
Assessment of Antibiofilm of Biofield Energy Treated *Serratia marcescens*

Mahendra Kumar Trivedi¹, Alice Branton¹, Dahryn Trivedi¹, Gopal Nayak¹, Mayank Gangwar², Snehasis Jana^{2,*}

¹Trivedi Global Inc., Henderson, NV, USA

²Trivedi Science Research Laboratory Pvt. Ltd., Bhopal, Madhya Pradesh, India

Email address:

publication@trivedisrl.com (S. Jana)

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Abstract: *Serratia marcescens* (*S. marcescens*) has become an important nosocomial pathogens and increased resistant isolates were reported. The current study evaluates the impact of an alternate energy medicine *i.e.* Mr. Trivedi's biofield energy treatment on *S. marcescens* for changes in sensitivity pattern of antimicrobial, biochemical characteristics, and biotype number. *S. marcescens* cells were procured from MicroBioLogics Inc., USA in sealed pack bearing the American Type Culture Collection (ATCC 13880) number and divided into two groups, Group (Gr.) I: control and Gr. II: treated. Gr. II was further subdivided into two sub-groups, Gr. IIA and Gr. IIB. Gr. IIA was analyzed on day 10, while Gr. IIB was stored and analyzed on day 159 (Study I). After retreatment on day 159, the sample (Study II) was divided into three separate tubes as first, second and third tube, which were analyzed on day 5, 10 and 15 respectively. All experimental parameters were studied using the automated MicroScan Walk-Away[®] system. Antimicrobial susceptibility results showed that 42.85% of tested antimicrobials results in altered sensitivity pattern, while decreased minimum inhibitory concentration values in 40.62% tested antimicrobials as compared to the control after biofield treatment on *S. marcescens*. The biochemical study showed that 12 out of 33 tested biochemicals (36.36%) were reported for alteration of biochemical reactions pattern as compared to the control. Biotype study showed an alteration in biotype number in all the experimental treated groups as compared to the control. These results suggested that biofield energy treatment has a significant impact on *S. marcescens*. Overall, it is expected that Mr. Trivedi's biofield energy treatment as an integrative medicine could be better therapy approach in near future.

Keywords: *Serratia marcescens*, Energy Healing, Biofield, Antimicrobial Susceptibility, Biochemical Reaction, Biotype

1. Introduction

Serratia marcescens (*S. marcescens*), is a Gram-negative bacillus, and member of the genus *Serratia* is classified as the member of *Enterobacteriaceae*. Most of the reported species of *Serratia* are associated with hospital acquired human infection from the last two decades [1]. *Serratia* spp. are motile, non-endospore forming rods shaped usually isolated from bloodstream and wound sites or from respiratory and urinary sites. Most common and best known clinical species are *S. marcescens*, *S. liquefaciens* and *S. odorifera* [2]. Among them, *S. marcescens* is the most common and the most important human pathogen in every conceivable kind of infections such as respiratory tract infection, urinary tract infection (UTI), septicaemia,

meningitis and wound infections [3-5]. It is also reported that *S. marcescens* causes ocular infections, and show high incidence of contact lens-related keratitis [6]. However, it is also associated with infective endocarditis, which usually affects the left side of the heart. Hospital acquired endocarditis due to *S. marcescens* is usually an exogenous infection related with cardiac surgery [7]. It is noticeable that the drug resistance pattern in *Serratia* spp. may vary even within a short period, due to continuous use of antibiotics. Besides, due to the several associated side effects of antibiotics, the use of integrative approaches to health and wellness has grown within hospital care settings. Researchers are currently exploring the potential benefits of integrative energy medicine in a variety of situations to promote the health and wellness of individuals across the world. The

practice of energy healing therapies involve an alteration in consciousness states including metaphysical, magnetic, psychological, and social processes, which produce a beneficial effect upon the energy field of the patient.

The energy medicine is one of the major categories of complementary and alternative medicine (CAM). Energy healing therapies (putative energy fields) are very popular in health care systems [8], and are defined under the subcategory of energy therapies by National Center for Complementary and Alternative Medicine (NCCAM) [9]. These therapies include human energy therapies, bioelectromagnetic therapy, magnet therapy, acupuncture, electrodermal therapy, homeopathy, and phototherapy that include low-level energy field interactions. The possible impact of biofield energy may be as it changes the conformation of biomolecules, may act directly on molecular structure, or it may transfer bioinformation *via* small energy signals [10]. Biofield treatment refers to a group of energy therapy that affects people's health and wellbeing by interacting with their biofield [11]. The human body emits the electromagnetic waves in the form of bio-photons and moving electric charged particles (ions, cell, molecule etc.) surround the body produce magnetic fields. Thus, human has the ability to harness the energy from the environment or universe and can transmit into any living or nonliving object(s) around the Globe. Specific environmental frequencies can be absorbed by biomolecules, and responding into the useful way that is called biofield energy and the process is known as biofield treatment. Mr. Trivedi's unique biofield energy is also known as The Trivedi effect[®], which has been effectively reported in the field of materials science research [12-14], agricultural research [15-18], and microbiology research [19, 20].

Considering the importance of increasing integrative medicine therapies in health care settings, and clinical importance of *S. marcescens*, the impact of biofield energy therapy was evaluated with respect to antibiogram, biochemical study, and biotype number.

2. Materials and Methods

S. marcescens, American Type Culture Collection (ATCC 13880) strain was procured from MicroBioLogics, Inc., USA and stored in laboratory conditions for further use. Antimicrobials and biochemicals tested against control and treated *S. marcescens* were procured from Sigma-Aldrich (MA, USA). The experimental studied parameters were estimated with the help of MicroScan Walk-Away[®] (Dade Behring Inc., West Sacramento, CA, USA) using Negative Breakpoint Combo 30 (NBPC 30) panel with respect to the control group (Gr.).

2.1. Inoculum Preparation

The turbidity standard technique using direct inoculation of revived and lyophilized strain of *S. marcescens* was used. Using a sterile wooden applicator stick or bacteriological loop, the surfaces of 4-5 large or 5-10 small morphologically

similar cultures were touched for well-isolated colonies from an 18-24 hour non-inhibitory agar plate. Further, *S. marcescens* cells were emulsified in 3 mL of inoculum water to an equivalent of a 0.5 McFarland barium sulfate turbidity standard. 100 μ L of the standardized suspension was pipetted into 25 mL of inoculum water using pluronic and inverted 8-10 times.

2.2. Experimental Design

The impact of biofield treatment on tested bacterium *S. marcescens* was evaluated in two groups.

Group I: ATCC strain in lyophilized state was considered as control. No treatment was given and analyzed for antimicrobial sensitivity, biochemical reactions and biotype number as per the standard protocol.

Group II: The lyophilized state sample of ATCC strain was divided into two parts named as Gr. IIA and Gr. IIB. Both the groups of ATCC strain of *S. marcescens* in lyophilized state were subjected to Mr. Trivedi's unique biofield treatment. Gr. IIA was analyzed on day 10 for antimicrobial sensitivity, biochemical reactions and biotype number as per the standard protocol, while Gr. IIB sample was stored in lyophilized state for 159 days at -70°C . Gr. IIB was further sub-divided in two separate parts named as Gr. IIB - Study I and Gr. IIB - Study II.

Group IIB - Study I.

After 159 days, the sample was revived and tested for antimicrobial sensitivity, MIC, biochemical reactions and biotyping were performed as per the standard protocol.

Group IIB - Study II.

The stored strain was revived from -70°C and again provided the Mr. Trivedi's biofield treatment (re-treatment) on day 159. After biofield retreatment, the sample was sub-cultured into three separate tubes on three different days (Day 0, Day 5 and Day 10) and analyzed keeping the main treated tube aside. Each sample was analyzed after 5 days of its sub-culturing.

2.3. Biofield Treatment Strategy

The lyophilized sample of *S. marcescens* was subjected to Mr. Trivedi's biofield energy treatment (first treatment) which was analyzed on day 10 (Gr. IIA), followed by retreatment after storing for 159 days in revived state (Gr. IIB, Study II). The first part was considered as control, no treatment was given to this part. The treated samples were handed over to Mr. Trivedi for biofield energy treatment under standard laboratory conditions. Mr. Trivedi provided the biofield treatment through his energy transmission process, which includes bioenergy emission to second sets of samples without touching. After treatment, sample was handed over in the same condition and stored at standard conditions as per the standard experimental protocol. An optimum precautionary measure was taken while evaluating the antibiogram analysis throughout the experiments. The differences in parameters before and after the treatment were noted and compared [21].

2.4. Antimicrobial Susceptibility Test

Investigation of antimicrobial susceptibility of *S. marcescens* was carried out with the help of automated instrument, MicroScan Walk-Away[®] using NBPC 30 panel. The panel can be stored at 2 to -25°C for analysis. The panel was allowed to equilibrate to room temperature prior to rehydration. All opened panels were used on the same day. The tests carried out on MicroScan were miniaturized of the broth dilution susceptibility test that has been dehydrated. Briefly, 0.1 mL of the standardized suspension of *S. marcescens* was pipetted into 25 mL of inoculum water using pluronic, inverted 8 to 10 times and inoculated, rehydrated, and then subjected to incubation for 16 hours at 35°C. Rehydration and inoculation were performed using the RENOK[®] system with inoculators-D (B1013-4). 25 mL of standardized inoculum suspension was poured into inoculum tray. The detailed experimental procedure and conditions were followed as per the manufacturer's instructions. The antimicrobial susceptibility pattern (S: Susceptible, R: Resistant; I: Intermediate, and IB; Inducible β -lactamases) and MIC values were determined by observing the lowest antimicrobial concentration showing inhibition of growth [21].

2.5. Biochemical Reaction Studies

The biochemical reactions of *S. marcescens* were performed using photometric or fluorogenic reader. On the basis of nature of bacilli (Gram-negative or Gram-positive), computerized reports were generated using conventional panels, which utilizes the photometric reader. Before commencing the experiment, the NBPC 30 panel was first incubated and read on the MicroScan Walkaway system. After evaluating the experimental reading on the Walkaway system, the NBPC 30 panel was removed from system and recorded on the Biomic system within 1 hour. The instrument consists of a database associated with collective information, which was required to identify the microbes with respect to group, genera, or species of the family. Detailed experimental

procedure was followed as per manufacturer-recommended instructions [21].

2.6. Identification of Organism by Biotype Number

The biotype number of *S. marcescens* was determined on MicroScan Walk-Away[®] processed panel data report with the help of biochemical reactions data [21].

3. Results and Discussion

3.1. Antimicrobial Susceptibility Test

Antimicrobial sensitivity result and MIC values of tested antimicrobials after biofield treatment on *S. marcescens* are summarized in Table 1 and 2, respectively. All the values presented are compared with the control group (Gr. I). Antimicrobials such as amikacin, cefepime, tobramycin, and gentamicin were reported for improved sensitivity *i.e.* resistance (R) in control group to susceptible (S) in all the experimental tested groups after biofield treatment on *S. marcescens*. Further, aztreonam, cefotaxime, cefotetan, and ceftazidime were reported for improved sensitivity from resistance (R) to inducible β -lactamases (IB), while ceftriaxone showed alter sensitivity pattern from intermediate (I) to inducible β -lactamases (IB) in all the experimental treated groups after biofield treatment. Biofield treated *S. marcescens* showed an improved sensitivity pattern of ceftazidime from R to IB in all the experimental groups except Gr. II, day 10, as no change was observed in Gr. II as compared to the control (Gr I). The sensitivity pattern of chloramphenicol was altered and reported as R to I in all the experimental treated groups except Gr. IIB (study I), day 15. Ticarcillin/k-clavulanate was reported with altered sensitivity as IB to I, only in Gr, IIB (Study II), day 10 as compared to control. Out of 32 tested antimicrobials, 12 antimicrobials were reported for altered sensitivity pattern after biofield treatment in *S. marcescens*. Rest of the antimicrobials did not report any change in their sensitivity pattern after biofield energy treatment.

Table 1. Effect of biofield treatment on antimicrobial susceptibility pattern of tested antimicrobials against *Serratia marcescens*.

S. No.	Antimicrobial	Gr. I	Gr. IIA	Gr. IIB, Study I	Gr. IIB, Study II		
		Control	Day 10	Day 159	Day + 5	Day + 10	Day + 15
1	Amikacin	R	S	S	S	S	S
2	Amoxicillin/k-clavulanate	R	R	R	R	R	R
3	Ampicillin/sulbactam	R	R	R	R	R	R
4	Ampicillin	R	R	R	R	R	R
5	Aztreonam	R	IB	IB	IB	IB	IB
6	Cefazolin	R	R	R	R	R	R
7	Cefepime	R	S	S	S	S	S
8	Cefotaxime	R	IB	IB	IB	IB	IB
9	Cefotetan	R	IB	IB	IB	IB	IB
10	Ceftazidime	R	R	IB	IB	IB	IB
11	Ceftazidime	R	IB	IB	IB	IB	IB
12	Ceftriaxone	I	IB	IB	IB	IB	IB
13	Cefuroxime	R	R	R	R	R	R
14	Cephalothin	R	R	R	R	R	R
15	Chloramphenicol	R	I	I	I	I	R
16	Ciprofloxacin	S	S	S	S	S	S

S. No.	Antimicrobial	Gr. I	Gr. IIA	Gr. IIB, Study I	Gr. IIB, Study II		
		Control	Day 10	Day 159	Day + 5	Day + 10	Day + 15
17	Gatifloxacin	S	S	S	S	S	S
18	Gentamicin	R	S	S	S	S	S
19	Imipenem	S	S	S	S	S	S
20	Levofloxacin	S	S	S	S	S	S
21	Meropenem	S	S	S	S	S	S
22	Moxifloxacin	S	S	S	S	S	S
23	Piperacillin/tazobactam	IB	IB	IB	IB	IB	IB
24	Piperacillin	IB	IB	IB	IB	IB	IB
25	Tetracycline	R	R	R	R	R	R
26	Ticarcillin/k-clavulanate	IB	IB	IB	IB	I	IB
27	Tobramycin	R	S	S	S	S	S
28	Trimethoprim/ Sulfamethoxazole	S	S	S	S	S	S

R: Resistant; I: Intermediate; S: Susceptible; IB: Inducible β -lactamases; Gr: Group.

Table 2. Minimum inhibitory concentration (MIC) of tested antimicrobials against *Serratia marcescens*.

S. No.	Antimicrobial	Gr. I	Gr. IIA	Gr. IIB, Study I	Gr. IIB, Study II		
		Control	Day 10	Day 159	Day + 5	Day + 10	Day + 15
1	Amikacin	>32	\leq 16	\leq 16	\leq 16	\leq 16	\leq 16
2	Amoxicillin/k-clavulanate	>16/8	>16/8	>16/8	>16/8	>16/8	>16/8
3	Ampicillin/sulbactam	>16/8	>16/8	>16/8	>16/8	>16/8	>16/8
4	Ampicillin	>16	>16	>16	>16	>16	>16
5	Aztreonam	>16	\leq 8	\leq 8	\leq 8	\leq 8	\leq 8
6	Cefazolin	>16	>16	>16	>16	>16	>16
7	Cefepime	>16	\leq 8	\leq 8	\leq 8	\leq 8	\leq 8
8	Cefotaxime	>32	\leq 8	\leq 8	\leq 8	\leq 8	\leq 8
9	Cefotetan	>32	\leq 16	\leq 16	\leq 16	\leq 16	\leq 16
10	Cefoxitin	>16	>16	\leq 8	\leq 8	\leq 8	\leq 8
11	Ceftazidime	>16	\leq 8	\leq 8	\leq 8	\leq 8	\leq 8
12	Ceftriaxone	32	\leq 8	\leq 8	\leq 8	\leq 8	\leq 8
13	Cefuroxime	>16	>16	>16	>16	>16	>16
14	Cephalothin	>16	>16	>16	>16	>16	>16
15	Chloramphenicol	>16	16	16	16	16	>16
16	Ciprofloxacin	\leq 1	\leq 1	\leq 1	\leq 1	\leq 1	\leq 1
17	ESBL-a Scrn	>4	\leq 4	\leq 4	\leq 4	>4	\leq 4
18	ESBL-b Scrn	>1	\leq 1	\leq 1	\leq 1	\leq 1	\leq 1
19	Gatifloxacin	\leq 2	\leq 2	\leq 2	\leq 2	\leq 2	\leq 2
20	Gentamicin	>8	\leq 4	\leq 4	\leq 4	\leq 4	\leq 4
21	Imipenem	\leq 4	\leq 4	\leq 4	\leq 4	\leq 4	\leq 4
22	Levofloxacin	\leq 2	\leq 2	\leq 2	\leq 2	\leq 2	\leq 2
23	Meropenem	\leq 4	\leq 4	\leq 4	\leq 4	\leq 4	\leq 4
24	Moxifloxacin	\leq 2	\leq 2	\leq 2	\leq 2	\leq 2	\leq 2
25	Nitrofurantoin	>64	>64	>64	>64	>64	>64
26	Norfloxacin	\leq 4	\leq 4	\leq 4	\leq 4	\leq 4	\leq 4
27	Piperacillin/tazobactam	\leq 16	\leq 16	\leq 16	\leq 16	\leq 16	\leq 16
28	Piperacillin	\leq 16	\leq 16	\leq 16	\leq 16	\leq 16	\leq 16
29	Tetracycline	>8	>8	>8	>8	>8	>8
30	Ticarcillin/k-clavulanate	\leq 16	\leq 16	\leq 16	\leq 16	64	\leq 16
31	Tobramycin	>8	\leq 4	\leq 4	\leq 4	\leq 4	\leq 4
32	Trimethoprim/Sulfamethoxazole	\leq 2/38	\leq 2/38	\leq 2/38	\leq 2/38	\leq 2/38	\leq 2/38

MIC values are presented in $\mu\text{g/mL}$; Gr.: Group; ESBL-a, b Scrn: Extended spectrum beta-lactamase a, b Screen.

The MIC results of tested antimicrobials against control and biofield treated *S. marcescens* were presented in Table 2. About four-fold decrease in MIC value were reported in case of cefotaxime (>32 to \leq 8 $\mu\text{g/mL}$) and ceftriaxone (32 to \leq 8 $\mu\text{g/mL}$) in all the experimental treated groups as

compared with the control. Approximately, two-fold decrease in MIC values were reported in case of amikacin and cefotetan (>32 to \leq 16 $\mu\text{g/mL}$), aztreonam, cefepime, and ceftazidime (>16 to \leq 8 $\mu\text{g/mL}$), and gentamicin and tobramycin (>8 to \leq 4 $\mu\text{g/mL}$) as compared to the control

group. The decrease in MIC values of antimicrobial cefoxitin (>16 to ≤ 8 $\mu\text{g/mL}$) was reported in all the experimental treated groups except in Gr. II, on day 10 as compared to the control. Biofield treated *S. marcescens* reported with slight decrease in MIC values in case of chloramphenicol, except in Gr. IIB, Study II, on day 15. Extended-spectrum β -lactamases (ESBL-b Scrn) was reported with slight decrease in MIC value in all the treated groups, while ESBL-a Scrn also showed slight decrease in MIC in all the treated groups except in Gr. IIB, study II, day 10 as compared with the control. Only ticarcillin/k-clavulanate was reported with around four-fold increase in MIC (≤ 16 to 64 $\mu\text{g/mL}$) in Gr. IIB, study II, on day 10 as compared to the control, while rest of the groups were reported with same MIC value as in control group (Gr. I). Out of 32 tested antimicrobials, 14 antimicrobials were reported for altered MIC values after biofield treatment in *S. marcescens* as compared to the control. Rest of the antimicrobials did not report any change in MIC values after biofield treatment.

Many recent reports analyzed and described the hospital outbreaks of *S. marcescens* [22]. Natural resistance had reported in *S. marcescens* against ampicillin, macrolides, and first-generation cephalosporins. Cephalosporins and penicillins are the class of antibiotics which are mostly reported with resistance against *S. marcescens* due to chromosomal-mediated β -lactamase production. Increasing number of clinical isolates of aminoglycoside resistant *S. marcescens* were highly reported [23]. This bacterium plays an important role as an opportunistic pathogen among immunocompromised hosts [24]. According to the report of Craven *et al.* increasing incidence of amikacin resistance among clinical isolates of *S. marcescens*, could limit the usefulness of antibiotic treatment therapy [25]. Experimental control results were well supported with literature, as natural resistance in amikacin. The biofield energy treatment on *S. marcescens* results an improved sensitivity pattern of amikacin, with decreased MIC value in all the experimental treated groups. Besides, the resistance nature of amikacin was changed to susceptible, hence, it could be used as an alternate treatment approach in complementary and alternate medicine against *S. marcescens* infections in near future. However, cefepime is the preferred drug and useful in patients with nosocomial infections caused by aerobic Gram-negative bacilli, even effective against microbes, which are resistant to most of the third-generation cephalosporins and gentamicin [26, 27]. Biofield treated *S. marcescens* results in improved antimicrobial sensitivity of cefepime and gentamicin from resistant to susceptible, while decreased the MIC value as compared to the control. Cefepime is an extended-spectrum cephalosporin, its extended activity results from its low affinity for type I β -lactamase and has the ability to pass through porin channels [28]. Biofield energy treatment might increase the ability of cefepime to cross the porin channel and inhibit the growth of *S. marcescens*.

Basic mechanism behind aminoglycosides against

microbes are, either through the alteration of the cell envelop, which prevent drug uptake, or by modifying the drug moiety by inactivation enzymes [29]. Gentamicin resistance is generally caused by acetyltransferase AAC (3)-1, an inactivating enzyme mediated by plasmids [30]. Biofield treatment might transfer the energy and inhibits the enzyme activities of *S. marcescens* responsible for resistance pattern against gentamicin. Results reported the alteration of the sensitivity pattern of gentamicin from resistance to susceptible, with decreased MIC values by about two-fold in all the experimental treated groups after biofield treatment in *S. marcescens* as compared to the control. Similarly, tobramycin an aminoglycosides has been reported for its resistance pattern due to the presence of combination of *aac(6')-Ia*, *aac(6')-Ic*, and *aac(6')-Ib* genes [31]. Biofield energy treatment might act at enzymatic or genetic level, which may improve the susceptibility pattern and decreased the MIC of tobramycin against *S. marcescens*.

Studies have been reported by many researchers using normal/cancer cells as the target of biofield treatments and reported associated intracellular level changes [32]. Another study showed an influence on the *in-vitro* growth of bacteria cultures [33]. The experimental design and results suggest that an alterations might occur even after storage of sample at -70°C for 159 days. It suggests that Mr. Trivedi's unique biofield energy treatment has the ability to alter the antimicrobial sensitivity in treated *S. marcescens* even in the lyophilized storage condition for a long duration. Based on the above findings the antimicrobials those are resistance now converted into susceptible after biofield energy treatment. Antimicrobial interactions with *S. marcescens* might alter the ligand-receptor protein that results in different phenotypic characteristics [34]. Our research group has also reported significantly improved the sensitivity pattern of antibiotics after biofield treatment on pathogenic microbes [19, 20], and inhibit the growth of cancer cells [35]. The results are very well supported with previous published literature. Based on these results, it is expected that biofield energy treatment has the scope to be an alternative approach beside existing antimicrobial therapy in near future.

3.2. Biochemical Reactions Studies

Biochemical reactions determine the presence of various enzymes which were used in identifying the microorganisms. Rapid identification can be accomplished with specific set of biochemical tests, which is the most common approach for determining the genus and species of an organism. This will define the ability of microorganism to grow and survive in the presence of certain inhibitors used in various biochemical reactions [36]. Results obtained from different set of biochemical reactions studies for differentiation of *S. marcescens* after biofield treatment are illustrated in Table 3. Experimental results showed negative reaction *i.e.* (+) positive to (-) negative in case of arabinose, arginine, hydrogen sulfide, kanamycin, malonate, melibiose, raffinose,

rhamnose, tobramycin, and urea in all the experimental treated groups as compared with the control group. The biochemicals galactosidase and adonitol also showed negative reaction only in Gr. IIB, Study II, on day 10, as compared to the control. The rest of the tested biochemicals

did not show any alteration in biochemical reaction with respect to the control. Overall, 12 out of 33 tested biochemicals (36.36%) were reported for altered biochemical reactions pattern as compared to the control.

Table 3. Effect of biofield treatment on biochemical reactions of *Serratia marcescens*.

S. No.	Code	Biochemical	Type of Response					
			Gr. I	Gr. IIA	Gr. IIB, Study I	Gr. IIB, Study II		
			Control	Day 10	Day 159	Day + 5	Day + 10	Day + 15
1	ACE	Acetamide	-	-	-	-	-	-
2	ADO	Adonitol	+	+	+	+	-	+
3	ARA	Arabinose	+	-	-	-	-	-
4	ARG	Arginine	+	-	-	-	-	-
5	CET	Cetrimide	-	-	-	-	-	-
6	CF8	Cephalothin	+	+	+	+	+	+
7	CIT	Citrate	+	+	+	+	+	+
8	CL4	Colistin	+	+	+	+	+	+
9	ESC	Esculin hydrolysis	+	+	+	+	+	+
10	FD64	Nitrofurantoin	+	+	+	+	+	+
11	GLU	Glucose	+	+	+	+	+	+
12	H ₂ S	Hydrogen sulfide	+	-	-	-	-	-
13	IND	Indole	-	-	-	-	-	-
14	INO	Inositol	-	-	-	-	-	+
15	K4	Kanamycin	+	-	-	-	-	-
16	LYS	Lysine	+	+	+	+	+	+
17	MAL	Malonate	+	-	-	-	-	-
18	MEL	Melibiose	+	-	-	-	-	-
19	NIT	Nitrate	+	+	+	+	+	+
20	OF/G	Oxidation-fermentation/glucose	+	+	+	+	+	+
21	ONPG	Galactosidase	+	+	+	+	-	+
22	ORN	Ornithine	+	+	+	+	+	+
23	OXI	Oxidase	-	-	-	-	-	-
24	P4	Penicillin	+	+	+	+	+	+
25	RAF	Raffinose	+	-	-	-	-	-
26	RHA	Rhamnose	+	-	-	-	-	-
27	SOR	Sorbitol	+	+	+	+	+	+
28	SUC	Sucrose	+	+	+	+	+	+
29	TAR	Tartrate	-	-	-	-	-	-
30	TDA	Tryptophan deaminase	-	-	-	-	-	-
31	TO4	Tobramycin	+	-	-	-	-	-
32	URE	Urea	+	-	-	-	-	-
33	VP	Voges-Proskauer	+	+	+	+	+	+

- : negative; +: positive; Gr.: Group.

Basic biochemical characteristics of *S. marcescens* include negative for indole production, due to the extraction of cell pigment into the upper organic layer. Further, *S. marcescens* not only ferments glucose to acid, but it also produces gas, which can be observed as bubble in the Durham tube, hence give positive reaction in glucose, sucrose, and sorbitol. It has the ability to reduce nitrate to nitrite, hence nitrate positive test. Lysine, ornithine, Voges-

Proskauer, urea, and citrate are some other characteristics positive reactions biochemical test, while indole and oxidase are the negative reaction test of *S. marcescens*. All the above biochemical reactions in control group are well supported with literature data [37].

3.3. Identification of Organism by Biotype Number

S. marcescens was further identified based on the

database associated with collective information of conventional biochemical characters. The biotype number of particular organism was evaluated after interpreting the results of the biochemical reactions. The biotype number then led to the particular organism identification. In this experiment, biotyping was performed using an automated system, and results showed a change in biotype number (7020 5356) in Gr. IIA (on day 10), Gr. IIB (Study I, on day 159), and Gr. IIB (Study II, on day 5 and 15) with red pigment as characteristic features as compared to the control Gr. I (7736 7376). Gr. IIB, Study II was also

reported for altered biotype number as 7000 5346, on day 10 as compared to the control Gr. I (7736 7376) (Table 4) with red pigment as characteristic features. The alteration in species was not reported in any of the experimental treated groups after biofield treatment as compared to the control. This change of biotype number may be due to the alteration of some enzymatic reactions under the influence of biofield energy treatment. Our research group recently reported the impact of biofield energy treatment on pathogenic microbes that results in altered biotype number [20].

Table 4. Effect of biofield treatment on biotype number of *Serratia marcescens*.

Feature	Gr. I	Gr. IIA	Gr. IIB, Study I	Gr. IIB, Study II		
	Control	Day 10	Day 159	Day + 5	Day + 10	Day + 15
Biotype number	77367376 (Very rare biotype)	70205356	70205356	70205356	70005346	70205356
Organism identification	<i>S. marcescens</i>	<i>S. marcescens</i>	<i>S. marcescens</i>	<i>S. marcescens</i>	<i>S. marcescens</i>	<i>S. marcescens</i>

4. Conclusions

In general, bioenergy healing therapy is an area, often neglected by mainstream medicine and research, however it may result as a complementary and alternate medicine in a cost effective manner. Antimicrobial sensitivity results reports an improved sensitivity and decreased MIC values (two to four fold) of antimicrobials such as amikacin, aztreonam, cefepime, cefotaxime, cefotetan, cefoxitin, ceftazidime, gentamicin, tobramycin, and chloramphenicol as compared to the control. The results suggest some enzymatic/genetic alterations which may suppress the enzymes responsible for resistance pattern of antimicrobials. Additionally, the enzymatic alterations were reported in biochemical reaction tests, which showed changes in 12 out of 33 tested biochemicals. Further, the biotyping results an alteration in the biotype numbers in all the experimental treated groups were assessed with respect to the control. Thus, it can be concluded that Mr. Trivedi's unique biofield energy treatment could be applied to alter the antimicrobials sensitivity pattern, which could be used as an alternate treatment approach and as an energy medicine in the near future.

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Abbreviations

NCCAM: National Center for Complementary and Alternative Medicine; CAM: Complementary and Alternative Medicine; ATCC: American Type Culture

Collection; NBPC 30: Negative Breakpoint Combo 30; MIC: Minimum Inhibitory Concentration.

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