



GLOBAL JOURNAL OF MEDICAL RESEARCH: B
PHARMA, DRUG DISCOVERY, TOXICOLOGY & MEDICINE
Volume 23 Issue 2 Version 1.0 Year 2023
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals
Online ISSN: 2249-4618 & Print ISSN: 0975-5888

Relationship between Antidepressant use and Increased Bacterial Resistance

By Paulo Eduardo Guedes Dornelles, Guilherme Silva Miranda, Samir Jamal Antonio Abou Fares, William de Freitas Barros, Luis Henrique da Costa Moraes, Maria de Fátima da Silva, Nilcele Freire de Oliveira, Thamirys Sartori de Souza, Heloisa Faria Gachet Rabelo, Esther Cabral Jersey, Laianne Barros Martins de Alcântara, Mariana Abreu Accioly, Idacir França Bottoli, Dayane Carolini Rodrigues, Edson Brunetti Da Silva, Lorena de Sousa Moura, Juliane Alves de Mesquita & Dra. Aline de Amorim Duarte

Abstract- Introduction: The uncontrolled use of antidepressant drugs can be potentially harmful to individual and collective health. Analgesics are often used inappropriately and carelessly, which can result in a number of negative effects like bacterial resistance, hypersensitivity, dependence, digestive bleeding, withdrawal symptoms, and even an increased risk for certain neoplasms (Ribeiro et al., 2010). The central nervous system, as well as the respiratory and digestive systems, are the sources of the complaints that are most frequently linked to self-medication, including headache, musculoskeletal pain, fever, respiratory infections, heartburn, abdominal pain, constipation, and diarrhea (Furtado et al., 2019).

Keywords: antidepressants; bacterial resistance; drug interaction.

GJMR-B Classification: NLM: QV 744



Strictly as per the compliance and regulations of:



© 2023. Paulo Eduardo Guedes Dornelles, Guilherme Silva Miranda, Samir Jamal Antonio Abou Fares, William de Freitas Barros, Luis Henrique da Costa Moraes, Maria de Fátima da Silva, Nilcele Freire de Oliveira, Thamirys Sartori de Souza, Heloisa Faria Gachet Rabelo, Esther Cabral Jersey, Laianne Barros Martins de Alcântara, Mariana Abreu Accioly, Idacir França Bottoli, Dayane Carolini Rodrigues, Edson Brunetti Da Silva, Lorena de Sousa Moura, Juliane Alves de Mesquita & Dra. Aline de Amorim Duarte. This research/review article is distributed under the terms of the Attribution-NonCommercial-NoDerivatives 4.0 International (CC BY-NC-ND 4.0). You must give appropriate credit to authors and reference this article if parts of the article are reproduced in any manner. Applicable licensing terms are at <https://creativecommons.org/licenses/by-nc-nd/4.0/>.

Relationship between Antidepressant use and Increased Bacterial Resistance

Paulo Eduardo Guedes Dornelles ^α, Guilherme Silva Miranda ^σ, Samir Jamal Antonio Abou Fares ^ρ, William de Freitas Barros ^ω, Luis Henrique da Costa Moraes [¥], Maria de Fátima da Silva [§], Nilcele Freire de Oliveira ^χ, Thamirys Sartori de Souza ^ν, Heloisa Faria Gachet Rabelo ^θ, Esther Cabral Jersey ^ζ, Lianne Barros Martins de Alcântara [£], Mariana Abreu Accioly [€], Idacir França Bottoli [£], Dayane Carolini Rodrigues ^², Edson Brunetti Da Silva ^δ, Lorena de Sousa Moura [^], Juliane Alves de Mesquita [¶], & Dra. Aline de Amorim Duarte [™]

Abstract- Introduction: The uncontrolled use of antidepressant drugs can be potentially harmful to individual and collective health. Analgesics are often used inappropriately and carelessly, which can result in a number of negative effects like bacterial resistance, hypersensitivity, dependence, digestive bleeding, withdrawal symptoms, and even an increased risk for certain neoplasms (Ribeiro et al., 2010). The central nervous system, as well as the respiratory and digestive systems, are the sources of the complaints that are most frequently linked to self-medication, including headache, musculoskeletal pain, fever, respiratory infections, heartburn, abdominal pain, constipation, and diarrhea (Furtado et al., 2019).

Methodology. This is a literature review whose bases were taken from the SciELO and PubMed data platforms. The research period was July 2023, meeting the inclusion criteria of articles from the years 2000 to 2023, in Portuguese and English, online texts, and full texts. As strategies for better evaluation of the texts, the following health descriptors (DeCS) were used: "Antidepressants" and "Bacterial resistance".

Results: The choice of an antidepressant takes into account efficacy, safety, tolerability, toxicity in overdose, the previous response of the patient or a family member to a given agent, the experience of the physician in the management of a given representative, the occurrence of special situations that require antidepressants free or with a lower degree of some of the adverse effects, and cost. (MINISTÉRIO DA SAÚDE, 2012). In addition to the circumstances mentioned, another variable that proved worthy of investigation was the increase in bacterial resistance associated with antidepressant use. Globally, antibiotic resistance is a significant public health threat. An estimated 1.2 million people died as a direct result of it in 2019, and this number is expected to increase (NEWS.MED.BR, 2023). Such effects are associated with increased reactive oxygen species, enhanced stress signature responses, and stimulation of efflux pump expression. Mathematical modeling also supported the role of antidepressants in the occurrence of antibiotic-resistant mutants and persistent cells (WANG, 2023).

Conclusion: Based on the foregoing, it is clear that psychosomatic illnesses have a large epidemiological component in the population of the twenty-first century. As a result, numerous treatment options have developed, including antidepressants. Additionally, it is intriguing to highlight and develop the notion that the indiscriminate use of antidepressants ultimately has a detrimental effect on all microbiota in the body, leading to an increase in bacterial

resistance. When used properly and in conjunction with a qualified health practitioner, the mental health of the entire community can be improved while also thinking about preventing potential illnesses.

Keywords: antidepressants; bacterial resistance; drug interaction.

I. INTRODUCTION

Antidepressant drug abuse has the potential to be detrimental to both an individual's and society's health. The improper and careless use of substances and even medications that the general public views as "simple," like analgesics, can have a number of negative effects, including bacterial resistance, hypersensitivity, dependence, digestive bleeding, withdrawal symptoms, and even an increased risk for certain neoplasms (Ribeiro et al., 2010).

Self-medication is most frequently linked to complaints involving the central nervous system, the respiratory, and digestive systems, as well as heartburn, abdominal pain, constipation, and diarrhea (Furtado et al., 2019). These complaints include headaches, musculoskeletal pain, fever, respiratory infections, and heartburn.

Researchers are relying on "drug repositioning" as an alternative to more quickly identify effective drugs to treat infectious diseases because bacterial resistance is typically linked to the abuse of antibiotics and has alarming clinical and economic consequences for the world. (2018) (SERAFIN, MB; HORNER, R).

It's interesting to examine the post-pandemic situation that the globe is in; the pandemic obviously made a number of psychological illnesses worse, so the negative impacts, like increasing bacterial resistance, must be discussed in scientific communities and in the general population.

II. METHODS

This is a literature review whose bases were taken from the SciELO and PubMed data platforms. The research period was July 2023, meeting the inclusion criteria of articles from the years 2000 to 2023, in Portuguese and English, online texts, and full texts. As

strategies for better evaluation of the texts, the following health descriptors (DeCS) were used: "Antidepressants" and "Bacterial resistance".

III. RESULTS AND DISCUSSION

The selection of an antidepressant considers factors like effectiveness, safety, tolerability, toxicity in overdose, prior responses of the patient or a family member to a given agent, experience of the doctor in the management of a given representative, the occurrence of special situations that require antidepressants free of or with a lower degree of some of the side effects, and cost. (2012) (MINISTÉRIO DA SAUDE). Along with the previously described factors, the rise in bacterial resistance linked to antidepressant usage also merited further research.

Antibiotic resistance poses a serious hazard to public health on a global scale. It caused an estimated 1.2 million deaths directly in 2019, and this number is projected to rise (NEWS.MED.BR, 2023).

Such effects are linked to an increase in reactive oxygen species, improved stress signature reactions, and the induced expression of efflux pumps. A function for antidepressants in the occurrence of mutant bacteria that are resistant to antibiotics and persistent cells was also supported by mathematical modeling (WANG, 2023). In bacteria grown in well-oxygenated laboratory conditions, the antidepressants caused the cells to generate reactive oxygen species— toxic molecules that activated the microbe's defense mechanisms. Most prominently, this activated the bacteria's efflux pump systems, a general expulsion system that many bacteria use to eliminate various molecules, including antibiotics. This probably explains how the bacteria could resist antibiotics without having specific resistance genes. But exposure of *E. coli* to antidepressants also led to an increase in the mutation rate of the microbe and the subsequent selection of various resistance genes. However, in bacteria grown under anaerobic conditions, levels of reactive oxygen species were much lower, and antibiotic resistance developed much more slowly (NEWS.MED.BR, 2023). Additionally, sertraline, at least one antidepressant, has fostered bacterial gene transfer, a technique that can hasten the emergence of resistance in a population. As a result of this transfer, resistance can move between species, including from pathogenic to harmless bacteria (NEWS.MED.BR, 2023). The antidepressant sertraline encourages plasmid conjugative transfer. One clonal line exhibits multidrug resistance and persistence, and horizontal transmission of antibiotic resistance brought on by sertraline antidepressants has been identified (WANG, 2023).

Antidepressants can influence membrane integrity and promote efflux pump expression. One important resistance mechanism is the activation of the

efflux pump, which enables bacteria to control their internal environment by expelling harmful elements like antibiotics. The efflux pump may have been expressed as a result of antidepressant use, which is thought to have contributed to the development of antibiotic resistance (WANG, 2023). Antidepressants can cause chromosomal mutations and multidrug resistance. The hypothesis is that reduced susceptibility to multiple antibiotics may also be associated with mutations in the chromosome. Antidepressants may also increase persistence with antibiotics. Persisters are dormant variants of wild-type bacteria that are formed in microbial populations. Persister cells are not antibiotic-resistant but exhibit high antibiotic tolerance (WANG, 2023). Antidepressants can affect the evolution of persistent and resistant bacteria. Generally, bacterial evolution through genetic mutations is a slow and incremental process. It has been found experimentally that antidepressants can significantly promote the process of antibiotic resistance and persistence (Wang, 2023).

IV. FINAL CONSIDERATION

After reading the foregoing, it is clear that psychosomatic illnesses have a substantial epidemiological component in the population of the twenty-first century. As a result, a number of treatment options have appeared, including antidepressants. Furthermore, it is intriguing to highlight and develop the hypothesis that the indiscriminate use of antidepressants ultimately has a deleterious influence on all microbiotas in the body, leading to an increase in bacterial resistance. With the proper use and in the company of a qualified health professional, thinking of preventing potential illnesses is a significant method to improve the quality of life and mental health of the entire community.

REFERENCES RÉFÉRENCES REFERENCIAS

1. MINISTÉRIO DA SAÚDE BRASÍLIA -DF 2012 Uso Racional de Medicamentos temas selecionados [Internet]. Available from: https://bvsms.saude.gov.br/bvs/publicacoes/uso_racional_medicamentos_temas_selecionados.pdf
2. NEWS.MED.BR, 2023. Antidepressivos ajudam as bactérias a resistir aos antibióticos. Disponível em: <https://www.news.med.br/p/medical-journal/1432855/antidepressivos-ajudam-as-bacterias-a-resistir-aos-antibioticos.htm>
3. Wang Y, Yu Z, Ding P, Lu J, Mao L, Ngiam L, et al. Antidepressants can induce mutation and enhance persistence toward multiple antibiotics. *Proceedings of the National Academy of Sciences*. 2023 Jan 23; 120(5).
4. DE JESUS PEREIRA, Thais; DE ANDRADE, Leonardo Guimarães; DE ABREU, Thiago Pereira. O

- farmacêutico frente ao risco do uso irracional de antibióticos. Revista Ibero-Americana de Humanidades, Ciências e Educação, v. 7, n. 9, p. 483-501, 2021.
5. DA SILVA CAMPOS, Laísa; TEIXEIRA, Bruna Caroline; CASALINI, Caroline Eickoff Copetti. perfil da automedicação em estudantes de ensino superior: impacto na resistência bacteriana. Revista saúde integrada, v. 12, n. 24, p. 67-78, 2019.
 6. MACHADO, Catrine et al. REPOSICIONAMENTO DE UM ANTIDEPRESSIVO A PARTIR DA AVALIAÇÃO DA ATIVIDADE ANTIBACTERIANA EM AMOSTRAS CLÍNICAS RESISTENTES. Anais do Salão Internacional de Ensino, Pesquisa e Extensão, v. 10, n. 2.
 7. SILVA, Liliam Sousa; DA SILVA JESUS, Marleide; TAKETANI, Natália Franco. DESENVOLVIMENTO DE RESISTÊNCIA BACTERIANA POR MOLÉCULAS NÃO ANTIBIÓTICAS. Revista Ensaios Pioneiros, v. 3, n. 2, p. 37-47, 2019.
 8. FRANCO, J. M. P. L. et al. O papel do farmacêutico frente à resistência bacteriana ocasionada pelo uso irracional de antimicrobianos. Rev. Semana Acadêmica. Fortaleza, v. 1, n. 72, p. 1-17, 2015.
 9. BARBOZA, Mavíael Pereira et al. O uso de antidepressivos na adolescência e sua automedicação. Research, Society and Development, v. 10, n. 15, p. e310101522995-e310101522995, 2021.
 10. ROCHA, Diego Pessoa et al. Coordenação de metais e antibióticos como uma estratégia de combate à resistência bacteriana. Química Nova, v. 34, p. 111-118, 2011.
 11. BARROS, Landerson Guimarães et al. Estudo bibliográfico sobre as potenciais interações medicamentosas envolvendo antidepressivos tricíclicos. E-Acadêmica, v. 3, n. 2, p. e8232244-e8232244, 2022.
 12. COSTA, Monize Evelin Araújo; DE OLIVEIRA, Joelma Coelho Pina. A importância da atenção farmacêutica no uso racional de medicamentos. SAÚDE & CIÊNCIA EM AÇÃO, v. 8, n. 1, p. 109-129, 2022.
 13. JUNIOR, Ismael Laurindo Costa; PLETSCHE, Adelmo L.; TORRES, Yohandra R. Ocorrência de fármacos antidepressivos no meio ambiente-revisão. Revista Virtual de Química, v. 6, n. 5, p. 1408-1431, 2014.
 14. LANDIM, Elane Cristina Silva et al. CARACTERÍSTICAS E FARMACOTERAPIA ATUAL DAS ÚLCERAS NO PÉ DIABÉTICO.
 15. BARROS, Landerson Guimarães et al. Estudo bibliográfico sobre as potenciais interações medicamentosas envolvendo antidepressivos tricíclicos. E-Acadêmica, v. 3, n. 2, p. e8232244-e8232244, 2022.