| 小微 | 209 | 42 | 20.10 | | | 19 | 9.09 | | |
| 工龄/年 | | | | 1.893 | 0.595 | | | 3.355 | 0.340 |
| ≤ 3 | 160 | 33 | 20.63 | | | 14 | 8.75 | | |
| $>3 \sim$ | 128 | 27 | 21.09 | | | 17 | 13.28 | | |
| $>6 \sim$ | 151 | 36 | 23.84 | | | 12 | 7.95 | | |
| >10 | 309 | 79 | 25.57 | | | 25 | 8.09 | | |
| 工作班制 | | | | 11.790 | 0.001 | | | 12.214 | <0.001 |
| 上夜班 | 253 | 78 | 30.83 | | | 36 | 14.23 | | |
| 不上夜班 | 495 | 97 | 19.60 | | | 32 | 6.46 | | |
| 周均工作时间/h | | | | 19.487 | <0.001 | | | 5.751 | 0.219 |
| <41 | 164 | 30 | 18.29 | | | 16 | 9.76 | | |
| 41~ | 102 | 20 | 19.61 | | | 5 | 4.90 | | |
| 45~ | 144 | 26 | 18.06 | | | 11 | 7.64 | | |
| 49~ | 109 | 22 | 20.18 | | | 8 | 7.34 | | |
| ≥ 55 | 229 | 77 | 33.62 | | | 28 | 12.23 | | |
| 月收入/元 | | | | 5.985 | 0.112 | | | 3.833 | 0.280 |
| $<3\ 000$ | 51 | 16 | 31.37 | | | 8 | 15.69 | | |
| $3\ 000 \sim$ | 272 | 65 | 23.90 | | | 27 | 9.93 | | |
| $5\ 000 \sim$ | 318 | 63 | 19.81 | | | 25 | 7.86 | | |
| $\geq 7\ 000$ | 107 | 31 | 28.97 | | | 8 | 7.48 | | |
| 睡眠障碍 | | | | 43.569 | <0.001 | | | 43.650 | <0.001 |
| 是 | 248 | 94 | 37.90 | | | 47 | 18.95 | | |
| 否 | 500 | 81 | 16.20 | | | 21 | 4.20 | | |

表 2 制造业工人抑郁、焦虑症状影响因素的多因素 logistic 回归分析

Table 2 Multivariable logistic regression analysis of factors affecting depression and anxiety symptoms among manufacturing workers

| 因变量 | 自变量 | 参照组 | β | $s_{\bar{x}}$ | Wald χ^2 值 | P值 | OR值 | 95%CI |
|------|----------|-------|---------|---------------|-----------------|--------|-------------|-------------|
| 抑郁症状 | 文化程度 | | | | | | | |
| | 初中 | 小学及以下 | -1.186 | 0.439 | 7.287 | 0.007 | 0.305 | 0.129~0.723 |
| | 高中/职高/中专 | | -0.630 | 0.431 | 2.134 | 0.144 | 0.533 | 0.229~1.240 |
| | 大专及以上 | | -0.619 | 0.445 | 1.931 | 0.165 | 0.539 | 0.225~1.289 |
| | 周均工作时间/h | | | | | | | |
| | 41~ | <41 | 0.103 | 0.332 | 0.097 | 0.755 | 1.109 | 0.579~2.125 |
| | 45~ | | -0.025 | 0.307 | 0.007 | 0.935 | 0.975 | 0.535~1.779 |
| | 49~ | | 0.028 | 0.327 | 0.008 | 0.931 | 1.029 | 0.542~1.951 |
| | ≥55 | | 0.546 | 0.266 | 4.234 | 0.040 | 1.727 | 1.026~2.906 |
| | 睡眠障碍 | | | | | | | |
| 是 | 否 | 1.119 | 0.186 | 36.219 | <0.001 | 3.062 | 2.127~4.407 | |
| 常量 | | | -1.100 | 0.468 | 5.534 | 0.019 | 0.333 | |
| 焦虑症状 | 文化程度 | | | | | | | |
| | 初中 | 小学及以下 | -1.628 | 0.500 | 10.592 | 0.001 | 0.196 | 0.074~0.523 |
| | 高中/职高/中专 | | -1.768 | 0.497 | 12.651 | <0.001 | 0.171 | 0.064~0.452 |
| | 大专及以上 | | -1.676 | 0.529 | 10.053 | 0.002 | 0.187 | 0.066~0.527 |
| | 工作班制 | | | | | | | |
| | 上夜班 | 不上夜班 | 0.863 | 0.289 | 8.884 | 0.003 | 2.369 | 1.344~4.177 |
| | 睡眠障碍 | | | | | | | |
| | 是 | 否 | 1.688 | 0.288 | 34.328 | <0.001 | 5.411 | 3.076~9.519 |
| 常量 | | | -1.584 | 0.531 | 8.901 | 0.003 | 0.205 | |

3 讨论

调查结果显示,北京市某区制造业工人抑郁症状检出率为 23.40%,焦虑症状检出率为 9.09%,检出率较高,需重点关注工人心理健康状况,做好动态监测。多因素 logistic 回归分析结果显示,制造业工人抑郁、焦虑症状主要受文化程度、工作班制、周均工作时间和睡眠障碍的影响。

高学历的制造业工人抑郁、焦虑症状风险较低,与蒋佶杉等^[12]研究结果类似。可能因为学历较高者通常具有丰富的职业健康知识和良好的心理调节能力,能更好地应对工作中的压力和挑战,降低了心理疾病风险。

本研究有 33.16% 的工人存在睡眠障碍,睡眠障碍的工人抑郁、焦虑症状风险较高,可能与去甲肾上腺素和 5-羟色胺系统分泌紊乱有关^[13],这些神经递质可通过解除快速眼动睡眠抑制,减少快速眼动睡眠潜伏期及增加快速眼动睡眠持续时间而引发抑郁、焦虑症状。建议加强制造业工人的心理健康知识学习,对于存在睡眠障碍的工人及时采取药物或认知行为疗法改善工人睡眠质量,降低抑郁、焦虑症状风险。

上夜班的工人焦虑症状风险较高,与 ROSEN-

BERG 等^[14]调查结果相似。夜班对心理健康的负面影响已在其他研究^[15-16]得到证实。长期上夜班会干扰正常的生物节律,影响睡眠质量,还增加高血压、恶性肿瘤等患病风险^[17-18],从而引发或加剧焦虑症状。周均工作时间≥55 h 的工人抑郁症状检出率较高,与 LEE 等^[19]研究结果相似。随着工作时间的延长,工人获得社会支持的机会减少,情感需求无法得到满足,工作与生活失衡,负性情绪增多导致其检出抑郁、焦虑症状的可能性增加。提示企业需科学分配工作量,合理安排工人的工作时间;重视工人的精神卫生保健,定期举办心理健康知识讲座,将心理健康培训参与度和成效纳入绩效考核体系,同时设立心理互助或兴趣小组,让工人在兴趣爱好中找到归属感。

参考文献

- [1] CHEN S Q, WANG Y Q, SHE R. Prevalence and gender disparity of those who screen positive for depression in China by the classification of the employer and industry: a cross-sectional, population-based study [J]. BMC Psychiatry, 2023, 23 (1): 1-11.
- [2] World Health Organization. Mental health in the workplace [EB/OL]. [2024-07-28]. <https://www.who.int/news-room/fact-sheets/detail/mental-health-at-work>.

- [3] 中华人民共和国中央人民政府. 健康中国行动(2019—2030年) [EB/OL]. [2024-07-28]. http://www.gov.cn/xinwen/2019-07/15/content_5409694.htm.
- [4] 吕虹, 毕海侠, 杨德华. 不同职业暴露危险因素对汽车制造业工人职业健康情况的影响 [J]. 职业与健康, 2019, 35 (19): 2607-2609.
- [5] 张琼云. 广东省涉苯企业有害因素联合暴露情况及作业工人外周血细胞计数异常研究 [D]. 广州: 广州医科大学, 2023.
- [6] 薛潘琪, 张译心, 周莉芳, 等. 快递从业人员职业紧张、生活满意度与抑郁症状的关联研究 [J]. 预防医学, 2022, 34 (12): 1201-1206, 1211.
- [7] LEE K H, CHAE C H, KIM Y O, et al. Anxiety symptoms and occupational stress among young Korean female manufacturing workers [J/OL]. *Ann Occup Environ Med*, 2015 [2024-07-28]. <https://doi.org/10.1186/s40557-015-0075-y>.
- [8] 雷兰英, 雷娜, 曹日芳. 高中学生情绪和应对方式积极心理干预效果评价 [J]. 预防医学, 2021, 33 (9): 961-962, 967.
- [9] WANG W Z, BIAN Q, ZHAO Y, et al. Reliability and validity of the Chinese version of the Patient Health Questionnaire (PHQ-9) in the general population [J]. *Gen Hosp Psychiatry*, 2014, 36 (5): 539-544.
- [10] SPITZER R L, KROENKE K, WILLIAMS J B, et al. A brief measure for assessing generalized anxiety disorder: the GAD-7 [J]. *Arch Intern Med*, 2006, 166 (10): 1092-1097.
- [11] NAKATA A, HARATANI T, TAKAHASHI M, et al. Job stress, social support, and prevalence of insomnia in a population of Japanese daytime workers [J]. *Soc Sci Med*, 2004, 59 (8): 1719-1730.
- [12] 蒋佳杉, 王洪蕊, 罗帆, 等. 在岗工人心理资本在其职业紧张与抑郁症状间的中介效应 [J]. 中国当代医药, 2023, 30 (34): 145-150.
- [13] WANG Y Q, LI R, ZHANG M Q, et al. The neurobiological mechanisms and treatments of REM sleep disturbances in depression [J]. *Curr Neuropharmacol*, 2015, 13 (4): 543-553.
- [14] ROSENBERG K. Shift work adversely affects mental health [J]. *Am J Nurs*, 2020, 120 (3): 67.
- [15] 马效东, 秦文彦, 张文珍, 等. 中部某省重点职业人群职业紧张、抑郁和焦虑状况分析 [J]. 职业与健康, 2024, 40 (8): 1034-1040.
- [16] LI Y X, WANG Y C, LYU X Y, et al. Effects of factors related to shift work on depression and anxiety in nurses [J]. *Front Public Health*, 2022, 10: 1-20.
- [17] WEI F Q, CHEN W Y, LIN X T. Night-shift work, breast cancer incidence, and all-cause mortality: an updated meta-analysis of prospective cohort studies [J]. *Sleep Breath*, 2022, 26 (4): 1509-1526.
- [18] KANKI M, NATH A P, XIANG R D, et al. Poor sleep and shift work associate with increased blood pressure and inflammation in UK Biobank participants [J]. *Nat Commun*, 2023, 14 (1): 1-15.
- [19] LEE K H, KIM J E, KIM Y K, et al. Long working hours and emotional well-being in Korean manufacturing industry employees [J]. *Ann Occup Environ Med*, 2013, 25 (1): 1-10.

收稿日期: 2024-03-28 修回日期: 2024-07-28 本文编辑: 徐亚慧

(上接第795页)

- admitted to an intermediate care center [J/OL]. *Int J Environ Res Public Health*, 2021, 18 (18) [2024-05-14]. <https://doi.org/10.3390/ijerph18189606>.
- [33] SHIMELS T, KASSU R A, BOGALE G, et al. Magnitude and associated factors of poor medication adherence among diabetic and hypertensive patients visiting public health facilities in Ethiopia during the COVID-19 pandemic [J/OL]. *PLoS One*. 2021, 16 (4) [2024-05-14]. <https://doi.org/10.1371/journal.pone.0249222>.
- [34] ALLAHAM K K, FEYASA M B, GOVENDER R D, et al. Medication adherence among patients with multimorbidity in the United Arab Emirates [J]. *Patient Prefer Adherence*, 2022, 16: 1187-1200.
- [35] FRANCHI C, LUDERGNANI M, MERLINO L, et al. Multiple medication adherence and related outcomes in community-dwelling older people on chronic polypharmacy: a retrospective cohort study on administrative claims data [J]. *Int J Environ Res Public Health*, 2022, 19 (9): 5692-5703.
- [36] BRIMAVANDI M, ABBASI P, KHALEDI-PAVEH B, et al. Examining the relationship between depression and medication adherence among elderlies suffering from cardiovascular disease referring to the clinics affiliated with Kermanshah University of Medical Sciences: a cross-sectional study [J/OL]. *Health Sci Rep*, 2023, 6 (8) [2024-05-14]. <https://doi.org/10.1002/hsr2.1503>.
- [37] FOLEY L, DOHERTY A S, WALLACE E, et al. Exploring the multidimensional relationship between medication beliefs and adherence to medications among older adults living with multimorbidity using polynomial regression: an observational cohort study [J]. *Ann Behav Med*, 2023, 57 (7): 561-570.
- [38] AL-AZAYZIH A, KANAAN R J, ALTAWALBEH S M, et al. Medication adherence and its associated determinants in older adults with type 2 diabetes and cardiovascular comorbidities [J]. *Patient Prefer Adherence*, 2023, 17: 3107-3118.
- [39] 罗发燕, 陈铁霞, 罗平平, 等. 慢性乙型肝炎患者服药依从性调查 [J]. 预防医学, 2023, 35 (11): 966-969, 974.
- [40] DEMIRTURK E, ASILAR R H. The effect of depression on adherence to antihypertensive medications in elderly individuals with hypertension [J]. *J Vasc Nurs*, 2018, 36 (3): 129-139.

收稿日期: 2024-03-28 修回日期: 2024-05-14 本文编辑: 徐文璐