

Muslim Prayer Movements as an Alternative Therapy in the Treatment of Erectile Dysfunction: A Preliminary Study

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Abstract. [Purpose] Our objective was to assess the effect of *salat* and mimicking *salat* movements and postures on subjects with erectile dysfunction. [Methods] Ten volunteers were recruited in this study. Subjects who were Muslims (Group I) were asked to perform their daily *salat* and a new intervention of an additional 12 movement cycles of *salat* for three sessions a week. Non-Muslim subjects (Group II) were taught to mimic *salat* movements, and were asked to perform a total of 12 movement cycles without reading the recitation for three sessions a week. An International Index for Erectile Function 5 (IIEF-5) questionnaire was given to the subjects before and after the intervention of performing *salat* or mimicking *salat* movements and postures. A nocturnal electrobioimpedance volume assessment (NEVA) device was used to measure the nocturnal penile tumescence (NPT) parameters over two consecutive nights. A nonparametric test was conducted to find the significant NPT parameters. [Results] The results showed that all measured parameters improved significantly, with the largest change observed in the maximum percent volumetric change over the baseline (from 138 to 222%). [Conclusion] This preliminary study suggests that the alternative approach of *salat* and mimicking *salat* movements and postures, may have beneficial effects for ED patients.

Key words: Erectile dysfunction, Penile erection, Religion

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INTRODUCTION

Erectile Dysfunction (ED) is a medical condition defined as the inability to attain or maintain a satisfactory erection for sexual intercourse¹⁾, and commonly classified as psychogenic, organic, or mixed psychogenic and organic²⁾. In 1998, the National Population and Family Development Board of Malaysia and the New England Research Institutes from the USA carried out a cross-national prevalence study on ED, and found that the ED prevalence rate was 16% for individuals aged 40 years and above³⁾. In addition, the age-adjusted overall prevalence of ED (mild, moderate and severe) in a study conducted by Pfizer Malaysia was 62.1% in Malaysia⁴⁾, while a recent study reported⁵⁾, using the International Index for Erectile Function 5 (IIEF-5), that the prevalence of ED increased to 69% (30% mild ED, 16% moderate ED, and 23% severe ED). A meta-analysis in the Asian population found pooled random effect age-specific prevalence rates for ED of 15.1%, 29.6%, 40.6%, 54.3%, and 70% for the age groups of 20–29, 30–39, 40–49, 50–59 and 60–69 years, respectively⁶⁾, which also indicates that incidence of ED increases significantly with age^{7–10)}. ED

also has a strong association with diabetes types 1 and 2, ischemic heart disease, hypertension and hypercholesterolaemia^{10–19)}. Additional risk factors that have been identified include smoking (risk increased with duration of smoking, both in current and former smokers), alcohol, Peyronie's disease, neurogenic disorders, and depression^{10–12, 20–23)}.

Nocturnal penile tumescence (NPT) is routinely considered and employed in evaluation and proposition of appropriate management of patients with ED. Several tools have been commonly employed to evaluate penile tumescence during sleep, including the stamp test¹³⁾, snap gauge¹⁴⁾, Rigi scan²⁴⁾, and nocturnal electrobioimpedance volume assessment (NEVA)^{25, 26)}. The NEVA measurement has been validated in a reference population with no history of ED²⁷⁾ and ED patients^{25, 26, 28)}. The International Index of Erectile Dysfunction (IIEF) was used to determine the degree of ED.

There are many options available for ED treatment including psychosexual counselling, PDE5 inhibitor, oral medication, vacuum devices, intracavernous injection therapy, vascular surgery and the use of penile prosthetic implants²⁹⁾. The most common oral medication used is PDE5 inhibitor, and is the first line of treatment in most patients with ED.

Nevertheless, one of the obstacles in managing ED pa-

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tients in Malaysia is the cost of these treatments. Since there is no financial reimbursement in treatment of ED in the Malaysian health-care system, the majority of patients without personal healthcare insurance generally do not seek treatment. In addition, based on the feedback of the patients seen in the clinical practice of one of the authors, many patients chose not to continue the prescribed treatment after some time, mainly due the cost involved.

On the other hand, physical exercise therapy, particularly involving pelvic floor muscles, has been shown to provide beneficial effects on ED¹²⁻¹⁴, thus providing complementary noninvasive methods that are easy to perform, painless and inexpensive. Thus, it is of particular interest to investigate the possibility of beneficial effects to be gained from performing alternative physical movements that mimic pelvic floor exercises for ED patients, as part of the treatment regime. In this pilot study, Muslim prayer (termed *salat* in Arabic) movements were selected, since they involve physical movements and act as a slow moderate exercise, and the majority of the Malaysian population are Muslims. It has previously been shown that *salat* movements, in addition to improving physical fitness^{26, 30-36}, cardiac blood-flow³⁷ and psychological well-being³⁸, result in activation of the pelvic floor muscles and were proven to be an effective form of pelvic floor exercise^{26, 27, 39}. The effect that they had on selected Malaysian volunteers was measured using the NEVA device and the IIEF-5.

SUBJECTS AND METHODS

The study protocol was approved by the ethics committees of the Hospital Universiti Kebangsaan Malaysia (HUKM) (Ethics code FF-006-2007) for recruiting Muslim subjects and the University of Malaya Medical Centre (UMMC) (Ethics no 672.16) for recruiting both Muslim and non-Muslim subjects.

Ten ED subjects (seven Muslims and three non-Muslim) were recruited for this pilot study. The subjects were recruited from patients attending the ED clinic at the Division of Urology, University of Malaya Medical Centre, Kuala Lumpur, Malaysia, and from patients at the Hospital Universiti Kebangsaan Malaysia (HUKM). A detailed subject history was taken, and a clinical examination was performed in all subjects. The subjects also answered a self-administered IIEF questionnaire. All subjects had an IIEF score of less than 21 and were previously on a phosphodi-

esterase-5 (PDE5) inhibitor treatment. Written consent was obtained from all the subjects. Subjects were also divided based on their religious affiliation (Muslims and non-Muslims) to investigate its relevancy on the obtained results.

The NEVA device system (UroMetrics, Inc., St. Paul, MN, USA) used in the study was based on the concept of measuring bioimpedance and nocturnal penile tumescence. This device is categorized as Class II according to the IEC classification, and has been clinically proven to be safe. The NEVA system determines changes in the penile volume, length and area by measuring the impedance within the penis, using alternating current (AC) of 150 µA at a frequency of 5 kHz delivered via an electrode attached to the subject's hip. The baseline nocturnal penile tumescence (NPT) measurement was obtained for two consecutive days. Measurement was performed from when the patient fell asleep until the patient woke up in the morning. Measurement was conducted on two consecutive nights³², before and after the period of intervention, with the average measurements taken as the baseline and intervention measurements, respectively. The IIEF questionnaire was also given to the ED subjects before and after the intervention.

Each of the subjects was briefed on the complete set of physical movements required in the performance of *salat* (Fig. 1). Practice sessions were held prior to the commencement of the intervention period, to ensure the movements were performed uniformly and consistently. Of particular importance is the period of time in performing each of the movement types; the movements are variable in length, ranging between 6 to 60 seconds.

As shown in Fig. 1, each movement cycle of the prayer consists of standing, bowing, prostration, and sitting. The subjects were required to perform three sessions per week for a duration of 4 months, consisting of 12 cycles of movements in each session. Group II consisted of the non-Muslim subjects mimicking *salat* movements and postures without the recitation. Group I consisted of Muslim subjects. For Muslim subjects, this was a new intervention for them because these sessions were conducted in addition to their daily *salat*. In their daily *salat*, they prayed 5 times per day, and 2 to 5 movement cycles were performed in each prayer session. The additional *salat* acted as a slow moderate exercise and consisted of 12 continuous movement cycles of prayer that took approximately 30 to 36 minutes. The time required to complete one cycle of *salat* movements was approximately 3 minutes.

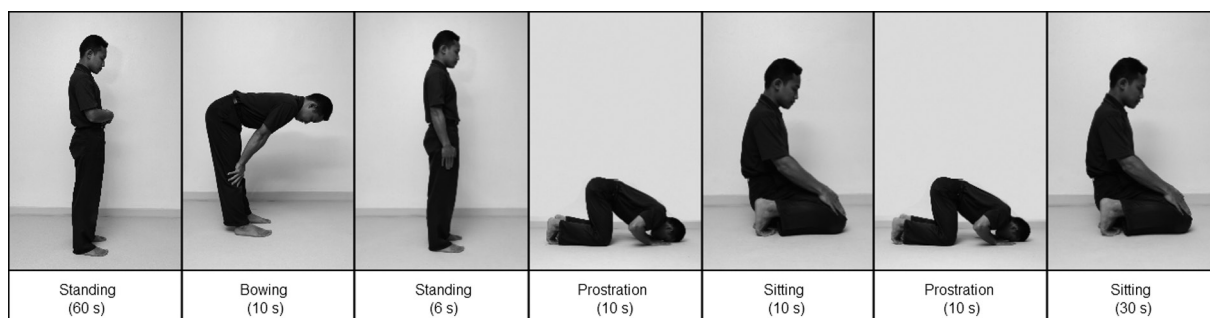


Fig. 1. A complete cycle of Salat or physical activity mimicking salat posture and movement.

Statistical analysis of the data with the nonparametric Wilcoxon signed-rank test was conducted using the Statistical Package for the Social Sciences (SPSS) version 17 (SPSS Inc, Chicago, IL, USA) with statistical significance at $p < 0.05$.

RESULTS

The age range for the subjects of this study was 51 to 66 years old ($n=10$; mean age and SD, 56 [5.9] years). The NEVA measurements were conducted for two consecutive nights, before and after the defined intervention period. Seven of the ten enrolled subjects were Muslim. The level of ED was determined using the IIEF scores: a score of more than 21 is normal; a score of 16 to 20 is defined as mild ED; a score of 10 to 15 is defined as moderate ED; and a score of 0 to 9 is defined as severe ED. In this study, four of the subjects were classified as having moderate ED, while the rest of them were classified as having severe ED.

Following the four-month intervention period, there was a general improvement in the subjects' NPT measurements and IIEF scores (Table 1). All of the measured parameters, namely the number and duration of tumescent events, change in penile volume and IIEF score showed improvements. Improvement was clearly observed in the maximum

percent volumetric change over baseline, with the mean of 138% before the intervention increasing to 222% after the intervention (Table 1). These improvements were in accordance with expected results from ED patients that have been prescribed pelvic floor exercises as part of their physiotherapy treatment regime for a similar period of time¹²⁻¹⁴.

In Group I (Muslim subjects), there was a significant difference ($p < 0.05$) in maximum volume change over baseline in comparison with Group II (non-Muslim subjects). The comparison is shown in Table 2. This may be due to the fact that Muslim subjects performed more movements (a total of 17 normal cycles in their daily *salat* and 12 additional cycles) and were more numerous ($n=7$), compared with the non-Muslim subjects ($n=3$).

Nevertheless, the results for the IIEF score in this pilot study collectively appear disappointing. Although the differences were statistically significant, the mean IIEF score increased only two points, and a score of 10 is right on the border between moderate and severe ED. However, Table 3 shows that individually there are two subjects (subjects A and H) who showed improvement from moderate ED to mild ED and another two subjects (subjects D and I) who showed improvement from severe ED to mild ED. Out of the ten subjects, only three (subjects B, E and F) failed to show positive progress. Individually observed, the patients are in the process of recovering.

DISCUSSION

The results showed that the *salat* movements produce beneficial effects in ED subjects as a complementary treatment¹²⁻¹⁴. Woo KW³⁹ referred to *salat* as a slow moderate exercise and proved that the range of muscle activation for the maximum voluntary contraction during performance of pelvic floor muscle exercise (Kegel) and movements mimicking *salat* comparatively have no significant differences. This indicates that *salat* movements are as good as Kegel exercise. Our study showed a significant increase in the penile volume in ED patients (Table 1), suggesting an improvement of blood flow to the erectile tissue of the penis.

Basically, regardless of the risk factors, there are only 2 main underlying mechanisms for non-psychogenic ED⁴⁰. The mechanism is either vasculogenic or neurogenic. In

Table 1. Statistical data of all subjects ($n=10$) for age, year, no. of events, maximum percent volumetric change over baseline, longest event duration, and IIEF score before and after the *salat* intervention

Characteristics	Before Intervention	After Intervention
	Mean (SD)	Mean (SD)
Age (years)	56 (5.9)	-
No. of events	2 (1.3)	3 (1.1)
Maximum percent volumetric change over baseline	137.7 (55.5)	221.7 (57)*
Longest event duration	24.9 (15.5)	30.1 (7.1)
IIEF score	8.0 (4.2)	10.1 (5.7)

*Statistically significant ($p < 0.05$); IIEF=International Index of Erectile Function; SD=standard deviation

Table 2. Statistical data of subjects in Groups I and II for no. of events, maximum percent volumetric change over baseline, longest event duration, and IIEF score before and after the *salat* intervention

Subjects	Characteristics	Before Intervention,	After Intervention,
		Mean (SD)	Mean (SD)
Muslim (Group I)	No. of events	2 (1.5)	3 (1.3)
	Max. percent volumetric change over baseline (%) †	125.7 (62.3)	219.1 (53.5)*
	Longest event duration (min)	24.4 (17.5)	31.1 (4.7)
	IIEF score	9.6 (3.3)	10.6 (6.2)
Non-Muslim (Group II)	No. of events	2 (0.6)	2 (0.6)
	Max. percent volumetric change over baseline (%)	165.5 (24.1)	227.7 (77)
	Longest event duration (min)	26 (13)	27.5 (12.2)
	IIEF score	4.3 (4.5)	9 (5.3)

*Statistically significant ($p < 0.05$); IIEF=International Index of Erectile Function; n=number of subjects; SD=standard deviation

Table 3. Statistical data of each subject for no. of events, maximum percent volumetric change over baseline, longest event duration, and IIEF score before and after the *salat* intervention

Subjects	Religion	Age	Before Intervention				After Intervention			
			No. of events	Max. percent volumetric change over baseline	Longest event duration (min)	IIEF score	No. of events	Max. percent volumetric change over baseline	Longest event duration (min)	IIEF score
A	M	51	2	121.15	34	13	5	152.5	25	18
B	M	51	2	182	21.5	11	3	239	29	9
C	NM	66	2	138	18	0	3	152	33	3
D	NM	50	2	175.5	41	9	3	306	36	13
E	M	60	2	108	12	8	3	306	36	4
F	M	53	3	140	13	5	3	238	27	3
G	M	56	2	184	44	6	4	199	31	8
H	M	52	5	145	46	11	4	159	38	18
I	NM	65	3	183	19	4	2	225	13.5	11
J	M	59	0	0	0	13	1	240	32	14

M=Muslim; NM=Non-Muslim; IIEF=International Index of Erectile Function

most patients, both components play a role. *Salat* movements, acting similarly to pelvic floor exercise, help to improve ED by increasing the blood flow to the pelvic region, which can increase the blood flow to the erectile tissue over time^{30, 35, 36, 39, 41, 42}. The exact mechanism could be due to individual vessel dilatation or increased neovascularization (formation of new vessels). PDE5 inhibitors like sildenafil, tadalafil and vardenafil also work by causing vasodilatation (dilatation of the blood vessels), which increases the blood flow to erectile tissue⁴³. PDE5 inhibitors are also used to treat all patients with ED irrespective of risk factors like diabetes, hypertension, hyperlipidemia, and smoking. However, they have a temporary effect after consumption and have side effects on one's health.

Since such an improvement can already be seen within a four-month intervention period, there is a very high possibility that these changes may be further improved if the intervention was extended to a six-month intervention period¹³. Furthermore, due to the very minimal cost in performing these movements, and the ease by which they can be completed (particularly for Muslim subjects, since the movements are simply additional to their obligatory prayers), it is very likely that such a complementary treatment regime will be carried out consistently for a longer period of time. Nevertheless, as with the prescription of pelvic floor exercises, these physical movements must be prescribed as a complement to routinely prescribed ED treatment. It is envisaged that these *salat* movements can be used as an adjunct to oral PDE5 inhibitors with potential to reduce the dosage and cost.

The main limitation of the study is the small number of subjects used, as well as the short duration of intervention. In the future, it is important to carry out a larger study before the current intervention can be recommended as a possible complementary treatment in patients with ED. The future study will need to include the following criteria: i) large population, ii) a Muslim group with regular praying only, iii) a Muslim group with regular praying plus pelvic

exercise, iv) a non-Muslim group with pelvic exercise only and v) a non-Muslim as a control. It is possible to do a larger study using only the IIEF as the assessment tool without the NEVA scan.

Physical activities consisting of *salat* movements may be offered as an alternative form of treatment in patients with ED, particularly for Muslim patients but also for non-Muslim patients, as they provide similar beneficial effects to pelvic floor muscles exercise, and an increase in blood flow to the erectile tissue of the penis, and the possibility of increased treatment compliance. However, it should be noted for all Muslims who have performed these *salat* movements in their daily lives that these movements alone will not guarantee that they will not experience ED. This is because the underlying etiology of ED is multifactorial¹⁷⁻²³, and it is not possible to conclude that all those who carry out the *salat* movements will not have ED. Since this is a pilot study, a larger study, however, is required in the future to validate these findings, particularly in their usage as an adjunct to PDE5 inhibitors.

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