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COMPARISON AND SYNERGISTIC EFFECT OF HOMEOPATHIC AND ALLOPATHIC DRUGS USED FOR THE TREATMENT OF TYPHOID FEVER

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Abstract

Enteric fever (typhoid), which annually affects millions of people and results in a considerable number of deaths, represents a serious challenge to the world. The causative agent, Salmonella typhi, has evolved a resistance to conventional medicines. In order to combat S. typhi, this study explores the synergistic potential of homoeopathic and allopathic medicine. Disc diffusion method was used in the study to evaluate the antimicrobial sensitivity of homeopathic medicine i.e. Baptisia, Gelsemium, Belladonna, and Rhustox. The results showed zones of inhibition of 12 mm, 15 mm, 15 mm, and 19 mm, respectively. MIC and MBC values of 64 µg/ml and 256 µg/ml for Gelsemium and Baptisia respectively showed strong inhibition. Combining several homoeopathic drugs with antibiotics to combat S. typhi was evaluated in this study; results showed synergy with Belladonna, neutrality with Rhustox and Gelsemium, and antagonism with Baptisia. Overall, the research suggests homeopathy's potential in the fight against multi drug resistant S. typhi.

1. Introduction:

Salmonella Typhi a Gram-negative bacterium belongs to Enterobacteriaceae family is responsible for causing typhoid fever which is a systemic infectious disease. Typhoid fever is a major public health risk all over the world and more specifically in developing countries due to various reasons such as poor sanitation and health care facilities. *S. typhi* is responsible for causing prolonged fever, gastrointestinal problems, fatigue, headaches, abdominal pain, and even can lead to death if left untreated (Alikhan et al., 2018). The "*Salmonella*" genus was named in honor of Daniel Elmer Salmon (Kazmi 2022). *S. typhi* is a rod-shaped

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flagellated and facultative intracellular bacterium with sizes ranging from 2 to 3 µm (Bulmer et al., 2012 and Doble et al., 2012).

For virulence, it uses *Salmonella* pathogenicity islands (SPI). After attaching to intestinal cells, it spreads to several organs via the bloodstream, causing bacteremia and a subsequent infection of the kidneys, gall bladder, and reticuloendothelial system. Inflammation and ulceration in Peyer's patches are the symptoms of typhoid. Symptoms of typhoid include a high fever that persists for a long time, fatigue, headaches, abdominal discomfort, changes in bowel patterns, loss of appetite, and possible rose-colored patches (Parry 2006). Fly, finger, feces, and fomites are considered to be the "four Fs" through which *Salmonella* can be transmitted and about 4% of people worldwide are the chronic carriers who excrete the bacteria for up to an year (Gupta et al., 2018 and Bhandari et al., 2022).

An outbreak of the Extensively Drug-Resistant (XDR) *S. typhi* that began in 2016, which was widespread in South Asia, and in Pakistan an extensive rise was observed. Third generation antibiotics like Fluoroquinolones, Cephalosporins, Ampicillin, Chloramphenicol, and Co-trimoxazole were commonly used for the treatment of typhoid fever. However, due to the improper use of these antibiotics the emergence of Multi Drug Resistance in *S. Typhi* has complicated the treatment strategies of eradicating the *S. typhi*, therefore to reduce the burden of this infection the demand of stronger antibiotics; including Carbapenems, Tigecycline, and Azithromycin and complementary approaches increasing day by day (Butt et al., 2022). However, despite an increase in multidrug resistance, death rates have declined as a result of new drugs, extensive research, and modified treatment approaches. Classical signs are less frequently seen during the era of broad-spectrum antibiotic usage (Bhandari et al., 2022).

Homoeopathy was developed by Samuel Hahnemann. It is a method of curing the symptoms using low doses of the same substances that causes the similar symptoms in diseased persons, but it is diluted for increased medication potency. Homoeopathy is used by 250–300 million people worldwide (Jain 2022 and Kuzniar 2017).

Allopathic symptomatic treatment reduces disease symptoms temporarily, often without treating the underlying cause. However, it might not stop the progression or problems of short-lived disorders. When medication is discontinued, symptoms could return. Typhoid, for instance,is not cured by treating the fever alone; ulcers and pain also develop. Early illness phases are combated by symptomatic drugs (Deb 2021).

Mother tincture is the first plant extract used in homoeopathy. A process called potentization involves repeatedly diluting a substance. Some remedies have minimal molecules, while others retain more tincture material. Variable amounts of dilution are represented by potencies like CI and C10 (Ernst 2016 and Grams 2019).

The antimalarial properties of *Cinchona bark* were first described in 1790 by the Scottish physician William Cullen. Hahnemann disagreed and performed tests with extremely large dosages of quinine (*Cinchona bark* powder), examining the effects on his body. Using healthy people as participants in tests, this was the first example of homoeopathic establishing. Hahnemann developed his homoeopathic principles as a result of quinine-induced symptoms of malaria. The "like cures like" approach, which treats diseases with substances that cause similar symptoms, was discovered by Hahnemann. He developed this theory under the influence of Hippocrates and Paracelsus, simulating fake symptoms of illness with homoeopathic medicines (Ernst 2016).

Red onion, arnica, arsenic, and belladonna are just a few examples of the ingredients used in homoeopathic medicines that are taken from botanical, mineral, and animal sources and diluted. The administration methods can be subcutaneous, oral, liquid, and combination forms. Calendula and Arnica are examples of natural treatments. Snake venom, bee products, and other animal products are examples of animal-based substances (Sağlik, & Demr 2022).

Raw plant, animal, and mineral materials are used to make homoeopathic medications. These substances are combined with water or alcohol to form a base material. Dilution and shaking lower the material's toxicity and adverse effects while preserving its positive characteristics. This dilution

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procedure uses X (1/10) and C (1/100) potencies, where X is in the range of 1 to 9 and C is in the range of 1 to 99. Also employed are higher potencies like XM and LM (Sağlik, & Demr 2022). The integration of allopathic and homeopathic medication can be used for managing typhoid fever.

2. Methodology:

2.1. Bacteria isolation and Identification

Blood samples from clinically diagnosed typhoid patients were collected in sterile tubes and transported to microbiology laboratory Abasyn University Peshawar, Pakistan. The collected blood samples were cultured on MacConkey and blood agar for bacterial growth. Colonies were selected based on their size, shape, and color. On blood agar, the bacteria appeared as small, spherical, and gray-white, surface was smooth convex, and showed non-hemolytic activity, while on MacConkey agar, the organism was colorless and did not ferment lactose. Gram staining confirmed bacteria as Gram-negative rods. Different biochemical testes such as Indole, Citrate, Urease, and H2S were performed and identified the cultured bacterium as *S. typhi*. API 20E test kit was also used for further identification. This system contains different biochemical substrate in 20 micro chambers. As a result of bacterial activity, the color change of chambers was noted. The number generated from this test was compared with the bacterial profiles in the database.

2.2. Antibiotic Susceptibility testing

For determining antimicrobial susceptibility different antibiotic discs such as Ceftriaxone, Cefixime, Azithromycin, and Ciprofloxacin were be placed on Mueller-Hinton agar inoculated with *S. typhi*. These plates were then incubated at 37°C for 24 hours. The zone of inhibitions was measured with modified Kirby-Bauer disk diffusion method and the zones were quantified in millimeters (Khanal et al., 2017).

2.3. Minimum Inhibitory Concentration

Macro-diluted nutrient broth was used for the determination of Minimum Inhibitory Concentration. Bacterial suspension with different concentrations of antibiotics were cultured in vials and incubated 37°C. Based on the clarity of tubes the MIC and Minimum Bactericidal Concentration (MBC) were identified. Growth inhibition was indicated by clarity of the tube and bacterial growth was determined by cloudiness of the tubes. For estimating the MIC of various antibiotics (Ciprofloxacin, Ceftriaxone, Azithromycin, Cefixime), Andrew's Agar dilution method described by was employed. Clear or cloudy tubes indicated the status of growth inhibition when bacteria were put to tubes containing serial antibiotic dilutions and then incubated (Andrews 2001).

Minimum Bactericidal Concentration

MBC is the minimal bactericidal concentration required to eradicate a bacterium during a predetermined time frame. From the MIC results obtained the MBC was determined by subculturing the samples on sterile agar plates. A predefined percentage i.e. 99.9% is used by MBC to identify the lowest concentration that reduces bacterial viability. MIC is complemented by MBC indicates the bactericidal concentration and it also differs from the growth inhibition observed in the MIC test (Liu et al., 2020). Synergism between homeopathic and allopathic drugs have been explored. Isolates were tested at concentrations five times higher than the original MIC. Fractional Inhibitory Concentration (FIC) index was used to find out the effects of the drugs in combinations. The FIC index was used to define interactions as follows: synergy (FIC ≤ 0.5), indifference (FIC between 0.5 and 1.0), and antagonism (FIC > 1.0). Tubes containing 2 ml of nutrient broth and test organisms were treated with different concentrations of antibiotics. Control tubes were also taken included: a tube which was drug-treated but uninoculated medium, and in another tube the media was inoculated (culture control). The tubes were incubated for 24 hours at 35°C, with random distribution in the incubator (Hossen et al., 2016).

Results:

A total of 62 blood samples from typhoid patients were collected from LRH Peshawar. Among them, 40 were collected from female patients and 22 were

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collected from male patients as shown in (Figure 3.1).

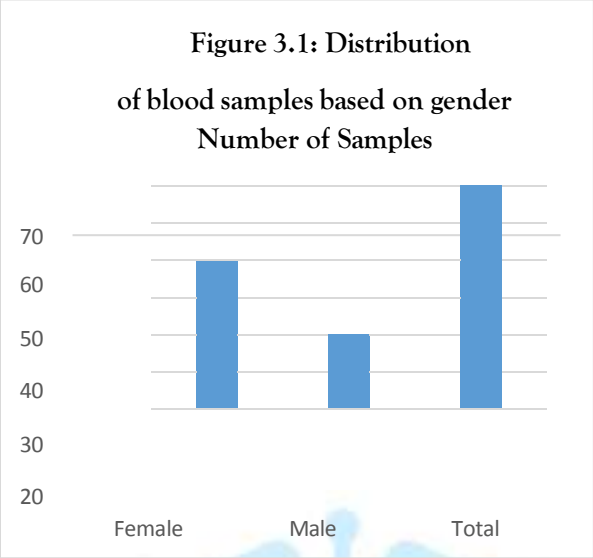




Figure: 3.2 *S.typhi* growth on agar



Figure: 3.3 *S.typhi* growth on Blood agar MacConkey

The result display that out of the total 42 samples processed, 48% (30) were positive for bacterial growth and 19% (12) showed negative results, indicating a significant presence of bacteria in the samples (Table 1.1 and Figure 1.2).

Table 3.1 Results of the sample processing for bacterial growth

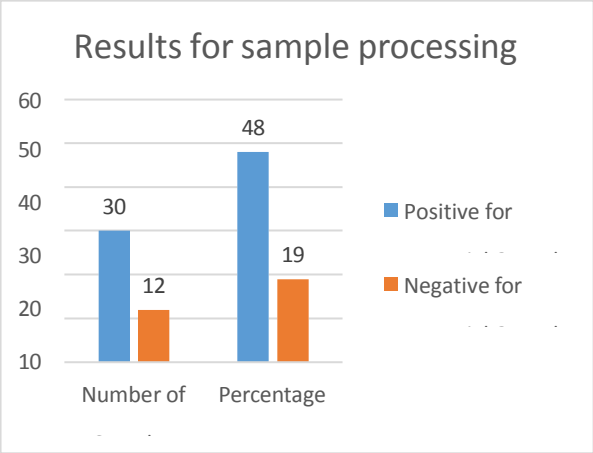
Results of Sample Processing	Number of Samples	Percentage
Positive for Bacterial Growth	30	48
Negative for Bacterial Growth	12	19

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Figure 3.4 Results of the sample processing for bacterial growth



Zones of inhibition are 10-15 mm, and Salmonella typhi is antibiotic-resistant. CFM has a 10 mm zone and is resistant to CFM, AZM, CIP, and CRO with 15 mm inhibition zones (Table 1.2)

Table 3.2 Antimicrobial susceptibility of *Salmonella typhi* to selected antibiotics

S.NO	Bacterial Species	CIP (mm)	CRO (mm)	AZM (mm)	CFM (mm)
1	*Salmonella typhi*	12	15	R	10



Figure: 3.5 biochemical test for *S.typhi* by API-E Kit



Figure: 3.6 Antimicrobial susceptibility test of Homeopathic and Allopathic drugs

Zones of inhibition for Salmonella typhi are between 12 and 19 millimetres. BAP 12 mm, RHU 19 mm, BEL 15 mm, and GEL 15 mm (Table 4.5 and Figure 4.3): Susceptible

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Table 3.3 Antimicrobial susceptibility of *Salmonella typhi* to selected homeopathic drugs

S.NO	Bacterial Species	BEL mm)	BAP mm)	RHU mm)	GEL mm)
1	*almonella typhi*	15	12	19	15

Using SPSS (Version 16), a statistical analysis compared the effectiveness of homoeopathic treatment and antibiotic susceptibility. Tables, bar graphs, pie charts, and percentages are used to visualize data. Homoeopathy and allopathy have a significant association, according to a chi-square test with a P-value of < 0.05. Statistics were optimized to maximize the effectiveness of homoeopathic remedies and antibiotic treatments.

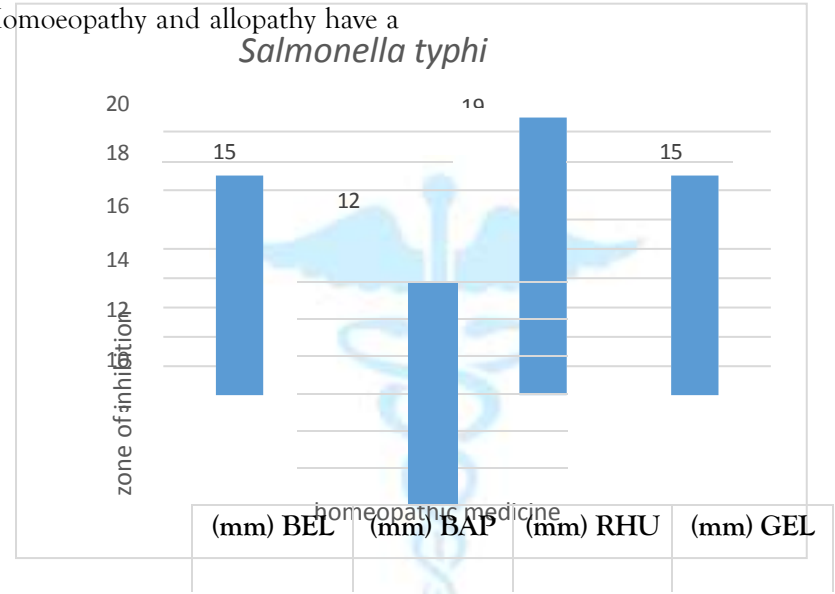


Figure: 3.7 Antimicrobial susceptibility of *Salmonella typhi* to selected Homeopathic drugs

The MIC and MBC of various antibiotics against Salmonella typhi are as follows: Cefixime MIC 15 µg/ml, MBC 20 µg/ml; Azithromycin MIC 20 µg/ml, MBC 25 µg/ml; and Ceftriaxone MIC 15 µg/ml, MBC 20 µg/ml (Table 1.4).

Table 3.4 MIC and MBC of selected antibiotics

S.NO	Isolates	MIC and MBC(µg/ml)								Positive control	Negative control
		CIP		AZM		CFM		CRO			
1	*Salmonella typhi*	MI C	MBC	MIC	MBC	MIC	MBC	MIC	MBC	CFM	Nutrient broth
		15	20	20	25	15	20	15	20	15	

Baptisia has a MIC of 64 µg/ml and an MBC of 256 µg/ml, Belladonna has a MIC of 64µ g/ml and an

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MBC of 256 µg/ml, Gelsemium has a MIC of 64 µg/ml and an MBC of 256 µg/ml, and Rhustox has a MIC of 128 µg/ml and MBC 256 µg/ml.

Table 3.5 MIC and MBC of selected Homeopathic medicine

S.N O	Isolates	MIC and MBC(µg/ml)								Positive control	Negative control
		BAP		BEL		GEL		RHU			
1	*Salmonella typhi*	MIC	MBC	MIC	MBC	MIC	MBC	MIC	MBC	CFM	Nutrient broth
		64	256	64	256	64	256	128	256	15	

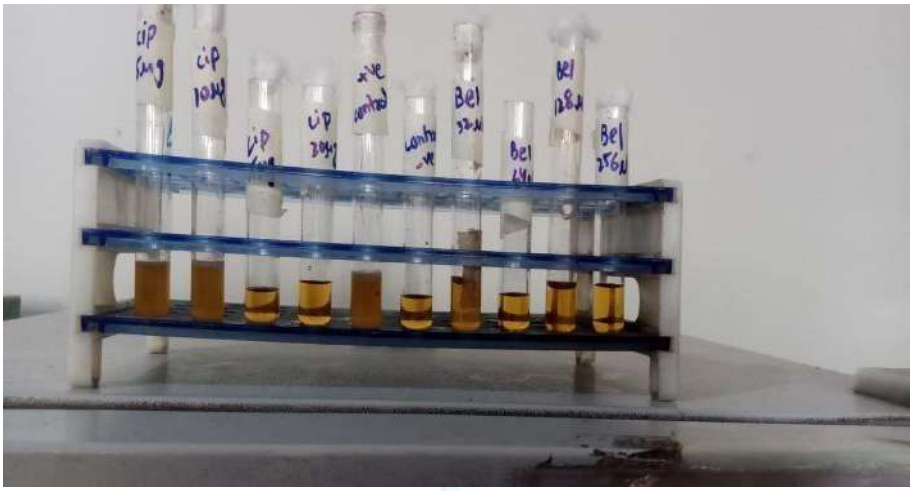


Figure: 3.8 MIC for Allopathic and Homeopathic medicine

Zone of inhibition Rhustox + Ciprofloxacin showed 15 mm of zone of inhibition, Gelsemium + Azithromycin showed 24mm zone of inhibition, Belladonna + Ceftriaxone showed 2mm zone of inhibition and Baptisia + Cefixime showed 21mm of zone of inhibition against *Salmonella typhi* (Table 4.8).

Table 3.6 Synergistic effect of selected homeopathic drugs with antibiotics against *Salmonella typhi*

S.NO	Homeopathic +Antibiotics	Zone of inhibition
1	Rhustox + Ciprofloxacin	15 mm
2	Gelsemium + Azithromycin	24 mm
3	Belladonna + Ceftriaxone	2 mm
4	Baptisia + Cefixime	21 mm

Calculation of Fractional Inhibitory Concentration Index (FICI)

FIC of agent A (FICA) = MIC of agent A in combination / MIC of agent A alone FIC of agent B (FICB) = MIC of agent B in combination / MIC of agent B alone

FICI index = FICA+FICB

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In the above formula the agent A represent Homeopathic drugs whereas agent B represent Allopathic drugs.

Interpretation of FICI

FIC index 0.5 is used to define synergy. FIC of 4.0 indicates antagonism between two agents, while values between 4.0 and 1.0 indicate indifference, with values between 1.0 and 0.5 indicating additive interaction.

Table: 3.7 Interpretation of FIC

S. NO	FICI range	Output
1	FICI ≤ 0.5	Synergy
2	FICI > 0.5 or ≤1	Additive
3	FIC I≥ 4	Antagonism
4	FICI >1 or ≤4	Indifference

Table: 1.8 Result interpretation Synergistic effect of selected Homeopathic drugs

S.NO	Homeopathic + Antibiotics	FICI range	Output
1	Rhustox + Ciprofloxacin	2.039	Indifference
2	Gelsemium + Azithromycin	1.6	Indifference
3	Belladonna + Ceftriaxone	0.266	Synergy
	Baptisia + Cefixime	3.85	antagonism



Figure: 3.10 Synergistic effect of Homeopathic and Allopathic

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Table: 1.9 OD_{600nm} (MIC) of Homeopathic medicine

S.NO	Isolates	Turbidimetric assay OD_{600nm} (MIC)			
1	*Salmonella typhi*	Belladonna	Gelsemium	Rhustox	Baptisia
		OD (MIC)	OD (MIC)	OD (MIC)	OD (MIC)
		0.169	0.368	0.207	0.784

Optical density of Belladonna MIC (0.169) and MIC (0.475), Gelsemium MIC (0.368), Rhustox MIC (0.207) and Baptisia MIC (0.784) against *Salmonella typhi*.

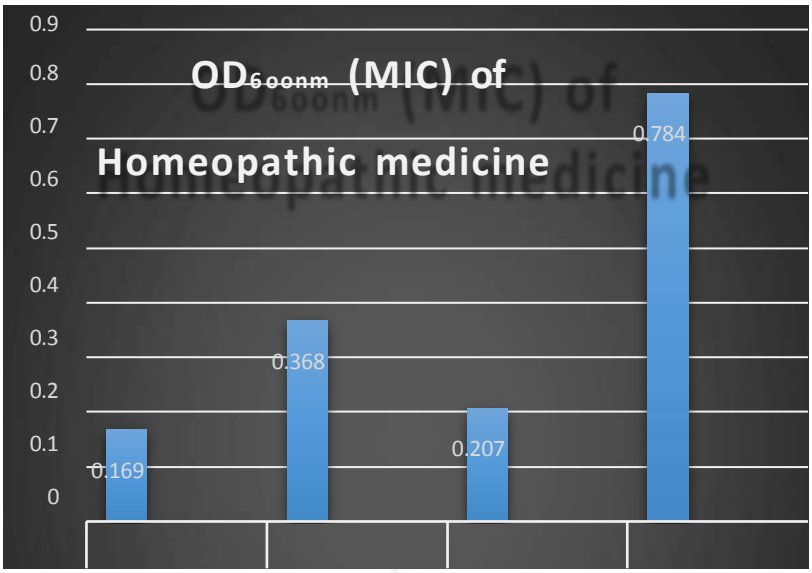


Figure: 3.11 OD_{600nm} (MIC) of Homeopathic medicine

Optical density (OD) is a measure of light absorb by microorganism at specific wavelength. The higher the optical density the more light absorb by microorganism.



Figure: 3.12 OD_{600nm} (MIC) of Homeopathic medicine

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Discussion:

With more than 21 million cases per year and 600,000 fatalities, typhoid disease constitutes a threat to world health. Population increase, urbanization, and problems with water access are most severe in developing nations. Typhoid's causative agent, *Salmonella typhi*, is becoming more difficult to treat with standard drugs. Studying the sensitivity and effectiveness of homoeopathy in combination with antibiotics involved isolating *S. typhi* from blood samples. The study examined the antibacterial properties of homoeopathic remedies on *S. typhi*, including Baptisia, Gelsemium, Belladonna, and Rhustox. Strong antibacterial activities and drug development potential were demonstrated by the investigation. Synergistic effects of homoeopathy and antibiotics were seen when used together to treat *S. typhi*. The lowest inhibitory doses (MIC) and maximum levels of inhibition were found in Gelsemium and Baptisia, demonstrating their potential as antimicrobials. Against *Pseudomonas aeruginosa*, ciprofloxacin was found to be extremely effective in a different investigation, whereas homoeopathic remedies only had a limited antibacterial effect.

The goal of the study was to determine whether homoeopathic remedies for *Salmonella typhi,* such as Baptisia, Gelsemium, Belladonna, and Rhustox, had any antibacterial properties. Inhibition zones against *S. typhi* were 10 mm and 15 mm for Cefixime and Ceftriaxone, respectively. With zones of inhibition ranging from 12 to 19 mm, homoeopathic medications shown susceptibility whereas Ciprofloxacin was ineffective. Gelsemium and Baptisia demonstrated potent inhibition and the best MIC (64 µg/ml), along with MBC (256 µg/ml), against *S. typhi*. Arora's prior research (2021) supported the effectiveness of homoeopathy in treating disease. Antibiotics' effect on microflora and bacteria's multidrug resistance were noticed (Khan 2014). This study demonstrated the superior antibacterial efficacy of homoeopathic treatment. The research highlighted homeopathy's effectiveness through antibacterial activity and its function in replicating fake sickness symptoms.

Herpes simplex virus types 1 and *2* are responsible for the disease, with *HSV-2* being largely responsible for genital herpes, claim Shinde *et al.* (2023). In vitro anti-inflammatory effects and the ability to treat herpes were demonstrated by the homoeopathic remedy Rhus Tox. Rhustox showed effective effects against typhoid in the current trial, with a synergistic effect (15 mm, FICI 2.039) and a 19 mm zone of inhibition. Rhustox may be effective against typhoid fever given that

its MIC and MBC against *Salmonella typhi* were 128 µg/ml and 256 µg/ml, respectively. The importance of individualized homoeopathic treatment in symptom relief and prompt recovery was highlighted by Umashankara *et al.* in their evaluation of the research from 2009 to 2022. Studies conducted in vitro and in vivo demonstrated the effectiveness of MIC-based homoeopathic therapy in combating pathogens like *Salmonella typhi.* There are gaps in the research, necessitating more testing to understand the efficacy and workings of homoeopathic therapy. The current study concentrated on hands-on activities, evaluating the antibacterial sensitivity of homoeopathic medicines (Baptisia, Gelsemium, Belladonna, and Rhustox) against *Salmonella typhi* utilizing disc diffusion method. The inhibition zones were 12, 15, 15, and 19 mm in size. In the context of typhoid, Gelsemium and Baptisia demonstrated considerable inhibition against *Salmonella typhi,* with effective MIC and MBC. FICI examined the interactions between homoeopathic remedies and antibiotics; Rhustox displayed indifference (FICI 2.039), Gelsemium displayed indifference (FICI 1.6), Belladonna synergy (FICI 0.266), and Baptisia antagonistic behavior (FICI 3.85). The study revealed that homoeopathy may be effective in treating bacteria like *Salmonella typhi* that are resistant to medication.

CONCLUSION

It is concluded from our study that selected homeopathic drugs such as Baptisia, Gelsemium, Belladonna and Rhustox have antibacterial activity against typhoid infection. When they used separately they showed the efficacy against typhoid pathogen was effective.

Combination of allopathic medicine with homeopathic drugs showed synergistic effects against *S. typhi.* All the selected allopathic drugs (5

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µg each of Cefixime and Ciprofloxacin, Azithromycin 15 µg and Ceftriaxone 30 µg) according to CLSI (2020) showed resistivity against *Salmonella typhi*. Our study revealved that combined used of antibiotics with homeopathic, or homeopathic separately could be useful in fighting against emerging drug resistant pathogens.

RECOMMENDATONS

- Proper care and preventive measures should be present for patients with typhoid bacterial infections.
- Investigate their ability to elicit immune responses, and optimize vaccine delivery systems to enhance immunogenicity and efficacy. In vitro and in vivo evaluations should be conducted to assess the immunological responses generated by vaccines loaded with homeopathic extract.
- To evaluate mode of action at molecular level.
- Conduct animal studies to assess the therapeutic efficacy of homeopathic drugs in vivo. Investigate their impact on microbial infections in animal models to validate their potential clinical applications.
- It is suggested to evaluate the antimicrobial activity of suggested homeopathic drugs like Arnica, Muriaticum Acidum, Bryonia Phosphorus, and Sulphur Album against typhoid fever.

REFERENCES

Andrews, J. M. (2001). Determination of minimum inhibitory concentrations. Journal of antimicrobial Chemotherapy, 48(suppl_1), 5-16.

Arora, G. R., & Goyal, A. (2021). Role of Homeopathic Genus Epidemicus in Epidemic and Pandemic Perspective.". *Advancements in Homeopathic Res*, 55-61.

Alikhan, N. F., Zhou, Z., Sergeant, M. J., & Achtman, M. (2018). A genomic overview of the population structure of Salmonella. *PLoS genetics*, *14*(4), e1007261.

Bulmer, D. M., Kharraz, L., Grant, A. J., Dean, P., Morgan, F. J., Karavolos, M. H., & Anjam Khan, C. M. (2012). The bacterial cytoskeleton modulates motility, type 3 secretion, and colonization in Salmonella. *PLoS pathogens*, *8*(1), e1002500.

Butt, M. H., Saleem, A., Javed, S. O., Ullah, I., Rehman, M. U., Islam, N., & Misbah, S. (2022). Rising XDR-typhoid fever cases in Pakistan: are we heading back to the pre-antibiotic era. *Frontiers in public health*, *9*, 794868.

Doble, A. C., Bulmer, D. M., Kharraz, L., Karavolos, M. H., & Khan, C. A. (2012). The function of the bacterial cytoskeleton in Salmonella pathogenesis. *Virulence*, *3*(5), 446-449.

Deb, D. (2021). A new explanation to homeopathy: analysis of the pharmacological property of homeopathic remedies. *TMR Theory and Hypothesis*, *4*(1), 445-454.

Ernst, E. (2016). *Homeopathy-The Undiluted Facts: Including a Comprehensive AZ Lexicon*. Springer.

Gupta, V., Kaur, M., Datta, P., & Chander, J. (2018). Chronic urinary carrier state due to Salmonella Typhi causing urinary tract infection in an immunocompetent healthy woman. *Tropical Doctor*, *48*(3), 236-238.

Grams, N. (2019). Homeopathy—where is the science? A current inventory on a pre-scientific artifact. EMBO reports, 20(3), e47761.

Hossen, F., Saha, O., Mukharjee, S. K., Khan, M. I. H., Amin, M. R., & Chowdhury, M. M. H. (2016). Evaluation of antimicrobial activity and determination of suitable method for antibiogram of some commercial homeopathic drugs. *World Journal of Pharmaceutical Research*, *5*(1), 240-249.

Jain, D. K. (2022). *Homeopathy: An Illusion of Effectiveness*. CRC Press.

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

Khan, C. M. (2014). The dynamic interactions between Salmonella and the microbiota, within the challenging niche of the gastrointestinal tract. International scholarly research notices, 2014.

Khanal, P. R., Satyal, D., Bhetwal, A., Maharjan, A., Shakya, S., Tandukar, S., & Parajuli, N. P.

(2017). Renaissance of Conventional First-Line Antibiotics in Salmonella enterica Clinical Isolates: Assessment of MICs for Therapeutic Antimicrobials in Enteric Fever Cases from Nepal. BioMed Research International, 2017(1), 2868143.

Kazmi, S. Y. (2022). The etymology of microbial nomenclature and the diseases these cause in a historical perspective. *Saudi Journal of Biological1 Sciences*, 103454.

Kuzniar, A. A. (2017). The Birth of Homeopathy out of the Spirit of Romanticism. University of Toronto Press.

Liu, Y., Moore, J. H., Kolling, G. L., McGrath, J. S., Papin, J. A., & Swami, N. S. (2020). Minimum bactericidal concentration of ciprofloxacin to Pseudomonas aeruginosa determined rapidly based on pyocyanin secretion. *Sensors and Actuators B: Chemical*, *312*, 127936.

Lianou, A., Nychas, G. J. E., & Koutsoumanis, K. P. (2017). Variability in the adaptive acid tolerance response phenotype of Salmonella enterica strains. *Food microbiology*, *62*, 99-105.

Parry, C. M. (2006). Epidemiological and clinical aspects of human typhoid fever. *Salmonella infections: Clinical, immunological and molecular aspects*, 1-18.

Sağlik, S., & Demir, Ş. (2022). care and spiritual social work on the axis of spirituality. *Current Research in Health Sciences*, 19.

Shinde, M. D., Patil, S. A., Mukherjee, A., & Nema, V. (2023). Revisiting the therapeutic potential of homeopathic medicine Rhus Tox for herpes simplex virus and inflammatory conditions. *Journal of Ayurveda and Integrative Medicine*, *14*(4), 100739.

Umashankara, C., Kunchirmanb, B. N., & Shindea, C. H. (2023). Homeopathic interventions against Salmonella typhi: A narrative, *Vol. 31 (2): 119-128*