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Analysis of Islamic Prayer Postures on Static and Dynamic Balance among Healthy People

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Abstract

Introduction: Balance is defined as the condition in which all forces acting on body are balanced such that the center of mass (COM) lies within the boundaries of base of support (BOS). The balance is commonly differentiated into two categories as Static Balance and Dynamic Balance. Static balance is the ability of body to keeping the COM within BOS when the body is at rest and Dynamic balance is the ability of body to maintain COM within BOS during motion which occurs when the external forces are neutralized by the soft tissues around the muscles and joints in body.

Research Methodology: Ninety subjects were recruited for this study as per the inclusion criteria. Subjects were selected between 20-40 years of age (males & females). Each subject was given through explanation of the procedure which was to be performed. There after informed consent and voluntary participation were obtained from each subject and proper assessment were done. Thereby, all the subjects were assigned into three groups i.e., Group–A, Group-B, Group-C and each group have 30 subjects (n=30). The Islamic prayer regime consists of nine postures.

Results: The result of study had concluded that there is statically significant better static and dynamic balance of the people who regularly practice Islamic prayer postures. Hence the study concluded that there is significant association found between Islamic prayer postures, Static balance and Dynamic balance among healthy people. So, regular practice of Islamic prayer postures may help to improve static and dynamic balance among healthy people.

Discussion: The present study was done to find out the effect of Islamic Prayer Postures on Static and Dynamic Balance among healthy people. It is seen that there is significant relationship present between Islamic prayer postures, static balance and dynamic balance.

Conclusion: The study concluded that there is significant effect of Islamic Prayer postures on static and dynamic balance among healthy people. There is statically significant better static and dynamic balance of the people who regularly practice Islamic prayer postures. So, regular practice of Islamic prayer postures may help to improve static and dynamic balance among healthy people.

Keywords: Islamic posture; Static balance; Dynamic balance

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Introduction

Balance is defined as the condition in which all forces acting on body are balanced such that the centre of mass (COM) lies within the boundaries of base of support (BOS) [1,2]. The balance is commonly differentiated into two categories as Static Balance and Dynamic Balance. Static balance is the ability of body to keeping the COM within BOS when the body is at rest and Dynamic

balance is the ability of body to maintain COM within BOS during motion which occurs when the external forces are neutralized by the soft tissues around the muscles and joints in body [3].

There are some factors which influence body balance i.e., sensory information obtained from the somatosensory system, visual system, and vestibular systems and motor responses that affect coordination, joint range of motion (ROM), and strength [4].

In order to improve the body balance, physical training is very important. It involves muscle strengthening, postural stability and also practicing somatosensory system. Physical training that is performed regularly, systematically and continuously on the daily basis helps in improving the physical ability [5]. Body balance can be improved by performing various tasks that demands movement of the centre of gravity, with a narrowed base of support and high velocity movements [6].

The systemic harmony of visual, vestibular, and somatosensory components are very important to maintain the body balance. Balance or postural control alters and body sway increases with age. The different sensory systems start to develop in younger age of children and become weaker in older adults age. Balance describes a complex interplay between the sensory systems which involves recognize the environmental stimuli, respond according to the stimuli and maintain the body's COG within the boundaries of BOS [7]. Visual system is the primary sensory information to maintain postural balance. Although it is hard to isolate vestibular input and has not been studied widely, it works together with visual and somatosensory system to sustain the balance. The somatosensory system helps to maintain the balance by giving the awareness to body's musculoskeletal framework about spatial and mechanical status regarding sense of position and movement of body [8]. Postural orientation and equilibrium are two chief functional goals of postural control or balance. Postural orientation helps to control the tone and alignment of body in relation to gravity, supporting surface, visual surroundings and internal references [9]. The body use compensatory mechanisms such as swaying in order to keep COG into the boundaries of BOS to maintain an upright orientation [8]. The changes that occur in sensory and motor systems influence balance performance, and it seems to be more effective if these changes induced in children during their appropriate age ranges, by using specific training [10].

The factors that affect balance can be divided into two factors i.e., musculoskeletal factor and a neurological factor. Musculoskeletal factors include postural alignment and flexibility of musculoskeletal system. Neurological factors include the sensory process, integration of central nervous system (CNS) and exercise programs influence physical balance, muscular strength and endurance [11].

Balance can be examined by using various tests, some balance tests names are mentioned here i.e., static balance can be examined by OLST with eyes open and close [12] and dynamic balance can be examined by using (SEBT) Star excursion balance test [13] and (YBT) Y-Balance test [14].

Islamic prayer, commonly represented by the Arabic term called Salat, is a form of meditation [15]. It is mandatory for all the Muslims to perform Islamic prayer five times a day at specific prescribed times. It is a religious physical activity that includes recitation of various Quranic v/s along with performance of specific postures i.e., standing, bowing, prostration, and sitting [16]. There are various meditation forms that can affect not only the autonomic nervous system [17,18] but also influence the central nervous system (CNS) [19,20].

As an activity of daily living, the Islamic prayer is performed by Muslim believers at least 5 times a day. Each prayer consists of specific number of repetitive units called Rakah. The total number of Rakah is approximately 48 Rakah per day which includes all mandatory and optional Rakah. The total number of mandatory Rakah is 17 and optional Rakah is 31 [21].

Each Rakah of Islamic prayer consists of a series of 7-9 postures. Each Rakah takes time around 3 to 6 minutes. If a practicing Muslim perform only compulsory Rakah i.e., 17 Rakah per day, therefore each Muslim is under obligation to perform 119 postures per day. In this manner, they have to perform 3750 postures per month and a total of 42,840 postures per year. However, we can assume that, if a Muslim live up to an average of 50 years & Islamic prayer is obligatory from the 10 years of age, then he/she would have to perform 1,713,600 postures compulsorily in his/her lifetime. There are 7-9 postures involved in the Islamic prayer i.e., the first posture is standing pose. It takes approximately 40 to 60 sec to complete it. Prayer starts with standing pose called Takbir. In this posture, the individual raises his hands to the level of his ears (3-5sec) and then down their hands to their waist & shoulders relaxed and promoting relaxed breathing. The body weight is equally divided on both feet. The second posture is bowing pose. It starts with the hands placed on knees so that the back bend forward for few seconds followed by the person rising back to an erect posture. It takes approximately 10 to 12 sec to complete it. The third posture is standing pose. After bowing pose the person return to standing position. It takes approximately 5 to 6 sec to complete it. The forth posture is prostration. It is called sajdah or sujood in Arabic. In this posture, the person goes down on his/her knees and put his/her hands and forehead on the ground. It takes approximately 10 to 12 sec. The fifth posture is sitting. In this posture, the muscles at the front of the ankle and foot are stretched, the toes should be extended and knees and hip are flexed. It takes approximately 6 to 8 sec. The sixth posture is prostration, it takes 10 to 12 sec. The seventh posture is sitting. In this posture, the patient is sitting on floor in the position of kneeling for 40 to 60 seconds before the end of prayer. The eighth and ninth posture is turning the head to right and then left side. It takes approximately 3 to 4 sec [19,22].

Islamic prayer is one of the effective ways to control the weight of body. It helps in stretching the muscles and provides tone to the body. It also helps to overcome joint arthritis because these postures enhance flexibility of the body and minimize stiffness [23]. Islamic prayer postures are similar to yogic postures and these postures are performed as a religious obligation, so that they can also give all the benefits of yoga. It requires little efforts in performing Islamic postures as they are of short duration which is beneficial for both mental as well as physical health [24].

Salat is spiritual and physical kind of activity in which nearly all

muscles of human body become more active than any kind of other physical exercise without muscle fatigue and induces calmness and relaxation on body and soul. The scientific evidence also supports that if a person perform moderate intensity activities on the daily basis, then the person can get some long-term health benefits [25]. Salat or Islamic prayer activity helps in the rehabilitation process in patients with neurological deficits and musculoskeletal impairments as it takes minimum effort and is beneficial for mental and physical health [26]. It also helps in activation of the pelvic floor muscles [27].

Prostration is one of the postures of Islamic prayer. It has remarkable impact on human brain as it helps in activation of parasympathetic nervous system and provides relaxation [28].

Physical activity level in Islamic prayer postures may also leads to an increase in brain-derived neurotrophic factor (BDNF). BDNF provides neuroprotective benefits and enhances brain neurogenesis and helps in contribution of the therapeutic action of antidepressant treatment [29].

Islamic prayer helps in improving the psychological, musculoskeletal and cerebral functions and improves muscular functions of geriatric, disabled and dementic patient in a rehabilitation program. The physiotherapist of the rehabilitation care centre who treats the patients to restore and maintain the range of motion of joints by means of mobilization techniques and exercise may take this prayer postures as a model for preserving the residual strength of the patient [24].

Research Methodology

Ninety subjects were recruited for this study as per the inclusion criteria. Subjects were selected between 20-40 years of age (males & females). Each subject was given through explanation of the procedure which was to be performed. There after informed consent and voluntary participation were obtained from each subject and proper assessment were done. Thereby, all the subjects were assigned into three groups i.e., Group–A, Group-B, Group-C and each group have 30 subjects (n=30). The Islamic prayer regime consists of nine postures.

Evaluation of static balance

One leg stance test (olst) with eyes open: The testing environment was well quiet and equipped with a table, chair or a couch to rest the subject. Explain the whole procedure to the subjects. The eligible subject was instructed to cross his arms over the chest and then asked to stand barefoot on the limb of their choice and the other limb raised so that the raised foot was near but not touching the ankle of their stance limb Each subject was asked to focus on a spot on the wall at eye level in front of him/her for the duration of the eyes open test. The stopwatch has been used to measure the amount of time the subject was able to stand on one limb. The time was commenced when the subject raise the foot off from the floor.

Time was ended when the subject either:

(1) Uncrossed his/her arms),

(2) Use the raised foot (moved it toward or away from the standing limb or touched the floor),

(3) Move the weight-bearing foot to maintain his/her balance,

(4) A maximum of 45 seconds has elapsed.

Then the same procedure was performed on the other limb. The procedure was repeated 3 times and each time was recorded on the data collection sheet. The best and the average of the 3 trials were also recorded. Subjects were performed 3 trials with eyes open.

Leg stance test (olst) with eyes close: The testing environment was well quiet and equipped with a table, chair or a couch to rest the subject. Explain the whole procedure to the subjects. The eligible subject was instructed to cross his arms over the chest and close their eyes. Then the subject was requested to stand barefoot on the limb of their choice and the other limb raised so that the raised foot was near but not touching the ankle of their stance limb. The stopwatch has been used to measure the amount of time the subject was able to stand on one limb with eyes closed. The time was commenced when the subject raise the foot off from the floor with closed eyes.

Time was ended when the subject either:

(1) Uncrossed his/her arms,

(2) Use the raised foot i.e., moved it toward or away from the standing limb or touched the floor,

(3) Move the weight-bearing foot to maintain his/her balance,

(4) A maximum of 20 seconds has elapsed, or

(5) Opened their eyes.

The procedure was repeated 3 times and each time was recorded on the data collection sheet. The best and the average of the 3 trials were also recorded. Then the same procedure was performed on the other limb. Subjects were performed 3 trials with eyes open and 3 trials with eyes closed. At least 5 minutes of rest was allowed between each trial to avoid fatigue.

Evaluation of dynamic balance

Y-Balance Test (YBT): The testing environment was well quiet and equipped with a table, chair or a couch to rest and measuring the limb length of the subject. Explain the whole procedure to the subjects. The Y-grid was made by using the red coloured tape on the floor for YBT. The eligible subject was requested to do a five minute warm up prior to the actual testing. Make sure the subjects should wear loose clothing to avoid restrictions while performing the test. Then asked the subjects to keep their hands on waist and stand barefoot in the middle of Y-grid on the limb of their choice and the other limb was raised. The participant was asked to reach as far as possible along each of the three lines of Y-grid, tell them to make a light touch on the line, and return the reaching leg back to the centre, while maintaining a single-leg stance with the other leg in the centre of the Y-grid. The terminology of reach directions was based on the direction of reach in relation to the stance leg. When reaching in the postero-lateral direction, the subjects must reach behind the stance leg to complete the task. The subjects

were allowed to practice the reaching before the actual testing. They were asked to begin with the anterior reach direction then postero-medial and then postero-lateral direction in clockwise manner around the grid. All the subjects were begin with a Right stance leg in the centre of the grid. After completion of the three trials in the three directions provide a rest of five minute, then the test was continued with a left stance leg. Each reach distance was measured with a mark on the tape as the distance from the centre of the grid to point of maximum excursion by the reach leg. At the conclusion of all trials, the investigator was measured the distances of each excursion with a standard tape measure. If the investigator feels the participant used the reaching leg for a substantial amount of support at any time, removed his or her foot from the centre of the grid, or was unable to maintain balance on the support leg throughout the trial, the trial would be discarded and repeated. The both lower limb length was taken to calculate the composite score of YBT. Composite score = (sum of average values of all three reach direction/ 3*limb length) * 100 **(Figures 1-6).**

Results

Data analysis performed using SPSS 24 software importing Microsoft excel master sheet containing subjects data. The demographic profile was analysed by using descriptive statistics. Descriptive statistics was used to analyze and find out mean, standard deviation of age, weight, height, BMI, OLST and YBT. The data was calculated and representations were done by graphs. It is done by ANOVA **(Tables 1-5).**

In this study, 90 subjects were recruited, on the basis of inclusion and exclusion criteria. The mean values and standard deviation for age, weight, height and BMI are:-

In all three groups, the balance tests i.e., OLST (with eyes open and close) and YBT were administrated. ANOVA analysis was done for all three groups i.e., (Group A, B & C) and it shows the result is significant. (p<0.01)

Pair wise group comparison using Post hoc Tukey's

Group A v/s Group B shows a significant difference in all balance test (p<0.01) except OLST with eyes open Right leg (p>0.05) which do not show significant difference. Group A v/s Group C

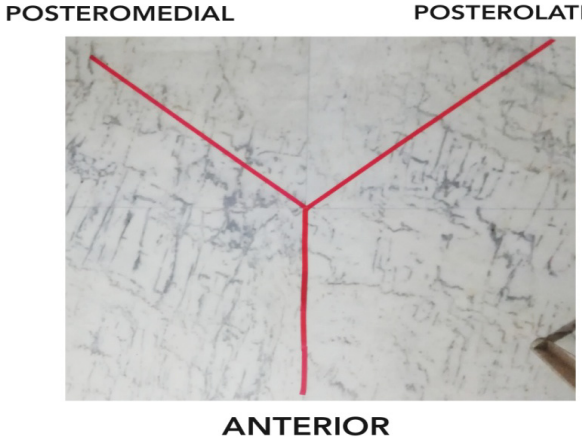

Figure 1 Y shape grid to check YBT on left leg stance.

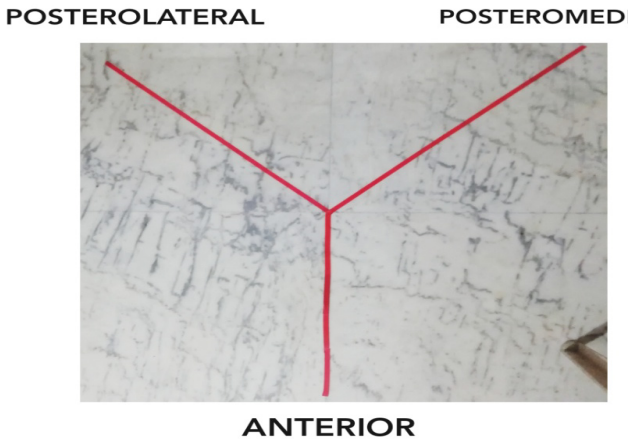

Figure 2 Y shape grid to check YBT on Right leg stance.

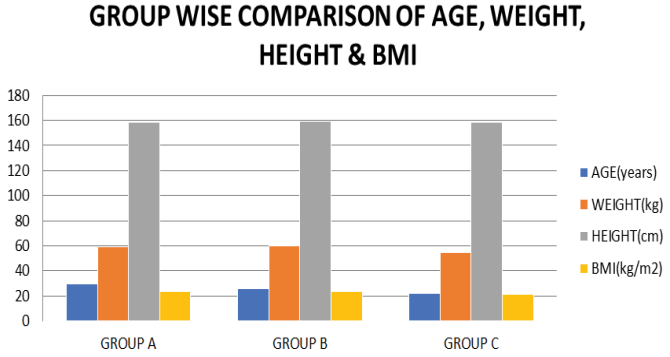

Figure 3 Graphs showing mean of age, weight, height and BMI of subjects.

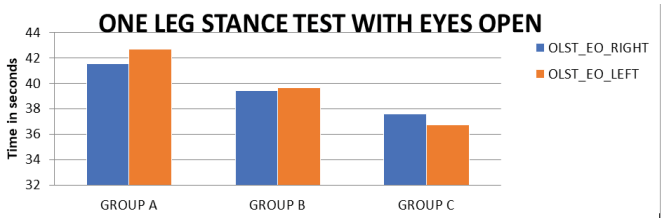

Figure 4 Graph showing mean values and for OLST with eyes open.

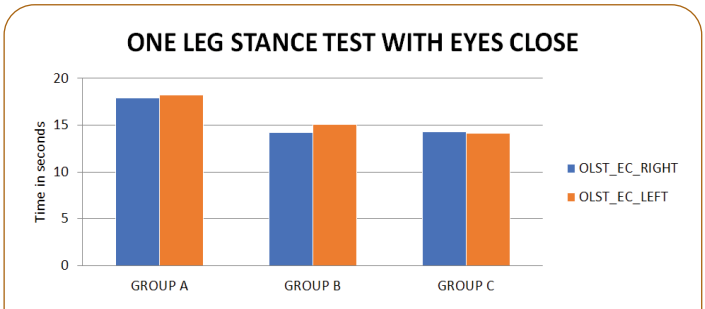

Figure 5 Graph showing mean values for OLST with eyes close.

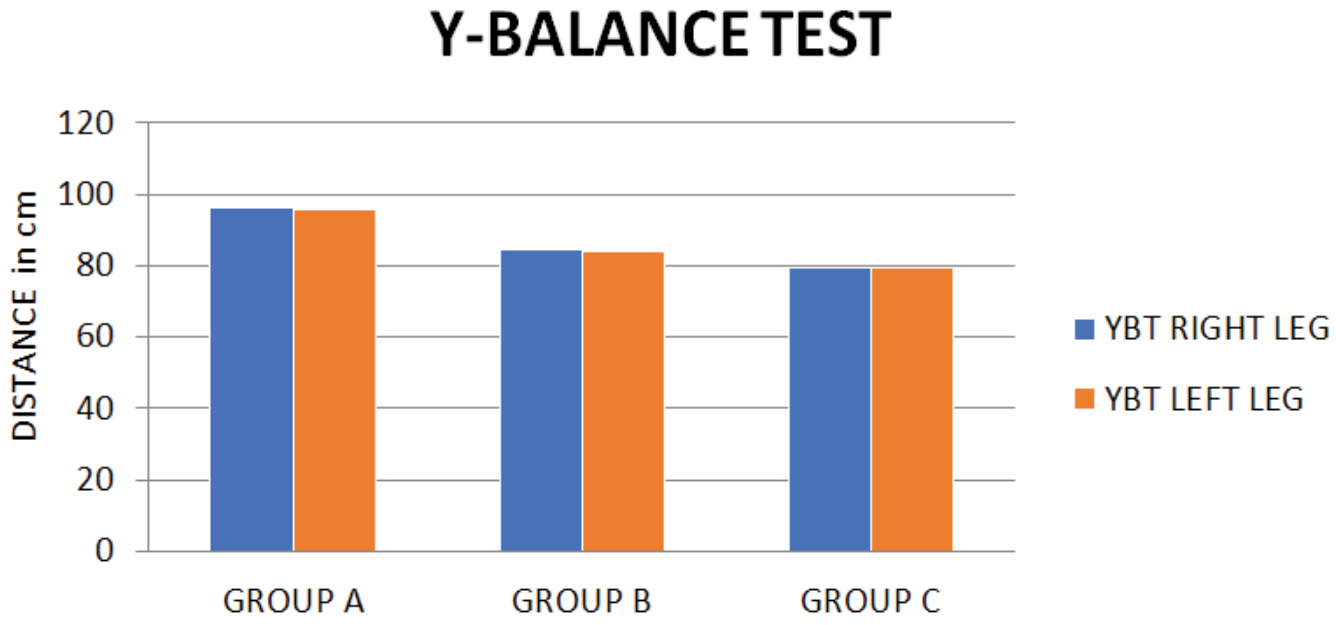

Figure 6 Graph showing mean values of YBT.

Table 1: Showing mean values and standard deviation for age, weight, height and BMI.

Groups	Group A (N=30)	Group B (N=30)	Group C (N=30)
Age (Years)	29.70 ± 6.09	26.00 ± 5.17	22.37 ± 3.5
Weight (Kg)	59.37 ± 7.08	59.87 ± 7.58	54.42 ± 10.55
Height (cm)	158.33 ± 6.55	159 ± 6.26	158.85 ± 6.46
BMI (Kg/m^2)	23.67 ± 2.11	23.62 ± 2.12	21.40 ± 2.74

Table 2: Showing mean values and standard deviation p & f values for OLST with eyes open.

Groups	Group A (N=30)	Group B (N=30)	Group C (N=30)	F Value	P Value
OLST_EO_Right	41.57 ± 1.96	39.45 ± 2.85	37.62 ± 5.70	7.941	0.001
OLST_EO_Left	42.70 ± 1.60	39.64 ± 2.32	36.77 ± 6.47	15.875	0

Table 3: Showing mean values, standard deviation, p & f values for OLST with eyes close.

Groups	Group A (N=30)	Group B (N=30)	Group C (N=30)	F Value	P value
OLST_EC_Right	17.90 ± 1.08	14.25 ± 1.68	14.27 ± 3.50	24.526	0
OLST_EC_Left	18.23 ± 0.75	15.05 ±1.63	14.11 ± 3.23	30.829	0

Table 4: Showing mean values and standard deviation p & f values for YBT.

Groups	Group A (N=30)	Group B (N=30)	Group C (N=30)	F Value	P value
OLST_EC_Right	17.90 ± 1.08	14.25 ± 1.68	14.27 ± 3.50	24.526	0
OLST_EC_Left	18.23 ± 0.75	15.05 ±1.63	14.11 ± 3.23	30.829	0

Table 5: Pair wise group comparison using Post hoc Tukey's.

Group comparison	Test	p- value
Group A v/s Group B	OLST_EO_Right	0.089
	OLST_EO_Left	0.013
	OLST_EC_Right	0
	OLST_EC_Left	0
	YBT_Right	0
	YBT_LEFT	0
Group A v/s Group C	OLST_EO_Right	0
	OLST_EO_Left	0
	OLST_EC_Right	0
	OLST_EC_Left	0
	YBT_Right	0
	YBT_Left	0
Group B v/s Group C	OLST_EO_Right	0.161
	OLST_EO_Left	0.021
	OLST_EC_Right	1
	OLST_EC_Left	0.208
	YBT_Right	0.001
	YBT_Left	0.001

show significant difference in all balance test ($p<0.01$) in post hoc analysis.

Group B v/s Group C-

1) OLST with eyes open (Right) do not show significant difference. ($p>0.05$)
2) OLST with eyes open (left) show significant difference. ($p<0.05$)
3) OLST with eyes close (Right) do not show significant difference. ($p>0.05$)
4) OLST with eyes close (left) do not show significant difference. ($p>0.05$)
5) YBT for left and Right show significant difference. ($p<0.05$)

The result of study had concluded that there is statically significant better static and dynamic balance of the people who regularly practice Islamic prayer postures. Hence the study concluded that there is significant association found between Islamic prayer postures, Static balance and Dynamic balance among healthy people. So, regular practice of Islamic prayer postures may help to improve static and dynamic balance among healthy people.

Discussion

The present study was done to find out the effect of Islamic Prayer Postures on Static and Dynamic Balance among healthy people. It is seen that there is significant relationship present between Islamic prayer postures, static balance and dynamic balance.

The study concluded that the religious meditation and prayers are beneficial for physiological functions of human body and balance. For this study sixty healthy male subjects were recruited. From their study they conclude that adult healthy subjects who practicing Islamic prayer regimes have statistically significantly better dynamic balance than the subjects who do not practicing Islamic prayer regimes [6].

Other study concluded that Yoga and Salat postures have many similarities. They have the same movement of stretching and flexibility which may highlight the lives of both the communities in a positive aspect. Each prayer position is corresponding to yoga position and these positions together activate all seven CHAKRAS i.e., energy fields. Prayer in standing pose is similar to mount pose in yoga. Bowing in prayer is somewhat similar to Ardha Uttanasana. Prayer in sitting pose is like yoga vajrasana. Balasana in Yoga is similar with Prostration pose in Islamic Prayer. Prostration makes the heart in a higher position than the brain, which enhances blood flow into upper regions of the body, especially to the head and lungs. It helps in cleaning the mental toxins. This position helps stomach muscles to develop and prevents growth of flabbiness in the midsection. It also helps to maintain proper position of foetus in pregnant women womb, reduces high BP, enhance elasticity of joints and reduce stress, anxiety, dizziness and fatigue [23].

There is a link between decreased ROM and falls in the elderly and that addressing ROM deficits may decrease potential falls [30]. The Muslim way of praying since childhood, forcing the knees into deep flexion, may stretch the soft tissue surrounding the knee and decrease stiffness and contact pressure of the articular cartilage [31].

As we know from the study that Islamic prayer postures helps to maintain the joint range of motion and helps in reducing the stress, anxiety and fatigue thereby help to maintain balance.

The static stretching provides negative impact on balance [32]. The stretching protocol intervention with the duration of 15-second hold may help in improving the balance performance and decrease the postural instability [33].

As you can see in Islamic prayer postures, each posture takes a hold around 5-60 seconds and the postures which produce stretching are mainly bowing and prostration posture which is around of 10-15 seconds of duration, in this posture the back and lower limb muscles are being stretched. So from this point of view we can also conclude that Islamic prayer postures have positive impact on body balance.

The proprioception plays a major role in controlling the balance and ankle proprioception is very important aspect of it. The ankle proprioceptive information along with other sensory information process in CNS and helps in integration for postural and balance control.

In Islamic prayer postures, ankle proprioception also come into play as there are transition occurs from standing to sitting and vice-versa. It helps to provide proprioceptive inputs which process into the CNS and hence improve balancing control [34].

Islamic prayer helps in improving the psychological, musculoskeletal and cerebral functions and improves muscular functions of geriatric, disabled and dementic patient in a rehabilitation program. The physiotherapist of the rehabilitation care centre who treats the patients to restore and maintain the range of motion of joints by means of mobilization techniques and exercise may take this prayer postures as a model for preserving the residual strength of the patient.

Hence, Islamic prayer postures have many benefits on mind as well as body. It has been shown that these postures provide relaxation, reduces high blood pressure, increases elasticity of joints and decrease stress, anxiety, dizziness and fatigue. It also helps in maintaining proper joint range of motion along with mild stretching. The transitions from standing to sitting and vice versa provide proprioceptive inputs to the body which is one of very important factor to maintain the balance. The turning of head to Right side and then left side is the last step of each Rakah. It helps to regulate the functioning of vestibular system; it is also very important factor to maintaining the balance.

Hence, regular practicing of Islamic prayer postures has many benefits and helps to maintain the physical activity as well as mind activity of an individual. So, regular practice of Islamic prayer postures may help to improve static and dynamic balance. These postures can be helpful and useful in the process of physiotherapy rehabilitation program for the treatment purpose.

Conclusion

The study concluded that there is significant effect of Islamic Prayer postures on static and dynamic balance among healthy people. There is statically significant better static and dynamic balance of the people who regularly practice Islamic prayer postures. So, regular practice of Islamic prayer postures may help to improve static and dynamic balance among healthy people.

Future Scope of Study

Other outcome measures can be taken to find out the analysis of Islamic Prayer Postures on balance, Different age groups can also be included, Can be done for difference between males and females, and can be done for older population.

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