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Bacterial detection, identification, and isolation in Clinical Samples: A case of Tertiary Care Hospital in Mardan, KPK of Pakistan

Fawad Mahmood[1]

Ikram Ullah[2]

Shahid Anwar[3]

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Abstract

Background: Bacteria are stunningly designed by Mother Nature and have the potential to challenge the most intellectual creature (human) in World. Pyogenic infections are characterized by the presence of local inflammation accompanied by the formation of pus and systemic symptoms. The bacteria involved are known as pyogenic, or pus-producing bacteria, and infections of soft tissue are typically accompanied by pus production. Infection of soft tissue and wounds may involve a wide range of aerobic species as well as anaerobic bacteria, either alone or in combination.
Objectives: The goal of the current research is to ascertain how often bacteria are found in blood and pus samples.
Study Design: Cross-Sectional Research
Material & Methods: Blood samples for culture were taken aseptically from veins up to 5 ml. Pus samples for cultures were aseptically collected in a sterile tube or disposable sterile syringe. All these samples were inoculated at 37 °C on appropriate culture media (Oxoid, MacConkey's agar, blood agar, chocolate agar) and incubated for 24 hours. For recording negative blood culture reports, 5 days' protocol was followed. Positive cultures were further proceeded by sub-cultures on blood agar, Mannitol Salt Agar (MSA), MacConkey agar, cholerae media, and spell to positivity was noted.
Results: Most common bacteria isolated from the blood cultures were E. coli, 28 %, Coli form 30 %, and Citrobacteria 15 % and followed by. Staphylococcus aureus at 17 % and Klebsiella species at 10 % while the most common bacteria from the pus cultures were

[1]1. Lecturer, Faculty of Rehabilitation and Allied Health Sciences, Riphah International University, Islamabad, Pakistan
e-mail:
[2] 2. Ph.D. Scholar, Department of Medical Laboratory Technology, University of Haripur, Pakistan
e-mail:
[3] 3.M.Phil. Scholar, Pharmacy, Department, University of Malakand, Malakand Pakistan
e-mail:

prevalent bacteria are staphylococcus aureus form 62 %, Coli at 15 %, Citrobacteria at 15 % and followed by. Klebsiella species 15 % and Citrobacteria.
Conclusion: The most frequently isolated bacteria from blood was E. coli, and Staphylococcus aureus was the most frequent germ recovered from pus samples.

Keywords: E. coli, Peshawar, Pus, Blood, Staphylococcus aureus

1 Introduction

The present-day lifestyle and less health awareness among individuals create numerous health problems (Al Halbusi et al. 2022; Jaffar 2020; Jaffar 2020; Mohammadi et al. 2021; Su et al. 2021), including microbial infections, and metabolic disorders (Narayanan et al. 2021). Bacteria are stunningly designed by Mother Nature and have the potential to challenge the most intellectual creature (human) in World (Doron S 2020). Bacteria are very diverse and flexible environmental poses health issues and creatures and human pathogens (Iorember et al. 2022; Lebni et al. 2021; Shoib et al. 2022; Soroush et al. 2021; Su et al. 2021). Bacteria may cause acute and chronic, deadly relapsing, community-acquired, or nosocomial infections (Winn 1995).In recent years, vector-borne parasitic, as well as bacterial infections, have emerged or re-emerged in various geographical regions causing a global health and economic problems (Hafeez et al. 2023; Iorember et al. 2022; Local Burden of Disease 2021; Micah et al. 2023; Peter et al. 2017), include humans, companion animals, livestock, and wildlife (Harrus and Baneth 2005). The virulence of bacteria and their susceptibility to antibiotic drugs may be attributed to the molecular structure of the cell wall, periplasm, plasmid, cytoplasm, and membranes that separate these sections (Garg et al. 2003). The skin and soft tissue infections (SSTI) caused by microbes during or after burn injuries, trauma, and surgical procedures pus, the composition of pus is a white to yellow fluid, dead WBCs, cellular debris, and sometimes necrotic tissues (Cogen et al., 2008).

Pyogenic infections are described by systemic and local inflammation with pus formation that cause various health problems (Farzadfar et al. 2022; Moradi et al. 2021; Su et al. 2022; Su et al. 2021; Zafar et al. 2022). Infections of soft tissue are usually coupled with the formation of pus and the bacteria involved are said to be pyogenic or pus-producing bacteria, which cause health issues (Azhar et al. 2018; Geng et al. 2022; NeJhaddadgar et al. 2022; Schmidt et al. 2022; Zeidabadi et al. 2022). A wide-ranging variety of aerobic species, as well as anaerobic bacteria, may be present either alone or in a mixture in the infection of soft tissue and wound (Garau et al. 2013; Scalise et al. 2015; Verma et al, 2012). The pus formation is a primary response to an infectious agent and mechanical injury to the tissues and other organs (Grace et al, 2020). Complicated cutaneous and soft tissue infections are common and frequently need treatment in hospitals (Aqeel et al. 2021; Aqeel et al. 2021; Paulson et al. 2021; Toqeer et al. 2021; Yao et al. 2022). They are a very heterogeneous group of infections for example abscesses, diabetic foot infections fasciitis, cellulitis, post-trauma, surgical site infection, as well as superficial abscesses in any anatomical site where the risk of anaerobic or Gram-negative bacteria involvement is high (Fattahi et al. 2020; Khazaie et al. 2021; Pouresmaeil et al. 2019; Su et al. 2021; Yoosefi Lebni et al. 2021), for example, the rectal part. Colonization with the spreading of bacterial flora could lead to wound infection which can be severe and even occasionally leads to death(Bowler et al., 2001). Bacteria, viruses, fungi, and protozoan cause wound infection. The common abscess-producing bacteria are Staphylococcus aureus, Pseudomonas, Klebsiella species, streptococcus, and Escherichia coli, while among all these bacteria Staphylococcus aureus is the most common bacteria that produce

pus furthermore may be poly-microbial and could involve both aerobic and anaerobic, Gram-negative and, Gram-positive bacteria(Moet et al. 2007; Talan et al. 2011; Rakesh Kumar 2013). The emerging frequency of resistance to numerous antibiotics in bacteria makes SSTI progressively challenging to treat (Moet et al. 2007). Moreover, the choice of management is often complicated by the need to treat without a confirmed diagnosis (Talan et al. 2011). Methicillin-resistant Staphylococcus aureus (MRSA) is predominant in the majority of the nations where it is sought for. This is one of the most important bacteria in hospital-acquired infections (Parajuli et al., 2014). The spread of multidrug-resistant (MDR) bacterial pathogens has further a new angle to the problem of wound infections. (Jain et al, 2015; Kotz et al. 2009).

Bacteremia is the existence of bacteria in the lifeblood, an incident of the occurrence of bacterial colonization in blood circulation is typically not a life-threatening state (Azizi et al. 2021; Jaffar et al. 2019; Lebni et al. 2020; Moradi et al. 2020; Su et al. 2020). Bloodstream infections (BSIs) are closely associated with significant patient morbidity, and mortality and are amongst the utmost common healthcare infections (Abbas 2021; Maqsood et al. 2021; NeJhaddadgar et al. 2020; Shuja et al. 2020; Yoosefi Lebni et al. 2020). BSI is a serious problem that needs immediate attention and treatment, particularly if caused by MDR organisms (Jaffar et al. 2022). It is valued that two million patients each year in the United States (US) acquire infections although, in hospitals, roughly 350,000 of these infections include the BSIs, and around 90,000 are deadly(Diekema et al, 2003). A wide range of microorganisms especially bacteria can cause BSIs, nevertheless, many of these bacteria are also part of normal flora(Saha et al., 2016).

A Widespread range of multidrug resistance bacteria can be caused blood infections that can lead to more morbidity, motility, and complications in hospitalized persons (Keihanian et al. 2018). The common BSI bacteria are streptococci, enterococci, Enterobacteriaceae, or staphylococci (Tiwari MK 2021).BSIs can cause local infection of organs or tissue like pneumonia or meningitis, or they can cause generalized infection such as septicemia without any localization (Brown et al. 2005). The frequency of drug resistance among the organism that causes BSIs is getting amplified bit by bit alarmingly, hence rendering common infections also more challenging to treat or untreatable, resulting in disturbing concerns to patients.

The discovery of antibiotics unlocked a new era in the management of infectious diseases but regular administration of drug formulation produces drug resistance among the microorganism (Narayanan et al. 2021). Drug resistance especially antibiotic resistance has been denoted as “The silent tsunami facing modern medicine”(Nagvekar et al. 2020). Meanwhile, the microorganisms efficiently get the genomic level evolution and develop resistance to medicines such as antibiotics. The research community, broadcasting, as well as political inventiveness, are creating awareness about drug resistance. Despite this hard work and awareness, antibiotic resistance is continuously snowballing all over the world (Exner et al. 2017). According to the World Health Organization (WHO) fact sheet report, infections through antimicrobial-resistant organisms can upshoot in failure of cure, an increased charge of treatment, increased hospitalization stay, as well as an increased socioeconomic burden. In past, diseases caused by MDR Gram-negative bacteria have intensely increased across the world.

The preferred antibiotic resistance mechanisms in bacteria include modifications to antibacterial target proteins on cell surfaces, changes in membrane permeability, and drug degradation through

enzymatic activity. (Mathiyazhagan et al, 2013; Narayanan et al, 2020). All these collective resistance mechanisms could intercede through chromosomes and plasmids (Narayanan, et al. 2020). Penicillin-resistant A good illustration of how the global movement of people spreads multi-drug resistant bacteria is streptococcus pneumoniae (PRSP). The DNA from penicillin-resistant commensal streptococci is transformed into penicillin-resistant commensal streptococci, with plasmids serving as the main vector in most bacteria, primarily Gram-negative bacteria. The importance of plasmids in Shigella bacteria that carry multiple drug resistance (MDR) indicators. Despite the fact that Escherichia coli (E.coli) was initially identified over 40 years ago in Japan (Phan et al. 2009, Gould 2008). The synthesis of b-lactamases enzymes by Gram-negative bacteria is the main method of antibiotic resistance. (Hawkey et al, 2009). MDR microorganisms are estimated to cause 10 million deaths by 2050 and roughly 700,000 diseases worldwide each year. They also severely harm economic output. (Martín et al, 2014; Gogoi et al, 2021). MDR bacteria, such as vancomycin-resistant enterococci (VRE) and methicillin-resistant Staphylococcus aureus (MRSA) have been the subject of several research investigations due to their increasing resistance over time. Contrarily, Pseudomonas aeruginosa, Klebsiella species, Enterobacter species, Acinetobacter baumannii, and Escherichia coli are some bacteria that are showing a growing trend of antibiotic resistance. (Gaynes et al, 2005;Gould 2008).

2 Materials and Methods

The current investigation was conducted between January and August of 2022 and followed research protocol (Al-Sulaiti 2022; Al-Sulaiti et al, 2004; Li et al, 2022; Shah et al, 2023; Zhuang et al, 2022). The research was conducted at Bacha Khan Medical College Mardan (BKMC), situated in the Mardan district of Khyber-Pakhtunkhwa (KPK), Pakistan. All the patients who had come for blood culturing and pus culturing were included in this study, and skin commensals and contaminants were not included in the study.

Laboratory data collection: From outpatient and inpatient departments, 778 clinical blood and urine samples were obtained. Clinical samples were processed at the Microbiology lab, Pediatric patients who received antibiotics within the past 2 weeks were excluded.

Isolation and documentation of Bacteria: Blood samples for culture were taken aseptically from veins up to 5 ml. Pus samples for cultures were aseptically collected in a sterile tube or disposable sterile syringe. All these samples were inoculated at 37 °C on appropriate culture media (blood agar, MacConkey's agar, chocolate agar, Oxoid) and incubated for 24 hours. For recording negative blood culture reports, 5 days' protocol was followed. Positive cultures were further proceeded by sub-cultures on MacConkey agar, blood agar, Mannitol Salt Agar (MSA), cholerae media, and spell to positivity was noted.

Antimicrobial susceptibility: All positive + cultures were further processed for identification of pathogens, gram staining, and biochemical tests (Gram's staining, appearance, morphology, catalase, oxidase reaction, motility, triple sugar iron (TSI), urease test, citrate test, DNase test, indole test.

Statistical Analysis: The Statistical Analysis for the Social Sciences (SPSS) version 26 was used for the assessment of the research study's data collection. The outcomes of these statistical analyses were then put through more processing in Microsoft Excel 2011.

3 Results and Discussion

A total of n = 819 patients for blood and pus culturing visited the BKMC Microbiology laboratory. Out of these 778 patients, 321 (41 %) individuals were tested for blood culturing, and 457 (59%) patients were tested for pus culturing. Among 321 blood cultures, 26 were positive and the overall incidence of bacteremia was 44.13%. A total of n=457 samples were recruited in the BKMC

Microbiology lab. Out of n=samples, 266 samples were negative and n=samples were positive, the detail as shown in Figure/Table: 1. this current finding is very similar to a study conducted on the geographical distribution of bacteremia it was reported that in India 16%–44 % and in Iran as 4%–18% and Iran as 4%–18%. (Keihanian et al, 2018). The current results are contrasted on the frequency of blood isolate for bacteremia in different geographical regions, reported the most prevalent bacteria from blood cultures was as follows: Pseudomonas aeruginosa29.3 %) coagulase-negative Staphylococcus and then followed by Pseudomonas aeruginosa 29.3 % (Keihanian et al, 2018; Saeidinia et al. 2016). According to another study, the most prevalent bacterium was Staphylococcus spp. isolated from skin or soft tissues (n = 197 samples), which was followed by E. coli, which was isolated from urine (n = 646 samples). Bacterial species did not spread uniformly across the nation. 95.7% (n = 1,919 samples) of isolates had consistent bacterial species identification using all methods. 2022) (Rebelo et al. Similar findings indicated that E. coli, Streptococcus uberis, and coagulase-positive staphylococci were the most frequently isolated significant pathogens. (Green et al. 2005).

Table No: 1.1 Frequency of Blood and Pus Cultures in Clinical Isolates

Culture Type	Number of specimens	Negative	Positive
Blood culture	321	274	47
Pus culture	457	266	191
Total	778	69 %	30 %

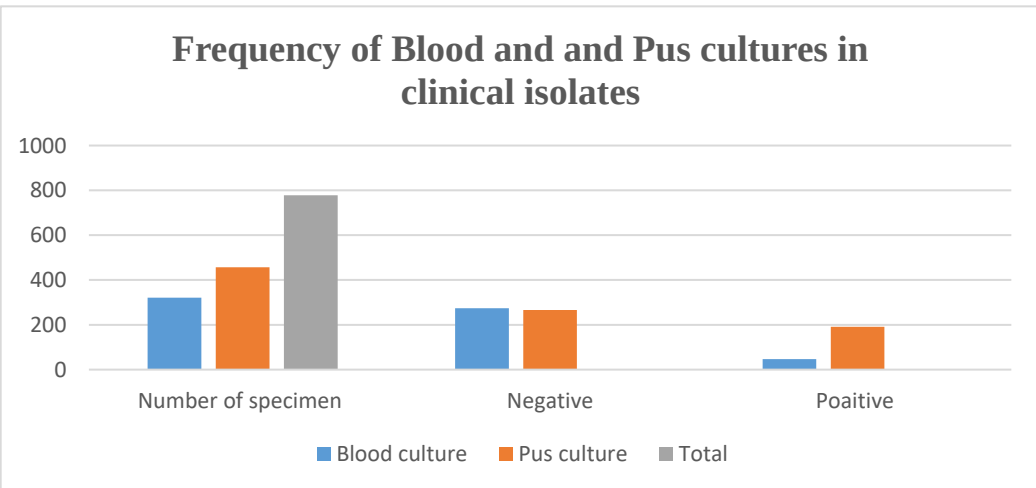


Figure No: 1.1 Frequency of Blood and Pus Cultures in Clinical Isolates

In this investigation, 321 samples in total were cultivated, and 47 samples yielded favorable results. From blood cultures, six different kinds of bacteria were identified. Among different bacteria the most prevalent bacteria are E. coli form 28 %, Coli forms 30 % and Citrobacteria 15 % and followed by. Staphylococcus aureus 17 %, and klebsiella species 10 %, the detail of all different bacteria is shown in Figure/Table No 2. This study's findings are quite similar to those of a study done in India, where the prevalence of main bacteria isolated was reported to be 24% for Staphylococcus aureus, 20% for E. coli, followed by 16% for Staphylococcus epidermidis and Streptococcus spp, and 10% for Klebsiella spp. (Sumathi,et al, 2008). The high frequency of Staphylococcus sp. followed by E. coli in the current study, according to another study, is consistent with the work of many other researchers. The most significant and common bacteria causing mastitis worldwide are staphylococci (Unakal et al, 2010). As opposed to a study on the

percentage of Enterobacteriaceae, and Klebsiella spp. in particular, dropped over time, the next most frequently isolated bacterial species after E. coli were Streptococcus spp., Klebsiella spp., Enterococcus spp., Staphylococcus spp., and Enterobacter spp. Separate cultures of Enterococcus spp. have been performed more frequently lately (Unakal et al, 2010). In a study on bacterial isolates from blood cultures of children in Nigeria with probable septicemia, Staphylococcus aureus was shown to be the most common isolate (48.7%), followed by Coliforms (23.4%) (Meremikwu et al. 2005).

Table No: 2.2: Frequency of different bacteria in Blood Cultures

Number of Bacteria (47)	Bacterial Isolates names	Percentage %
8	Staphylococcus aureus	17
5	Klebsiella Species	10
13	Coli form	28
14	E.coli	30
7	Citrobactor Species	15

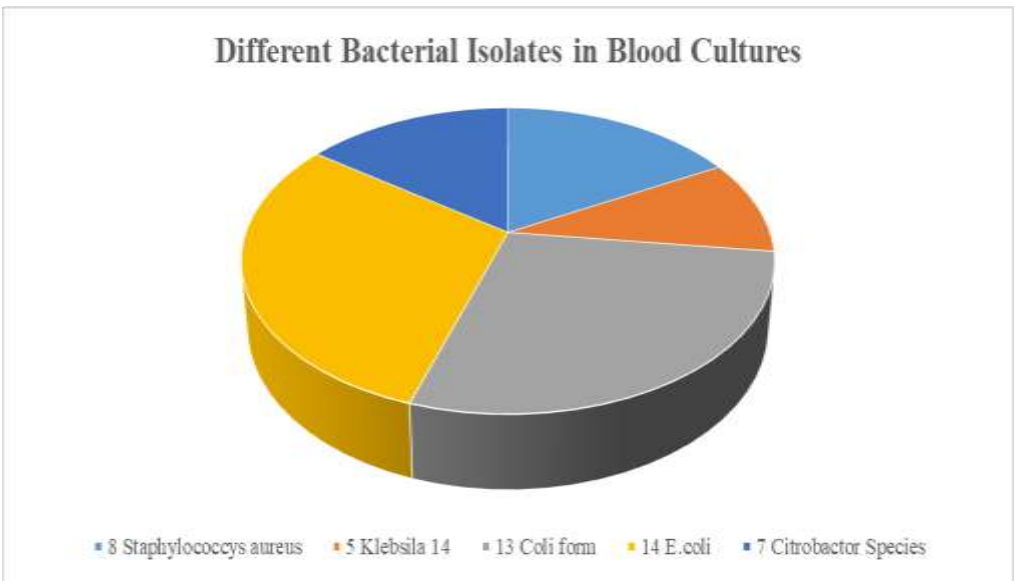


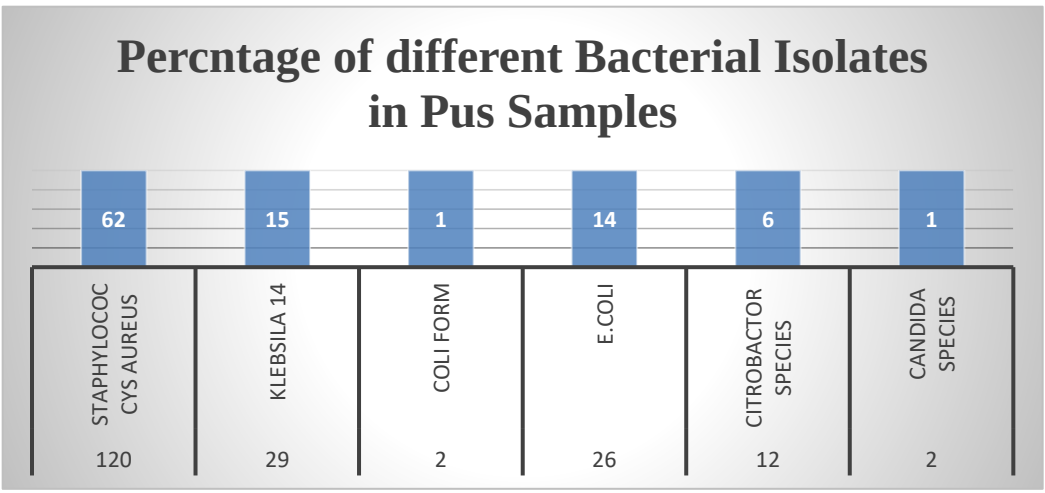
Figure No: 2.2: Frequency of different bacteria in Blood Cultures

In this investigation, a total of 457 samples of pus were cultured, and 191 of those samples tested positive for the infection. From pus cultures, six different bacteria were recovered. Staphylococcus aureus makes up 62% of all bacteria, followed by Coli 15% and Citrobacteria 15% as the most common bacteria. The breakdown of all the various bacteria is illustrated in Figure/Table No. 3, with Klebsiella species accounting for 15% of the total. According to a 2011 study by M et al, P.

aeruginosa is one of the most important pyogenic bacteria and the third most common reason for pyogenic infections, with variable prevalence depending on the geographic region and the clinical situation. Pyogenic nosocomial bacterial infections are closely associated with P. aeruginosa.(MM et al, 2021). A similar study reported that the most predominant bacteria in pus samples is a staphylococcus aureus (Zafar et al, 2012). Another similar study reported that bacterial species which were identified in our study as compared to the given finding: Staphylococcus aureus, Pseudomonas aeruginosa, Streptococcus spp., E. coli, Proteus vulgaris, Micrococcus luteus, Bacillus cereus (Agri 2011). The Mardan investigation, according to KPK, found that E. coli made up the majority of the isolates (90.3%), followed by Pseudomonas aeruginosa (7.2%), Staphylococcus aureus (1.3%), and Klebsiella pneumonia (1.3%). (Sajid Ali et al. 2021).

Number of Bacteria (191)	Bacterial Isolates names	Percentage %
120	Staphylococcus aureus	62
29	Klebsiella 14	15
2	Coli form	1
26	E.coli	14
12	Citrobactor Species	6
2	Candida Species	1

Figure No: 2.3: Frequency of different bacteria in Pus Cultures



Conclusion: E. coli was the most typical bacteria to be isolated from blood cultures, 28 %, Coli form 30 %, and Citrobacteria 15 % and followed by. Staphylococcus aureus 17 %, and klebsiella species 10 % while the most common bacteria from the pus cultures were prevalent bacteria are staphylococcus aureus form 62 %, Coli forms 15 % and Citrobacteria 15 % and followed by. Klebsiella species 15 % and Citrobacteria.

Conflict of Interest: The author has no conflict of interest.

References

Abaalzamat, K. H., Al-Sulaiti, K. I., Alzboun, N. M., & Khawaldah, H. A. (2021). The role of Katara cultural village in enhancing and marketing the image of Qatar: Evidence from TripAdvisor. *SAGE Open*, *11*(2), 21582440211022736. doi: 10.1177/21582440211022737

Aqeel, M., Abbas, J., Raza, S., & Aman, J. (2021). Portraying the multifaceted interplay between

sexual harassment, job stress, social support and employee's turnover intension amid COVID-19: A Multilevel Moderating Mode. *Foundation University Journal of Business & Economics*, *6*(2).

Baloch, H., Rind, R., Kalhoro, D. H., & Kalhoro, A. B. (2011). Study on the incidence of clinical mastitis in buffaloes caused by bacterial species. Pak. J. Agri., Agril. Engg., Vet. Sci, 27(1), 83–93.

Al Halbusi, H., Al-Sulaiti, K., Abbas, J., & Al-Sulaiti, I. (2022). Assessing factors influencing technology adoption for online purchasing amid COVID-19 in Qatar: Moderating role of word of mouth. *Frontiers in Environmental Science*, 1039. https://doi.org/10.3389/fenvs.2022.942527

Li, Y., Al-Sulaiti, K., Dongling, W., Abbas, J., & Al-Sulaiti, I. (2022). Tax Avoidance Culture and Employees' Behavior Affect Sustainable Business Performance: The Moderating Role of Corporate Social Responsibility. *Frontiers in Environmental Science*, 1081.

Al-Sulaiti, K. I., & Fontenot, R. J. (2004). Country of origin [COO] influence on foreign vs. domestic products: Consumers' perception and selection of airlines in the Arab Gulf Region. *Global Business Research-Academy for Global Business Advancement*, *1*(1), 260–277.

Aqeel, M., Abbas, J., Raza, S., & Aman, J. (2021). Portraying the multifaceted interplay between sexual harassment, job stress, social support and employee's turnover intension amid COVID-19: A Multilevel Moderating Mode. *Foundation University Journal of Business & Economics*, *6*(2).

Aqeel, M., Rehna, T., Shuja, K. H., & Abbas, J. (2022). Comparison of students' mental wellbeing, anxiety, depression, and quality of life during COVID-19's full and partial (smart) lockdowns: A follow-up study at a 5-month interval. *Frontiers in Psychiatry*, *13*.

Azhar, A., Abbas, J., Wenhong, Z., Akhtar, T., & Aqeel, M. (2018). Linking infidelity stress, anxiety and depression: Evidence from Pakistan married couples and divorced individuals. *International Journal of Human Rights in Healthcare*, *11*(3), 214–228. https://doi.org/10.1108/IJHRH-11-2017-0069

Azizi, M. R., Atlasi, R., Ziapour, A., Abbas, J., & Naemi, R. (2021). Innovative human resource management strategies during the COVID-19 pandemic: A systematic narrative review approach. Heliyon, 7(6), e07233. doi:10.1016/j.heliyon.2021.e07233

Balsalobre-Lorente, D., Abbas, J., He, C., Pilař, L., & Shah, S. A. R. (2023). Tourism, urbanization and natural resources rents matter for environmental sustainability: The leading role of AI and ICT on sustainable development goals in the digital era. Resources Policy, 82, 103445. doi:10.1016/j.resourpol.2023.103445

Wisplinghoff, H., Bischoff, T., Tallent, S. M., Seifert, H., Wenzel, R. P., & Edmond, M. B. (2004). Nosocomial bloodstream infections in US hospitals: Analysis of 24,179 cases from a prospective nationwide surveillance study. Clinical Infectious Diseases, 39(3), 309–317. https://doi.org/10.1016/s1077-9108(08)70211-1.

Duerden, B. I. (2001). armstrong Dg. Wound microbiology and associated approaches to wound mamagement. Clin Microbial Rev, 14, 244–269. https://doi.org/10.1128/CMR.14.2.244-269.2001.

Brown, D. F., Edwards, D. I., Hawkey, P. M., Morrison, D., Ridgway, G. L., Towner, K. J., & Wren, M. W. (2005). Guidelines for the laboratory diagnosis and susceptibility testing of methicillin-resistant Staphylococcus aureus (MRSA). Journal of Antimicrobial Chemotherapy, 56(6), 1000–1018. https://doi.org/10.1093/jac/dki372.

Cogen, A. L., Nizet, V., & Gallo, R. L. (2008). Skin microbiota: A source of disease or defence. British Journal of Dermatology, 158(3), 442–455.

Diekema, D. J., S. E. Beekmann, K. C. Chapin, K. A. Morel, E. Munson, & G. V. Doern. (2003). Epidemiology and Outcome of Nosocomial and Community-Onset Bloodstream Infection. Journal of Clinical Microbiology, 41 (8), 3655–60.

https://doi.org/10.1128/JCM.41.8.3655-3660.2003.

Doron, S., & Gorbach, S. L. (2008). Bacterial infections: Overview. *International Encyclopedia of Public Health*, 273.

Exner, M., Bhattacharya, S., Christiansen, B., Gebel, J., Goroncy-Bermes, P., Hartemann, P., Heeg, P., Ilschner, C., Kramer, A., & Larson, E. (2017). Antibiotic resistance: What is so special about multidrug-resistant Gram-negative bacteria? GMS Hygiene and Infection Control, 12.

Farzadfar, F., Naghavi, M., Sepanlou, S. G., Moghaddam, S. S., Dangel, W. J., Weaver, N. D., Aminorroaya, A., Azadnajafabad, S., Koolaji, S., & Mohammadi, E. (2022). Health system performance in Iran: A systematic analysis for the Global Burden of Disease Study 2019. *The Lancet*, *399*(10335), 1625–1645. https://doi.org/10.1016/S0140-6736(21)02751-3

Fattahi, E., Solhi, M., Kasmaei, P., Rastaghi, S., Pouresmaeil, M., . . . Gilan, H. D. (2020). Prioritization of needs among students of University of Medical Sciences: A needs assessment. *J Educ Health Promot*, 9, 57. doi:10.4103/0445-7706.281641

Mahmood, F. (2022). Detection and Identification of Bacterial isolates in Clinical Samples in Tertiary Care Hospital Mardan, Khyber Pakhtunkhwa, Pakistan. *Medical and Life Sciences*, *1*(2).

Garau, J., Ostermann, H., Medina, J., Ávila, M., McBride, K., & Blasi, F. (2013). Current management of patients hospitalized with complicated skin and soft tissue infections across Europe (2010–2011): Assessment of clinical practice patterns and real-life effectiveness of antibiotics from the REACH study. *Clinical Microbiology and Infection*, *19*(9), E377–E385. https://doi.org/10.1111/1469-0691.12235

Garg, M., Misra, M. K., Chawla, S., Prasad, K. N., Roy, R., & Gupta, R. K. (2003). Broad identification of bacterial type from pus by 1H MR spectroscopy. *European Journal of Clinical Investigation*, *33*(6), 518–524.

Gaynes, Robert, and Jonathan R. Edwards. (2005). Overview of Nosocomial Infections Caused by Gram-Negative Bacilli. *Clinical Infectious Diseases 41* (6), 848–54. https://doi.org/10.1086/432803.

Geng, J., Ul Haq, S., Ye, H., Shahbaz, P., Abbas, A., & Cai, Y. (2022). Survival in Pandemic Times: Managing Energy Efficiency, Food Diversity, and Sustainable Practices of Nutrient Intake amid COVID-19 Crisis. *Frontiers in Environmental Science*, *13*, 945774. doi:10.3389/fenvs.2022.945774

Gogoi, Gourangie, Mousumi Dutta, & Gargi Choudhury. (2021). Prevalence of Antimicrobial-Resistant Infection among Patients Attending Assam Medical College and Hospital, Dibrugarh. *Assam Journal of Internal Medicine 11* (2), 24. https://doi.org/10.4103/ajoim.ajoim_7_21.

Gould, I. M. 2008. The Epidemiology of Antibiotic Resistance. International *Journal of Antimicrobial Agents 32* (SUPPL. 1), 2–9. https://doi.org/10.1016/j.ijantimicag.2008.06.016.

Grace, B Nirmala, K Ravi Kiran, & B Venkata Rao. (2020). Study of Aerobic Bacterial Isolates and Their Antibiogram from Pus Sample in Government General Hospital, Guntur.Website: Www.Ijrrjournal.Com Original Research Article International Journal of Research and Review (Ijrrjournal.Com) 7 (7), 412. www.ijrrjournal.com.

Green, M. J., L. E. Green, A. J. Bradley, P. R. Burton, Y. H. Schukken, & G. F. Medley. (2005). Erratum: Prevalence and Associations between Bacterial Isolates from Dry Mammary Glands of Dairy Cows (Veterinary Record Vol. 156 (71-77)). *Veterinary Record 156* (10): 309. https://doi.org/10.1136/vr.156.10.309.

Hafeez, A., Dangel, W. J., Ostroff, S. M., Kiani, A. G., Glenn, S. D., Abbas, J., Afzal, M. S., Afzal, S., Ahmad, S., & Ahmed, A. (2023). The state of health in Pakistan and its provinces and territories, 1990–2019: A systematic analysis for the Global Burden of Disease Study

2019. *The Lancet Global Health*, *11*(2), e229–e243. https://doi.org/10.1016/S2214-109X(22)00497-1

Harrus, S., & G. Baneth. (2005). Drivers for the Emergence and Re-Emergence of Vector-Borne Protozoal and Bacterial Diseases. *International Journal for Parasitology 35* (11–12), 1309–18. https://doi.org/10.1016/j.ijpara.2005.06.005.

Hawkey, Peter M., & Annie M. Jones. (2009). The Changing Epidemiology of Resistance. *Journal of Antimicrobial Chemotherapy 64* (SUPPL.1). https://doi.org/10.1093/jac/dkp256.

Iorember, P. T., Iormom, B., Jato, T. P., & Abbas, J. (2022). Understanding the bearable link between ecology and health outcomes: the criticality of human capital development and energy use. *Heliyon, 8*(12), e12611. doi:10.1016/j.heliyon.2022.e12611

Jaffar, A. (2020a). The Impact of Coronavirus (SARS-CoV2) Epidemic on Individuals Mental Health: The Protective Measures of Pakistan in Managing and Sustaining Transmissible Disease. *Psychiatr Danub, 32*(3-4), 472-477. doi:10.24869/psyd.2020.472

Jaffar, A. (2020b). The Role of Interventions to Manage and Reduce Covid-19 Mortality Rate of the COVID-19 Patients worldwide. Foundation *University Journal of Psychology, 4*(2), 33-36. doi:https://doi.org/10.33897/fujp.v4i2.158

Jaffar, A., Al-Sulaiti, K., Balsalobre-Lorente, D., Shah, A. R. S., & Shahzad, U. (2022). Reset the industry redux through corporate social responsibility: The COVID-19 tourism impact on hospitality firms through business model innovation (1st ed.): Routledge.

Jaffar, A., Aqeel, M., Shaher, B., A, J., Sundas, J., & Zhang, W. (2019). The moderating role of social support for marital adjustment, depression, anxiety, and stress: Evidence from Pakistani working and nonworking women. *J Affect Disord*, 244, 231-238. doi:10.1016/j.jad.2018.07.071

Jaffar, A., Mubeen, R., Iorember, P. T., Raza, S., & Mamirkulova, G. (2021). Exploring the impact of COVID-19 on tourism: transformational potential and implications for a sustainable recovery of the travel and leisure industry. *Current Research in Behavioral Sciences*, 2, 100033. doi:10.1016/j.crbeha.2021.100033

Jain, Vikas, V K Ramnani, & Navinchandra Kaor. (2015). Antimicrobial Susceptibility Pattern amongst Aerobic Bacteriological Isolates in Infected Wounds of Patients Attending Tertiary Care Hospital in Central India.International J*ournal of Current Microbiology and Applied Sciences 4* (5), 711–19. http://www.ijcmas.com/vol-4-5/Vikas Jain, et al.pdf.

Keihanian, Fatemeh, Amin Saeidinia, Keivan Abbasi, & Faeze Keihanian. (2018). Epidemiology of Antibiotic Resistance of Blood Culture in Educational Hospitals in Rasht, North of Iran. *Infection and Drug Resistance 11*, 1723–28. https://doi.org/10.2147/IDR.S169176.

Khazaie, H., Lebni, J. Y., Mahaki, B., Chaboksavar, F., Kianipour, N., . . . Ziapour, A. (2021). Internet Addiction Status and Related Factors among Medical Students: A Cross-Sectional Study in Western Iran. *Int Q Community Health Educ*, 272684X211025438. doi:10.1177/0272684X211025438

Kotz, Paula, Jane Fisher, Pat McCluskey, Samantha D. Hartwell, & Hussein Dharma. (2009). Use of a New Silver Barrier Dressing, ALLEVYNparallelogram Open Ag in Exuding Chronic Wounds. *International Wound Journal 6* (3), 186–94. https://doi.org/10.1111/j.1742-481X.2009.00608.x.

Lebni, J. Y., Toghroli, R., Kianipour, N., NeJhaddadgar, N., Salahshoor, M. R., . . . Ziapour, A. (2021). Nurses' Work-Related Quality of Life and Its Influencing Demographic Factors at a Public Hospital in Western Iran: A Cross-Sectional Study. *Int Q Community Health Educ*, *42*(1), 37-45. doi:10.1177/0272684X20972838

Lebni, J. Y., Toghroli, R., NeJhaddadgar, N., Salahshoor, M. R., Mansourian, M., . . . Ziapour, A. (2020). A study of internet addiction and its effects on mental health: A study based on Iranian University Students. *J Educ Health Promot, 9*(1), 205. doi:10.4103/jehp.jehp_148_20

Li, Y., Al-Sulaiti, K., Dongling, W., & Al-Sulaiti, I. (2022). Tax Avoidance Culture and

Employees' Behavior Affect Sustainable Business Performance: The Moderating Role of Corporate Social Responsibility. *Frontiers in Environmental Science*, 10. doi:10.3389/fenvs.2022.964410

Local Burden of Disease, H. I. V. C. (2021). Mapping subnational HIV mortality in six Latin American countries with incomplete vital registration systems. BMC Med, 19(1), 4. doi:10.1186/s12916-020-01876-4

Mansourian, M., Qorbani, M., Mehr, B. R., Ziapour, A., Lebni, J. Y., & Safari, O. (2019). Secrecy in drug abusers: A qualitative study in Iran. *Journal of Postgraduate Medical Institute, 33*(3), 256-262. doi:https://jpmi.org.pk/index.php/jpmi/article/view/2492

Maqsood, A., Rehman, G., & Mubeen, R. (2021). The paradigm shift for educational system continuance in the advent of COVID-19 pandemic: Mental health challenges and reflections. Current Research in Behavioral Sciences, 2, 100011. doi:10.1016/j.crbeha.2020.100011

Martín-Loeches, Ignacio, Emili Diaz, & Jordi Vallés. (2014). Risks for Multidrug-Resistant Pathogens in the ICU. *Current Opinion in Critical Care 20* (5), 516–24. https://doi.org/10.1097/MCC.0000000000000124.

Mathiyazhagan, N, & Natarajan D. (2013). Metal Extraction Competence of Plants on Waste Dumps of Magnesite Mine, Salem District, South India. *Journal of Mining and Environment 4* (2), 113–24. https://doi.org/10.22044/jme.2013.199.

Mathiyazhagan, Narayanan, & Devarajan Natarajan. (2012). Optimization of RAPD-PCR Protocol to Screen Jatropha Curcas and Gossypium Hirsutum Grown in Metal Contaminated Soil. Journal of Petroleum & Environmental Biotechnology 03 (01), 2–5. https://doi.org/10.4172/2157-7463.1000113.

Meremikwu, Martin M., Chukwuemeka E. Nwachukwu, Anne E. Asuquo, Joseph U. Okebe, and Simon J. Utsalo. (2005). Bacterial Isolates from Blood Cultures of Children with Suspected Septicaemia in Calabar, Nigeria. *BMC Infectious Diseases 5*,1–4. https://doi.org/10.1186/1471-2334-5-110.

Micah, A. E., Bhangdia, K., Cogswell, I. E., Lasher, D., Lidral-Porter, B., Maddison, E. R., . . . Dieleman, J. L. (2023). Global investments in pandemic preparedness and COVID-19: development assistance and domestic spending on health between 1990 and 2026. *The Lancet Global Health*. doi:https://doi.org/10.1016/S2214-109X(23)00007-4

MM, Ali, Mansoor R, Zahra QA, Liangliang L, Gangguo W, Ali R, Kazmi A, & Khan MI. 2021. "Frequency and Antimicrobial Susceptibility Pattern of Pseudomonas Aeruginosa in Human Pus Samples at Holy Family Hospital Rawalpindi." *Open Access Journal of Microbiology & Biotechnology 6* (1): 1–8. https://doi.org/10.23880/oajmb-16000189.

Moet, Gary J., Ronald N. Jones, Douglas J. Biedenbach, Matthew G. Stilwell, & Thomas R. Fritsche. (2007). Contemporary Causes of Skin and Soft Tissue Infections in North America, Latin America, and Europe: Report from the SENTRY Antimicrobial Surveillance Program (1998-2004). Diagnostic Microbiology and Infectious Disease 57 (1), 7–13. https://doi.org/10.1016/j.diagmicrobio.2006.05.009.

Mohammadi, A., Pishgar, E., Firouraghi, N., Bagheri, N., Shamsoddini, A., & Kiani, B. (2021). A geodatabase of blood pressure level and the associated factors including lifestyle, nutritional, air pollution, and urban greenspace. BMC Res Notes, 14(1), 416. doi:10.1186/s13104-021-05830-2

Moradi, F., Tourani, S., Ziapour, A., Hematti, M., Moghadam, E. J., . . . Soroush, A. (2020). Emotional Intelligence and Quality of Life in Elderly Diabetic Patients. *Int Q Community Health Educ*, 272684X20965811. doi:10.1177/0272684X20965811

Moradi, F., Ziapour, A., Najafi, S., Rezaeian, S., Faraji, O., . . . Soroush, A. (2021). Comparing the Associated Factors on Lifestyle Between Type 2 Diabetic Patients and Healthy People: A Case-Control Study. *Int Q Community Health Educ*, 272684X211022158. doi:10.1177/0272684X211022158

Nagvekar, Vasant, Sheetal Sawant, Supriya Amey. (2020). Prevalence of Multidrug-Resistant Gram-Negative Bacteria Cases at Admission in a Multispeciality Hospital. *Journal of Global Antimicrobial Resistance 22*, 457–61. https://doi.org/10.1016/j.jgar.2020.02.030.

Narayanan, Mathiyazhagan, Gajendiran Kandasamy, P. Murali, Sabariswaran Kandasamy, Veeramuthu Ashokkumar, Omaima Nasif, and Arivalagan Pugazhendhi. (2021). Optimization and Production of Polyhydroxybutyrate from Sludge by Bacillus Cereus Categorized through FT-IR and NMR Analyses.*Journal of Environmental Chemical Engineering 9* (1). https://doi.org/10.1016/j.jece.2020.104908.

Narayanan, Mathiyazhagan, Muthusamy Ranganathan, Shivakumar Muthugounder Subramanian, Suresh Kumarasamy, and Sabariswaran Kandasamy. (2020). Toxicity of Cypermethrin and Enzyme Inhibitor Synergists in Red Hairy Caterpillar Amsacta Albistriga (Lepidoptera: Arctiidae). *The Journal of Basic and Applied Zoology 81* (1). https://doi.org/10.1186/s41936-020-00185-9.

Narayanan, Mathiyazhagan, Suresh Kumarasamy, Muthusamy Ranganathan, Sabariswaran Kandasamy, Gajendiran Kandasamy, and Keerthana Gnanavel. (2020). Enzyme and Metabolites Attained in Degradation of Chemical Pesticides ß Cypermethrin by Bacillus Cereus. *Materials Today: Proceedings 33* (xxxx), 3640–45. https://doi.org/10.1016/j.matpr.2020.05.722.

NeJhaddadgar, N., Ziapour, A., Mardi, A., & Zare, M. (2020). Correlation between general health and sexual function in older women in an Iranian setting. *J Educ Health Promot, 9*(1), 300. doi:10.4103/jehp.jehp_316_20

NeJhaddadgar, N., Ziapour, A., Zakkipour, G., Abolfathi, M., & Shabani, M. (2022). Effectiveness of telephone-based screening and triage during COVID-19 outbreak in the promoted primary healthcare system: a case study in Ardabil province, Iran. *Journal of Public Health, 30*(5), 1301-1306. doi:10.1007/s10389-020-01407-8

Parajuli, P., Basnyat SR, Shrestha R, Shah PK, Gurung P. (2014). Identification and Antibiotic Susceptibility Pattern of Aerobic Bacterial Wound Isolates in Scheer Memorial Hospital. *JSM Microbiology 2* (2).

Paulson, K. R., Kamath, A. M., Alam, T., Bienhoff, K., Abady, G. G., . . . Kassebaum, N. J. (2021). Global, regional, and national progress towards Sustainable Development Goal 3.2 for neonatal and child health: all-cause and cause-specific mortality findings from the Global Burden of Disease Study 2019. *The Lancet, 398*(10303), 870-905. doi:10.1016/s0140-6736(21)01207-1

Peter, S., Aqeel, M., Akhtar, T., & Farooq, K. (2017). The moderating role of pregnancy status among coping strategies, depression, anxiety and stress across Pakistani married women. *Foundation University Journal of Psychology, 1*(2), 67-93. doi:https://doi.org/10.33897/fujp.v1i2.55

Phan, Minh Duy, Claire Kidgell, Satheesh Nair, Kathryn E. Holt, Arthur K. Turner, Jason Hinds, Philip Butcher, et al. (2009). Variation in Salmonella Enterica Serovar Typhi IncHI1 Plasmids during the Global Spread of Resistant Typhoid Fever. *Antimicrobial Agents and Chemotherapy 53* (2), 716–27. https://doi.org/10.1128/AAC.00645-08.

Pouresmaeil, M., Solhi, M., Ziapour, A., & Fattahi, E. (2019). Prioritizing health promotion lifestyle domains in students of Qazvin University of Medical Sciences from the students and professors' perspective. *J Educ Health Promot, 8*, 228. doi:10.4103/jehp.jehp_250_19

Qureshi, Majda, Farooq Aziz, F Aziz - Biomedica, undefined 2011, and Farooq Aziz. 2011. "Prevalence of Microbial Isolates in Blood Cultures and Their Antimicrobial Susceptibility Profiles." Biomedica 27 (6): 136–39. http://www.thebiomedicapk.com/articles/270.pdf%0Ahttps://www.thebiomedicapk.com/articles/270.pdf%0Ahttp://thebiomedicapk.com/articles/270.pdf.

Rakesh Kumar, Asati. (2013). "Antimicrobial Sensitivity Pattern of Klebsiella Pneumonia Isolated

from Pus from Tertiary Care Hospital and Issues Related to the Rational Selection of Antimicrobials." *Journal of Chemical and Pharmaceutical Research 5* (11), 326–31. https://doi.org/10.36347/sjams.2013.v01i05.0062.

Rebelo, Ana Rita, Tobias Ibfelt, Valeria Bortolaia, Pimlapas Leekitcharoenphon, Dennis Schrøder Hansen, Hans Linde Nielsen, Svend Ellermann-Eriksen, et al. (2022). One Day in Denmark: Nationwide Point-Prevalence Survey of Human Bacterial Isolates and Comparison of Classical and Whole-Genome Sequence-Based Species Identification Methods. *PLoS ONE 17* (2 February), 1–17. https://doi.org/10.1371/journal.pone.0261999.

Saeidinia, Amin, Ilnaz Tavakoli, Mohammad Reza Naghipour, Behnaz Rahmati, Hossein Ghavami Lahiji, Omid Salkhori, and Keyhan Ashrafi. (2016). Prevalence of Strongyloides Stercoralis and Other Intestinal Parasites among Institutionalized Mentally Disabled Individuals in Rasht, Northern Iran. *Iranian Journal of Parasitology 11* (4), 527–33.

Saha, Samir K., Shams El Arifeen, & Stephanie J. Schrag. (2016). Aetiology of Neonatal Infection in South Asia (ANISA): An Initiative to Identify Appropriate Program Priorities to Save Newborns. *Pediatric Infectious Disease Journal 35* (5), S6–8. https://doi.org/10.1097/INF.0000000000001099.

Sajid Ali, Hina Khalid, Noor Muhammad, Syed Luqman Shuaib, and Anees Muhammad. (2021). Frequency of Bacterial Isolates and Antibiotics Resistance Patterns in Urine and Pus Samples. *The Professional Medical Journal 28* (11), 1571–77. https://doi.org/10.29309/tpmj/2021.28.11.5987.

Scalise, A., A. Bianchi, C. Tartaglione, E. Bolletta, M. Pierangeli, M. Torresetti, M. Marazzi, and G. Di Benedetto. (2015). Microenvironment and Microbiology of Skin Wounds: The Role of Bacterial Biofilms and Related Factors. *Seminars in Vascular Surgery 28* (3–4), 151–59. https://doi.org/10.1053/j.semvascsurg.2016.01.003.

Schmidt, C. A., Cromwell, E. A., Hill, E., Donkers, K. M., Schipp, M. F., Johnson, K. B., . . . Hay, S. I. (2022). The prevalence of onchocerciasis in Africa and Yemen, 2000-2018: a geospatial analysis. *BMC Med, 20*(1), 293. doi:10.1186/s12916-022-02486-y

Shah, S. A. R., Zhang, Q., Balsalobre-Lorente, D., & Pilař, L. (2023). Technology, Urbanization and Natural Gas Supply Matter for Carbon Neutrality: A New Evidence of Environmental Sustainability under the Prism of COP26. *Resources Policy, 82*, 103465. doi:10.1016/j.resourpol.2023.103465

Shoib, S., Gaitan Buitrago, J. E. T., Shuja, K. H., Aqeel, M., de Filippis, R., . . . Arafat, S. M. Y. (2022). Suicidal behavior sociocultural factors in developing countries during COVID-19. *Encephale, 48*(1), 78-82. doi:10.1016/j.encep.2021.06.011

Shuja, K. H., Shahidullah, Aqeel, M., Khan, E. A., & Abbas, J. (2020). Letter to highlight the effects of isolation on elderly during COVID-19 outbreak. *Int J Geriatr Psychiatry, 35*(12), 1477-1478. doi:10.1002/gps.5423

Soroush, A., Ziapour, A., Jahanbin, I., Andayeshgar, B., Moradi, F., . . . Cheraghpouran, E. (2021). Effects of Group Logotherapy Training on Self-Esteem, Communication Skills, and Impact of Event Scale-Revised (IES-R) in Older Adults. *Ageing International, 47*(4), 758-778. doi:10.1007/s12126-021-09458-2

Su, Z., Cheshmehzangi, A., Bentley, B. L., McDonnell, D., Segalo, S., Ahmad, J., . . . da Veiga, C. P. (2022). Technology-based interventions for health challenges older women face amid COVID-19: a systematic review protocol. *Syst Rev, 11*(1), 271. doi:10.1186/s13643-022-02150-9

Su, Z., McDonnell, D., Cheshmehzangi, A., Li, X., & Cai, Y. (2021). The promise and perils of Unit 731 data to advance COVID-19 research. *BMJ Glob Health, 6*(5), e004772. doi:10.1136/bmjgh-2020-004772

Su, Z., McDonnell, D., Li, X., Bennett, B., Segalo, S., . . . Xiang, Y. T. (2021). COVID-19 Vaccine

Donations-Vaccine Empathy or Vaccine Diplomacy? A Narrative Literature Review. Vaccines (Basel), 9(9), 1024. doi:10.3390/vaccines9091024

Su, Z., McDonnell, D., Shi, L., Cai, Y., & Yang, L. (2021). Secondhand Smoke Exposure of Expectant Mothers in China: Factoring in the Role of Culture in Data Collection. *JMIR Cancer*, *7*(4), e24984. doi:10.2196/24984

Su, Z., McDonnell, D., Wen, J., Kozak, M., Segalo, S., . . . Xiang, Y. T. (2021). Mental health consequences of COVID-19 media coverage: the need for effective crisis communication practices. *Globalization and Health*, *17*(1), 4. doi:10.1186/s12992-020-00654-4

Su, Z., Wen, J., McDonnell, D., Cheshmehzangi, A., Li, X., . . . Cai, Y. (2020). A race for a better understanding of COVID-19 vaccine non-adopters. *Brain Behav Immun Health*, 9, 100159. doi:10.1016/j.bbih.2020.100159

Sumathi, B. R., B. M. Veeregowda, & Amitha R. Gomes. (2008). "Prevalence and Antibiogram Profile of Bacterial Isolates from Clinical Bovine Mastitis." *Veterinary World 1* (8), 237–38.

Talan, David A., Anusha Krishnadasan, Rachel J. Gorwitz, Gregory E. Fosheim, Brandi Limbago, Valerie Albrecht, and Gregory J. Moran. (2011). Comparison of Staphylococcus Aureus from Skin and Soft-Tissue Infections in Us Emergency Department Patients, 2004 and 2008. Clinical Infectious Diseases 53 (2), 144–49. https://doi.org/10.1093/cid/cir308.

Tiwari MK, Bhimkhatri H. (2021). Clinical and Microbiological Profile of Neonatal Sepsis at a Tertiary Care Hospital in Dehradun, India.*National Journal of Laboratory Medicine 10* (1): 1–4. https://doi.org/10.7860/NJLM/2021/45878.

Toqeer, S., Aqeel, M., Shuja, K. H., Bibi, A., & Abbas, J. (2021). Attachment styles, facebook addiction, dissociation and alexithymia in university students; a mediational model. *Nature-Nurture Journal of Psychology*, 1, 28-37. doi:https://doi.org/10.47391/NNJP.4

Unakal, C. G., and B. B. Kaliwal. (2010). Prevalence and Antibiotic Susceptibility of Staphylococcus Aureus from Bovine Mastitis. *Veterinary World 3* (2), 65–67.

Verma, Poonam, et J al Int Pharm Bio Sci, & Varsha Chandrakar. (2012). Antibiotic Sensitivity Treatment for Gram Negative Bacteria Isolated From Pus Sample. *International Journal of Pharmacy and Biological Sciences 2* (3), 2230–7605. www.ijpbs.com%5Cnwww.ijpbsonline.com.

Winn, Washington C. 1995. "Current Concepts in Pathologic h Diagnosis: Bacterial Diseases." Journal of Histotechnology 18 (3): 241–46. https://doi.org/10.1179/his.1995.18.3.241.

Yao, J., Ziapour, A., Toraji, R., & NeJhaddadgar, N. (2022). Assessing puberty-related health needs among 10–15-year-old boys: A cross-sectional study approach. *Archives de Pédiatrie*, *29*(2). doi:10.1016/j.arcped.2021.11.018

Yoosefi Lebni, J., Khorami, F., Khosravi, B., Jalali, A., & Ziapour, A. (2020). Challenges Facing Women Survivors of Self-Immolation in the Kurdish Regions of Iran: A Qualitative Study. *Front Psychiatry*, 11, 778. doi:10.3389/fpsyt.2020.00778

Yoosefi Lebni, J., Moradi, F., Salahshoor, M. R., Chaboksavar, F., Irandoost, S. F., . . . Ziapour, A. (2021). How the COVID-19 pandemic effected economic, social, political, and cultural factors: A lesson from Iran. *Int J Soc Psychiatry*, *67*(3), 298-300. doi:10.1177/0020764020939984

Zafar, Aizza, Hasan Ejaz, Jawwad Masood Ahmed, and Ayisha Javed. 2012. "Frequency and Antimicrobial Susceptibility of Staphylococcus Aureus Isolated from Pus Samples of Paediatric Patients." *Pakistan Journal of Medical and Health Sciences 6* (1): 32–35.

Zafar, M. Z., Shi, X., Yang, H., & Chen, J. (2022). The Impact of Interpretive Packaged Food Labels on Consumer Purchase Intention: The Comparative Analysis of Efficacy and Inefficiency of Food Labels. *Int J Environ Res Public Health*, *19*(22), 15098. doi:10.3390/ijerph192215098

Zeidabadi, S., Mangolian Shahrbabaki, P., & Dehghan, M. (2022). The Effect of Foot Reflexology on the Quality of Sexual Life in Hemodialysis Patients: A Randomized Controlled

Clinical Trial. *Sexuality and Disability*, *41*(1), 1-12. doi:10.1007/s11195-022-09747-x

Zhuang, D., Al-Sulaiti, K., Fahlevi, M., Aljuaid, M., & Saniuk, S. (2022). Land-use and food security in energy transition: Role of food supply. *Frontiers in Sustainable Food Systems*, 6. doi:10.3389/fsufs.2022.1053031