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The Effect of Mental Imagery On Bhavsar Skill's Dynamic Performance On Parallel Bars for Juniors Under-15 Years.

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Introduction:

Skills are characterized with ever changing of motor requirements required from player, which emerged as a result gymnastics development, requiring the player to reshape skills learned and learn new motor skills, and this in turn require special physical preparation for player to be able to accomplish new motor duties that fits perfectly for development physical abilities attributes to these skills (Shehata, 2003, pp245-246)

Gymnast needs physical, psychological and mental qualities and abilities distinguishes him/her from other individual sports, gymnastics is characterized with difficulties in technical performance and high-level challenge to player's abilties, which requires from him/her distinctive physical , mental and psychological characteristics. (Al-Nimr & Al-Khatib, 2000, p7)

Mental imagery is one of the important aspects in sports psychology, which helps to acquire and develop skills performance and improve motor skills; so it is a major pillar of athletic training to achieve the highest levels. It also helps the player to guide the right perception process for the skill be learned, developed or trained on. (Gould, Tommen & Murphy, 1989, pp 30, 312)

Mental imagery is a means by which its possible to configure mental images of past experiences or new images never happened before in order to mental preparation for performance or mental preparedness, whenever such images are clear in player's mind it is possible for brain to send clear signals to body parts determine what is required from it. (Rateb, 2007, p117)

Mental imagery plays an important role in developing athlete abilities and level, where it represents the ability to build a mental image for the intended work, mind practice is an extension of this activity, which includes not only composition of images, but also include repeated images mental recovery; this activity may help and strengthens performance as mental activity stimulates nerve pulses and body parts, which helps to strengthen the special neural pathways responsible of sending signals from nervous system to groups that perform skills. (Allawi,2002,p14) (Rushall and Lippman, 1997, p122) (Rateb,2007,p317)

Gymnastics one of the sports that require good imagery due to its skills difficulty and high precision which characterize it, where failure in skill performance is due to several factors, including individual's lack of optimum perception and imagery of the desired performance.

Recently, gymnastics training included developing mind and locomotor system through which expert and novice player can reach highest level can be achieved in a short period

Research results confirmed that active mental imagery for performing certain skills result in muscle activity, may be limited, but the benefit is reflected in strengthening of neural pathways sent from nervous system to these working muscles, gymnast through systematically evoke skill 's mental images leads to actual subscription body muscles in this skill performance (Rajeh,1985, pp316-317)

Recently, interest in mental perception and its aspects increased, it was concluded that the impulses of visual and auditory receptors and sensory organs enter in certain brain parts and use the information from these multiple receptors as well as promote this through mental imagery means to complete the image (Shamoon , 2001, p21)

The mental images that formed during mental imagery cause some physiological responses, it has been shown that thought processes result in contractions in muscle groups used to produce the movement being visualized and that physical performance includes degrees of correlation with mental activity, followed it was concluded that these muscle responses can be measured; in (1930) Freemann conducted a research to validate the hypothesis that there was muscle contractions during mental activity, and Jackson (1932) measured the muscle activity during mental perception for the first time using the Electromyography (EMG). (Shamoon , 2001, p 22)

Mental activity physiology is not limited to closed circles in brain, but muscle groups are also involved in this activity, mental imagery is formed by correlations with

different senses types, which have a special importance in motor skills' images by sight and kinetic sense, as explained by Cripe (1985) (Shamoon , 2001, p23)

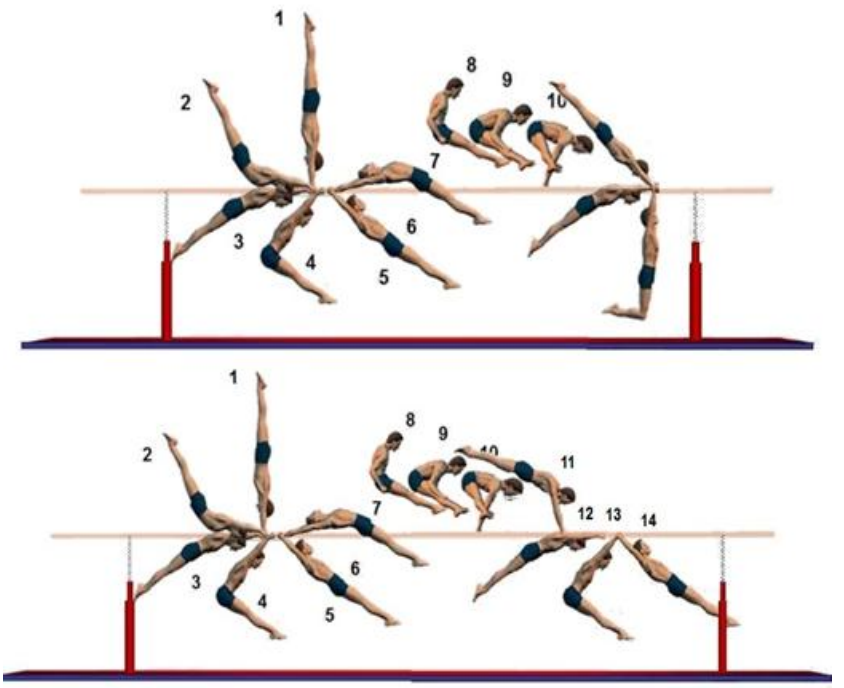
Mental imagery contributes to invoke the sense of ideal performance and focusing the attention upon it with strengthening neural pathway which assist the player to repeat the good performance. "(Shamoon , 2001, p222) (Allawi, 1997,p229) (Rateb, 2000, p117)

Mental skills training gives the player an advantage over other players who do not engage in this kind of training, and in some cases it will be the success and sports excellence criterion (Rateb,2007, p193)

The researchers - through their work of gymnastics training and exercises and gymnastics teaching - have observed a drop in performance level on parallel bars within juniors under 15 years

So they conducted a pilot study through under 15 years championship at 2010/2011 sport season on parallel bars routines' low performance level and also the low SV (Start Value) for parallel bars routines for most players, routines analysis revealed that reason of low exercise content on the device is lack of high difficulty movements (E, D e.g.) and with this logic, based on routines analysis it was found that most players perform Moy skill (C difficult skill) which could be easily developed to Tippelt skill (D difficult skill) and also to Bhavsar skill (E difficult skill) (figure 1) The researchers made an imagination for the skill (under study) performance as shown in figure (1)

Figure (1)



Researchers found that the theoretical content for Bhavsar skill is not available - because it is a new skill - either theoretical content, assisting drills the best training method or players' psychological rehabilitation of this difficult skill is not available, so researchers have to teach the selected skill side by side with psychological preparation, which involves mental imagery, without accompanied applied content in spite of remarkable importance of applied psychological preparation.

The researchers believe that the psychological aspect in this difficult skill is of the most important preparation aspects due skill's difficulty, as any error by player through skill's artistic performance stages represent injury risk, and all this results from increased mental and muscular tension and lack of mental imagery of proper artistic performance, so attention must be given to players' psychological preparation means to get them to the appropriate mental state that enables them to achieve best performance, or through mental imagery using a variety of psychological skills.

Research objective:

This research aimed at : Identify the effect of mental imagery on developing some mental, psychological, and physical abilities and on Bhavsar skill's dynamic performance on parallel bars for juniors under-15 years

Research hypotheses:

- There are statistically significant differences between pre- and post measurements for experimental group in measurement of mental imagery, some physical abilities and Bhavsar skill's performance level on parallel bars for juniors under-15 years
- There are statistically significant differences between pre- and post measurements for control group in measurement of mental imagery, some physical abilities and Bhavsar skill's performance level on parallel bars for juniors under-15 years
- There are statistically significant differences between post measurements for experimental and control group in measurement of mental imagery, some physical abilities and Bhavsar skill's performance level on parallel bars for juniors under-15 years

Terms used:

- - mental imagery definition: A similar experience to sensory experience (hearing, sight, sense), but it appear in the absence of external stimulus. (Martens, 1987, p78)
- - Relaxation: it is temporary and deliberate withdrawal from activity, leading to re-charging and full benefit from physical, mental and emotional energies. (Shamoon, 2001, p157)

Research procedures:

Methodology used: Experimental approach with two groups design, one experimental and the other control using pre and post measurement have been used

Research domains:

Spatial domain: all pre, in-between and post measurements, and implementing training program were conducted at Smouha Sports Club

Time domain: the researchers conducted the first pilot study on a sample similar to study sample and outside the main sample from the same original research community, the aim was as following: Confirming the validity of used instruments and tools and training program exercises' adequacy for research sample, conducted on Saturday, April 14th, 2012.

- - Pre measurements conducted in the period from April 17th to April 19th, 2012
- - Program implementation conducted in the period from April 21st to June 14th, 2012.
- - Post measurements conducted in the period from June 11th to June 18th, 2012

Research sample:

- Sample chosen intentionally and included (12) gymnasts under (15 years) from Smouha Sports club, Sports Establishment club (Army Club) in Alexandria and called Alexandria Sports club (Sporting) registered the Egyptian Gymnastics Federation records, they represent the Alexandria team and represent the vast majority of total community of Alexandria gymnasts, the sample was divided into two homogeneous groups in basic, physical, skills and mental abilities variables , this sample was chosen for the following reasons:

1- Availability of the appropriate number as a sample for this research.

2- Convergence of age and skill performance level within sample individuals.

3- The researchers overseeing training, plans development and training programs for this sample.

4- Availability of devices and facilities necessary to implement research experiment.

I- Measuring devices:

- Restameter device to measure height (cm.)
- Calibrated medical scale to measure weight (kg).
- Geneometer device to measure shoulders joints' extend movement's extent the tidal movement.
- - Stopwatch (1/100 sec) to determine tests time, rest and training. periods

II- Facilities necessary foe experiment implementation:

legal Parallel bars, low parallel bars, mattresses with different sizes, Manezia, honey.

III-: mental imagery tests (Martens, 1987, p80-p94), Bhavsar skill performance level evaluation Attachment (1)

- Evaluating skill performance level:

The performance assessment of the skill under study was done by a committee of (7) men artistic gymnastic international and first class judges, according to the International Gymnastics Law, They assessed the performance of the players level of skill being studied and assessed artistic performance pre and post the the experiment.

total score was (15) fifteen marks and were distributed as follows:

- - Five marks for technical performance by one (D) judge (1) one rule.
- - Ten marks for formal performance of the skill under study by six (E) judges

Program design:

After reviewing many gymnastics and using of tools and devices programs, as well as references in gymnastics training (Shehata, 1992, p272)' (Al-Sharhan, 2000, p66) '(Salem, 1990, p15) and aided by gymnastics specialized experts, in addition to researchers' personal experience as faculty staff and coaches at various technical stages, it was possible to choose - might choose to identify your program content using the devices, tools and assistance, which could be employed in educational steps proposed and scalable and is similar to the performance of the skill 'taking into account the correct way of performance while using the tools and devices' facility (7), (8)

Educational steps that will be used in program using tools and devices were presented to five faculty staff members with not less than 10 years experience in gymnastics training, after theses experts approved the educational steps using tools and devices in its final form, training doses were determined.

Program Components:

- Muscle relaxation through progressive relaxation (contraction and extention)
- Mental relaxation through breathing control exercises to visualize relaxation
- General mental imagery exercises through imagery clarity and control
- Multi-aspect mental imagery through ocular, auditory, kinesthetic, emotional imagery
- Proposed mental training program 's aspects: Attachment (2)
- Time-table for proposed skill program : Attachment (3)

Procedural research steps:

Pre measurements:

Pre measurements conducted in the period from April 17th to April 19th, 2012 Application search experience:

Program implementation

Program implementation conducted in the period from April 21st to June 14th, 2012. On study sample for physical measurements and skill performance level (under study)

Post measurements:

Post measurements conducted in the period from June 1 1th to June 18th, 2012 for physical measurements and skill performance level (under study)

Statistical methods:

All statistical work has been done using SPSS program to find out the following:

- arithmetic mean.
- standard deviation.
- Median
- Skewness, variance and kurtosis coefficient.
- Mann-Whitney test
- Wilcoxon
- Pearson correlation coefficient
- Eta square coefficient
- "T" test for differences per one group .
- Lowest significant difference L.S.D
- Improvement. percentage

Results

I- Results for (mental and skill performance for skill under discussion) measurements for experimental and control groups

Table (1) statistical significance of motor range measurements between experimental and control groups

Statistics / Motor range Variables	Experimental group n=6						Experimental group n=6					
	Pre		In-between		Post		Pre		In-between		Post	
	Mean	±SD	Mean	±SD	Mean	±SD	Mean	±SD	Mean	±SD	Mean	±SD
Wide grand car	27.83	4.07	19.5	3.73	11.67	3.72	28.33	5.05	25.75	3.25	23.33	2.16
Bridge (marks)	136.8	7.94	153.7	5.85	170.7	3.78	137	6.9	142	4.43	147.5	1.87
Long setting hands back to farthest point (mark)	75	3.74	93.5	2.74	112.5	1.87	75	3.03	81.17	2.56	87.5	1.87
Malkha (marks)	186	2.9	195	2.61	204.2	2.48	185.7	3.27	186.8	1.08	187.8	2.79

Table (2) repeated measures ANAOVA (pre – In-between- post) for motor range variables for research sample

Statistics Variables			Type III Sum of Squares	df	Mean Square	F	Sig.	Effect Size (η^2)
Wide grand car	Experimental group	Within measurements effects	00،6962	1	6962.00	166.82	0.00	0.98
		Within measurements error	208.67	5	41.73			
		Between measurements effects	784.33	2	392.17	301.67	0.00	
		Between measurements error	13.00	10	1.30			
	Control group	Within measurements effects	68،11986	1	11986.68	253.97	0.00	0.69
		Within measurements error	169.40	5	33.88			
		Between measurements effects	75.03	2	37.51	10.99	0.00	
		Between measurements error	34.14	10	3.41			
Bridge (marks)	Experimental group	Within measurements effects	425349.39	1	425349.39	4146.46	0.00	0.99
		Within measurements error	512.94	5	102.59			
		Between measurements effects	3434.11	2	1717.06	385.37	0.00	
		Between measurements error	44.56	10	4.46			
	Control group	Within measurements effects	363804.50	1	363804.50	6305.10	0.00	0.84
		Within measurements error	288.50	5	57.70			
		Between measurements effects	331.00	2	165.50	25.46	0.00	
		Between measurements error	65.00	10	6.50			
Long setting hands back to farthest point (mark)	Experimental group	Within measurements effects	157922.00	1	157922.00	6806.96	0.00	1.00
		Within measurements error	116.00	5	23.20			
		Between measurements effects	4219.00	2	2109.50	2343.89	0.00	
		Between measurements error	9.00	10	0.90			
	Control group	Within measurements effects	118746.89	1	118746.89	6516.60	0.00	0.99
		Within measurements error	11،91	5	18.22			
		Between measurements effects	468.78	2	234.39	448.82	0.00	
		Between measurements error	5.22	10	0.52			
Malkha (marks)	Experimental group	Within measurements effects	684840.06	1	684840.06	32628.70	0.00	1.00
		Within measurements error	104.94	5	20.99			
		Between measurements effects	990.11	2	495.06	262.88	0.00	
		Between measurements error	1.89	10	0.19			
	Control group	Within measurements effects	627760.13	1	627760.13	15684.22	0.00	0.15
		Within measurements error	20.29	5	4.06			
		Between measurements effects	14.08	2	7.04	0.91	0.44	
		Between measurements error	77.75	10	7.78			

F significance at 0:01 between measurements = 6.61 F significance at 0:05 within measurements = 4.10

Table (2) results reveal presence of statistically significant differences between repeated measurements (pre-in-between- post) in motor range variables for research sample search where (F) calculated is higher (F) significance which at 0.05 level equal to (4.10) and at 0.01 level equal to (6.61), and that there is no statistically significant difference in malkha variable for control group.

Table (2) results also declare that effect size value (ETA square) is greater than 0.50, indicating the high effect size of the training program except for malkha in control group.

Table (3)

Lowest significant difference (LSD) at 0.05 level between repeated measurements means (pre- in-between- post) for motor range variables for research sample

Variables		Repeated measures		Difference between means	Significance level	Significance
Wide grand car	Experimental group	Pre	In-between measurement	8.333*	0.00	Significant
			Post measurement	* 16.167	0.00	Significant
		In-between	Pre measurement	-8.333 - *	0.00	Significant
			Post measurement	7.833*	0.00	Significant
		post	Pre measurement	-16.17 *	0.00	Significant
			In-between measurement	-7.83*	0.00	Significant
	Control group	Pre	In-between measurement	2.58*	0.03	Significant
			Post measurement	5.00*	0.02	Significant
		In-between	Pre measurement	-2.58 *	0.03	Significant
			Post measurement	2.42*	0.02	Significant
		post	Pre measurement	-5.00*	0.02	Significant
			In-between measurement	-2.42*	0.02	Significant
Bridge (marks)	Experimental group	Pre	In-between measurement	-16.83 *	0.00	Significant
			Post measurement	-33.83 *	0.00	Significant
		In-between	Pre measurement	16.83 *	0.00	Significant
			Post measurement	-17.00 *	0.00	Significant
		post	Pre measurement	33.83 *	0.00	Significant
			In-between measurement	17.00 *	0.00	Significant
	Control group	Pre	In-between measurement	-5.00*	0.00	Significant
			Post measurement	-10.50 *	0.00	Significant
		In-between	Pre measurement	5.00*	0.00	Significant
			Post measurement	-5.50*	0.00	Significant
		post	Pre measurement	10.50 *	0.00	Significant
			In-between measurement	5.50*	0.00	Significant
Long setting hands back to farthest point (mark)	Experimental group	Pre	In-between measurement	-18.50 *	0.00	Significant
			Post measurement	-37.50 *	0.00	Significant
		In-between	Pre measurement	18.50 *	0.00	Significant
			Post measurement	-19.00 *	0.00	Significant
		post	Pre measurement	37.50 *	0.00	Significant
			In-between measurement	19.00 *	0.00	Significant
	Control group	Pre	In-between measurement	-6.17*	0.00	Significant
			Post measurement	-12.50 *	0.00	Significant
		In-between	Pre measurement	6.17*	0.00	Significant

Variables		Repeated measures		Difference between means	Significance level	Significance
			Post measurement	-6.33*	0.00	Significant
		post	Pre measurement	12.50 *	0.00	Significant
			In-between measurement	6.33*	0.00	Significant
Malkha (marks)	Experimental group	Pre	In-between measurement	-9.00*	0.00	Significant
			Post measurement	-18.17 - *	0.00	Significant
		In-between	Pre measurement	9.00*	0.00	Significant
			Post measurement	-9.17 - *	0.00	Significant
		post	Pre measurement	18.17 *	0.00	Significant
			In-between measurement	9.17*	0.00	Significant
	Control group	Pre	In-between measurement	There is no significant differences between the three measurements		
			Post measurement			
		In-between	Pre measurement			
			Post measurement			
		post	Pre measurement			
			In-between measurement			

* Significant difference between means at 0.05 level

Table (4)

Improvement percentages between repeated measures for motor range variables for experimental and control group

Variables	Group	Means		Improvement %		
				Pre	In-between	Post
Wide grand car	Experimental	Pre	27.83		29.93	58.07
		In-between	19.5			40.15
		post	11.67			
	control	Pre	28.33		9.11	17.65
		In-between	25.75			9.4
		post	23.33			
Bridge (marks)	Experimental	Pre	136.83		12.31	24.73
		In-between	153.67			11.06
		post	170.67			
	control	Pre	137		3.65	7.66
		In-between	142			3.87
		post	147.5			
Long setting hands back to farthest point (mark)	Experimental	Pre	75		24.67	50
		In-between	93.5			20.32
		post	112.5			
	control	Pre	75		8.23	16.67
		In-between	81.17			7.8
		post	87.5			
Malkha (marks)	Experimental	Pre	186		4.84	9.77
		In-between	195			4.7
		post	204.17			
	control	Pre	185.67		0.58	1.16
		In-between	186.75			0.58
		post	187.83			

Graphs for motor range variables

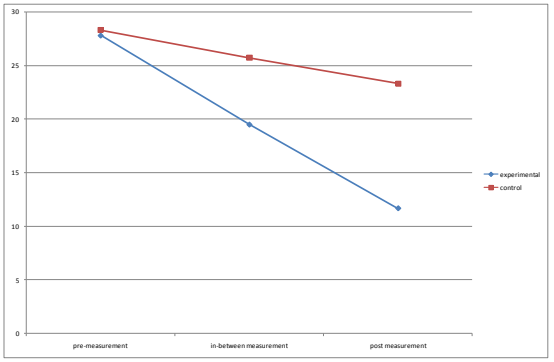


Fig (2) **Wide grand car**

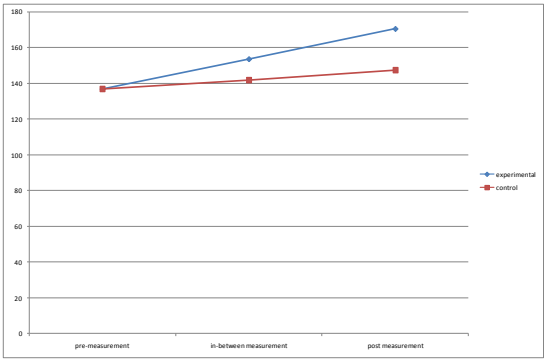


Fig (3) **Bridge (marks)**

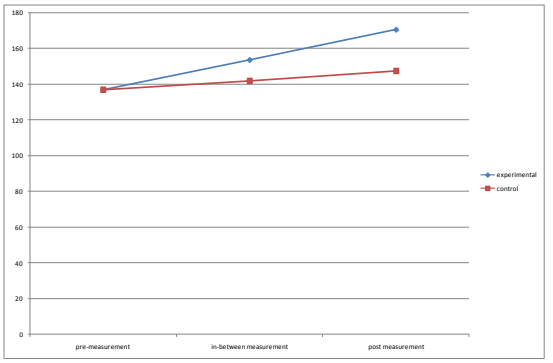


Fig (4) **Long setting hands back to farthest point (mark)**

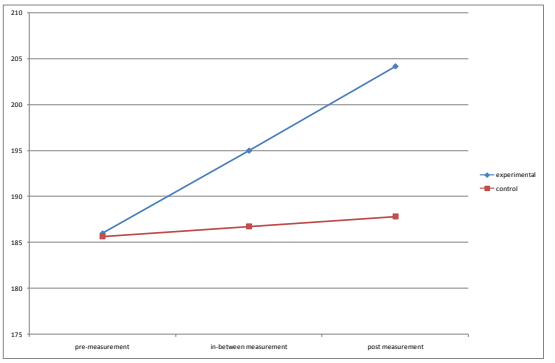


Fig (5) Malkha

Table (5)
Statistical significance for mental measurements between experimental and control groups

Statistics / Mental variables	Experimental group n=6						Experimental group n=6					
	Pre		In-between		Post		Pre		In-between		Post	
	Mean	±SD	Mean	±SD	Mean	±SD	Mean	±SD	Mean	±SD	Mean	±SD
Muscle tension	73.00	3.03	45.33	2.66	23.50	2.66	73.17	1.47	68.17	1.47	51.50	4.18
Vision imagery	9.83	0.75	11.33	1.21	12.33	1.75	9.67	0.82	9.83	0.75	10.17	0.75
Auditory imagery	9.33	0.52	11.17	0.98	12.33	1.03	9.50	1.05	9.67	0.82	10.33	0.82
Locomotor	9.33	0.52	11.67	0.52	12.83	0.75	9.17	0.75	9.50	0.84	9.83	0.75
Emotional state	8.17	1.17	11.33	1.21	12.67	0.82	8.33	0.82	8.50	0.84	9.00	0.63
Image control	8.17	0.75	11.33	1.03	12.67	0.82	8.33	1.03	9.00	0.89	9.83	0.98
Overall mental imagery	44.83	1.33	56.83	2.64	62.83	2.79	45.00	1.90	46.50	2.17	49.17	1.94

Table (6)
repeated measures ANAOVA (pre – In-between- post) for mental variables for research sample

Statistics Mental variables			Type III Sum of Squares	df	Mean Square	F	Sig.	Effect Size (η^2)
Muscle Tension	Experimental group	Within measurements effects	6962،00	1	6962.00	3799.59	0.00	0.99
		Within measurements error	208.67	5	41.73			
		Between measurements effects	784.33	2	392.17	577.94	0.00	
		Between measurements error	13.00	10	1.30			
	Control group	Within measurements effects	11986،68	1	11986.68	7810.09	0.00	0.96
		Within measurements error	169.40	5	33.88			
		Between measurements effects	75.03	2	37.51	125.54	0.00	
		Between measurements error	34.14	10	3.41			
Vision Imagery	Experimental group	Within measurements effects	40233.39	1	40233.39	547.44	0.00	0.79
		Within measurements error	52.94	5	10.59			
		Between measurements effects	7384.78	2	3692.39	19.00	0.00	
		Between measurements error	63.89	10	6.39			
	Control group	Within measurements effects	74369.39	1	74369.39	1131.57	0.00	0.39
		Within measurements error	47.61	5	9.52			
		Between measurements effects	1544.44	2	772.22	3.18	0.09	
		Between measurements error	61.56	10	6.16			
Auditory Imagery	Experimental group	Within measurements effects	2244.50	1	2244.50	1717.21	0.00	0.84
		Within measurements error	20.50	5	4.10			
		Between measurements effects	19.00	2	9.50	26.28	0.00	
		Between measurements error	5.00	10	0.50			
	Control group	Within measurements effects	1760.22	1	1760.22	828.81	0.00	0.58
		Within measurements error	7.78	5	1.56			
		Between measurements effects	0.78	2	0.39	7.00	0.00	
		Between measurements error	1.22	10	0.12			
Locomotor	Experimental group	Within measurements effects	2156.06	1	2156.06	3169.92	0.00	0.95
		Within measurements error	6.28	5	1.26			
		Between measurements effects	27.44	2	13.72	100.88	0.00	
		Between measurements error	5.22	10	0.52			
	Control group	Within measurements effects	1740.50	1	1740.50	1036.92	0.00	0.50
		Within measurements error	10.50	5	2.10			
		Between measurements effects	2.33	2	1.17	5.00	0.44	
		Between measurements error	1.67	10	0.17			
Emotional State	Experimental group	Within measurements effects	2289.39	1	2289.39	1076.59	0.00	0.89
		Within measurements error	3.61	5	0.72			
		Between measurements effects	38.11	2	19.06	40.63	0.00	
		Between measurements error	1.89	10	0.19			
	Control group	Within measurements effects	1624.50	1	1624.50	876.83	0.00	0.54
		Within measurements error	7.83	5	1.57			
		Between measurements effects	1.33	2	0.67	5.91	0.02	

Statistics Mental variables			Type III Sum of Squares	df	Mean Square	F	Sig.	Effect Size (η^2)
		Between measurements error	1.33	10	0.13			
Image control	Experimental group	Within measurements effects	2069.39	1	2069.39	1648.19	0.00	0.93
		Within measurements error	9.61	5	1.92			
		Between measurements effects	64.11	2	32.06	61.38	0.00	
		Between measurements error	7.89	10	0.79			
	Control group	Within measurements effects	1334.72	1	1334.72	601.11	0.00	0.78
		Within measurements error	7.61	5	1.52			
		Between measurements effects	1.44	2	0.72	17.94	0.00	
		Between measurements error	1.22	10	0.12			
Overall Mental imagery	Experimental group	Within measurements effects	40233.39	1	40233.39	8158.77	0.00	0.95
		Within measurements error	52.94	5	10.59			
		Between measurements effects	7384.78	2	3692.39	102.16	0.00	
		Between measurements error	63.89	10	6.39			
	Control group	Within measurements effects	74369.39	1	74369.39	3590.40	0.00	0.91
		Within measurements error	47.61	5	9.52			
		Between measurements effects	1544.44	2	772.22	51.17	0.00	
		Between measurements error	61.56	10	6.16			

F significance at 0:01 between measurements = 6.61

F significance at 0:05 within measurements =4.10

Table (6) results reveal presence of statistically significant differences between repeated measurements (pre-in-between- post) in mental variables for research sample search where (F) calculated is higher (F) significance which at 0.05 level equal to (4.10) and at 0.01 level equal to (6.61), and that there is no statistically significant difference in vision imagery variable for control group.

Table (6) results also declare that effect size value (ETA square) is greater than 0.50, indicating the high effect size of the training program except for vision imagery variable for control group.

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Table (7)

Lowest significant difference (LSD) at 0.05 level between repeated measurements means (pre- in-between- post) for mental variables for research sample

Variables		Repeated measures		Difference between means	Significance level	Significance
Muscle tension	Experimental group	Pre	In-between measurement	27.67 *	0.00	Significant
			Post measurement	49.50 *	0.00	Significant
		In-between	Pre measurement	-27.67 *	0.00	Significant
			Post measurement	21.83 *	0.00	Significant
		post	Pre measurement	-49.50 *	0.00	Significant
			In-between measurement	-21.83 *	0.00	Significant
	Control group	Pre	In-between measurement	5.00*	0.00	Significant
			Post measurement	21.67 *	0.00	Significant
		In-between	Pre measurement	-5.00*	0.00	Significant
			Post measurement	16.67 *	0.00	Significant

Variables		Repeated measures		Difference between means	Significance level	Significance
		post	Pre measurement	-21.67 *	0.00	Significant
			In-between measurement	-16.67 *	0.00	Significant
Vision imagery	Experimental group	Pre	In-between measurement	-1.50*	0.01	Significant
			Post measurement	-2.50 *	0.01	Significant
		In-between	Pre measurement	1.500 *	0.01	Significant
			Post measurement	-1.00 *	0.01	Significant
		post	Pre measurement	2.500*	0.01	Significant
			In-between measurement	1.00*	0.01	Significant
	Control group	Pre	In-between measurement	There is no significant differences between the three measurements		
			Post measurement			
		In-between	Pre measurement			
			Post measurement			
		post	Pre measurement			
			In-between measurement			
Auditory imagery	Experimental group	Pre	In-between measurement	-1.83*	0.01	Significant
			Post measurement	-3.00*	0.00	Significant
		In-between	Pre measurement	1.83*	0.01	Significant
			Post measurement	-1.17*	0.00	Significant
		post	Pre measurement	3.00*	0.00	Significant
			In-between measurement	1.17*	0.00	Significant
	Control group	Pre	In-between measurement	-0.17	0.36	Not Significant
			Post measurement	-0.83*	0.04	Significant
		In-between	Pre measurement	0.17	0.36	Not Significant
			Post measurement	-0.67*	0.03	Significant
		post	Pre measurement	0.83*	0.04	Significant
			In-between measurement	0.67*	0.03	Significant
Locomotor	Experimental group	Pre	In-between measurement	-2.33*	0.00	Significant
			Post measurement	-3.50*	0.00	Significant
		In-between	Pre measurement	2.33*	0.00	Significant
			Post measurement	-1.17*	0.00	Significant
		post	Pre measurement	3.50*	0.00	Significant
			In-between measurement	1.17*	0.00	Significant
	Control group	Pre	In-between measurement	-0.33	0.17	Not Significant
			Post measurement	-0.67*	0.03	Significant
		In-between	Pre measurement	0.33	0.17	Not Significant
			Post measurement	-0.33	0.17	Not Significant
		post	Pre measurement	0.67*	0.03	Significant
			In-between measurement	0.33	0.17	Not Significant
Emotional state	Experimental group	Pre	In-between measurement	-3.17*	0.00	Significant
			Post measurement	-4.50*	0.00	Significant
		In-between	Pre measurement	3.17*	0.00	Significant
			Post measurement	-1.33*	0.00	Significant

Variables		Repeated measures		Difference between means	Significance level	Significance
		post	Pre measurement	4.50*	0.00	Significant
			In-between measurement	1.33*	0.00	Significant
	Control group	Pre	In-between measurement	-0.17	0.36	Not Significant
			Post measurement	-0.67*	0.03	Significant
		In-between	Pre measurement	0.17	0.36	Not Significant
			Post measurement	-0.50	0.08	Not Significant
		post	Pre measurement	0.67*	0.03	Significant
			In-between measurement	0.50	0.08	Not Significant
Image control	Experimental group	Pre	In-between measurement	-3.17*	0.00	Significant
			Post measurement	-4.50*	0.00	Significant
		In-between	Pre measurement	3.17*	0.00	Significant
			Post measurement	-1.33*	0.00	Significant
		post	Pre measurement	4.50*	0.00	Significant
			In-between measurement	1.33*	0.00	Significant
	Control group	Pre	In-between measurement	-0.67*	0.03	Significant
			Post measurement	-1.50*	0.00	Significant
		In-between	Pre measurement	0.67*	0.03	Significant
			Post measurement	-0.83*	0.04	Significant
		post	Pre measurement	1.50*	0.00	Significant
			In-between measurement	0.83*	0.04	Significant
Overall Mental imagery	Experimental group	Pre	In-between measurement	-12.00 *	0.00	Significant
			Post measurement	-18.00 *	0.00	Significant
		In-between	Pre measurement	12.00 *	0.00	Significant
			Post measurement	-6.00*	0.00	Significant
		post	Pre measurement	18.00 *	0.00	Significant
			In-between measurement	6.00*	0.00	Significant
	Control group	Pre	In-between measurement	-1.50*	0.02	Significant
			Post measurement	-4.17*	0.00	Significant
		In-between	Pre measurement	1.50*	0.02	Significant
			Post measurement	-2.67*	0.00	Significant
		post	Pre measurement	4.17*	0.00	Significant
			In-between measurement	2.67*	0.00	Significant

* Significant difference between means at 0.05 level

Table (8)
Improvement percentages between repeated measures for mental variables for experimental and control group

Variables	Group	Means		Improvement %		
				Pre	In-between	Post
Muscle Tension	Experimental	Pre	73		37.9	67.81
		In-between	45.33			48.16
		post	23.5			
	control	Pre	73.17		6.83	29.62
		In-between	68.17			24.45
		post	51.5			
Vision Imagery	Experimental	Pre	9.83		15.26	25.43
		In-between	11.33			8.83
		post	12.33			
	control	Pre	9.67		1.65	5.17
		In-between	9.83			3.46
		post	10.17			
Auditory Imagery	Experimental	Pre	9.33		19.72	32.15
		In-between	11.17			10.38
		post	12.33			
	control	Pre	9.5		1.79	8.74
		In-between	9.67			6.83
		post	10.33			
Locomotor	Experimental	Pre	9.33		25.08	37.51
		In-between	11.67			9.94
		post	12.83			
	control	Pre	9.17		3.6	7.2
		In-between	9.5			3.47
		post	9.83			
Emotional State	Experimental	Pre	8.17		38.68	55.08
		In-between	11.33			11.83
		post	12.67			
	control	Pre	8.33		2.04	8.04
		In-between	8.5			5.88
		post	9			
Image Control	Experimental	Pre	8.17		38.68	55.08
		In-between	11.33			11.83
		post	12.67			
	control	Pre	8.33		8.04	18.01
		In-between	9			9.22
		post	9.83			
Overall Mental Imagery	Experimental	Pre	44.83		26.77	40.15
		In-between	56.83			10.56
		post	62.83			
	control	Pre	45		3.33	9.27
		In-between	46.5			5.74
		post	49.17			

Graphs for mental measurements

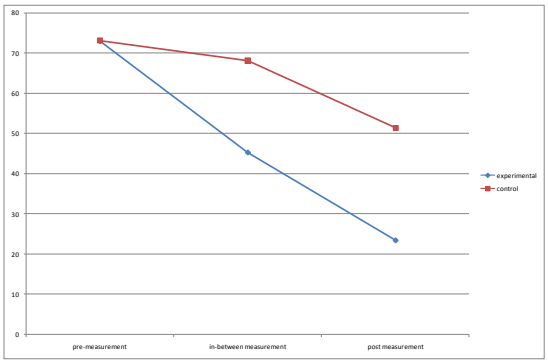

Fig (6) Muscle tension

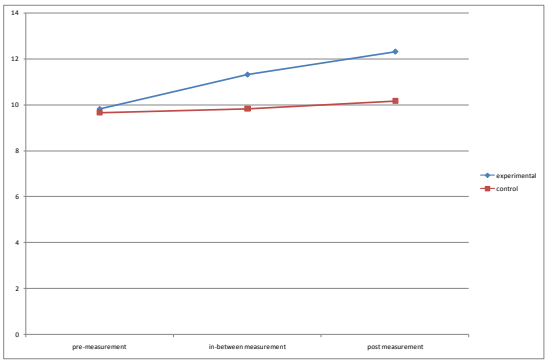

Fig (7) Vision imagery

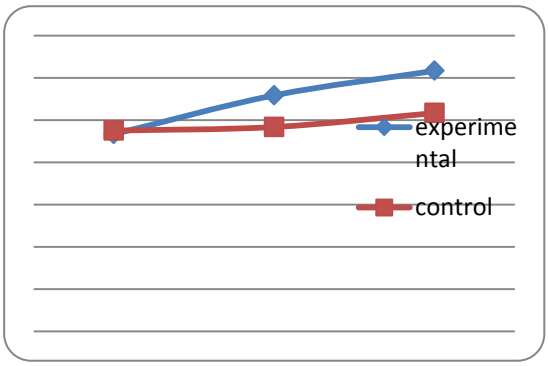

Fig (8) Auditory imagery

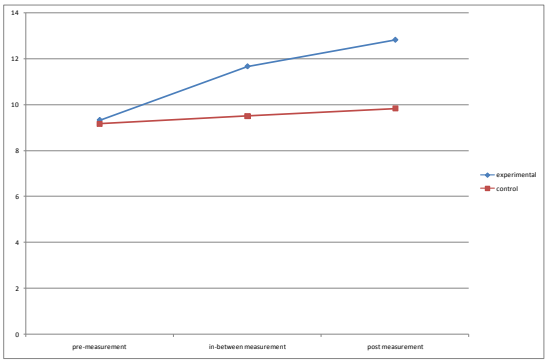

Fig (9) Locomotor

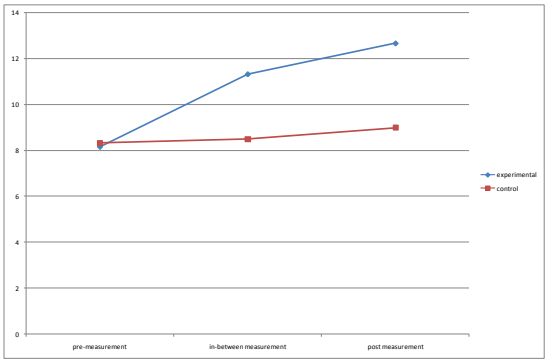

Fig (10) Emotional state

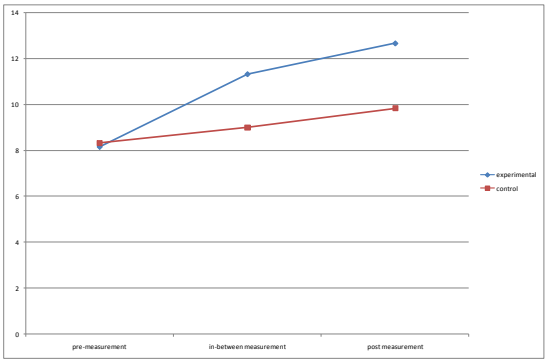

Fig (11) Image control

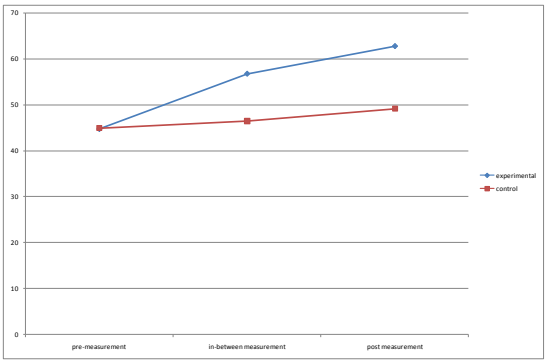

Fig (12) Overall mental imagery

Table (9)
Statistical significance for skill variable measurements between experimental and control groups

Statistics / Mental variables	Experimental group n=6						Experimental group n=6					
	Pre		In-between		Post		Pre		In-between		Post	
	Mean	±SD	Mean	±SD	Mean	±SD	Mean	±SD	Mean	±SD	Mean	±SD
Muscle tension	4.00	0.89	7.50	0.55	11.5	0.55	4.00	0.63	5.83	0.41	7.67	0.52

Table (10)
repeated measures ANAOVA (pre – In-between- post) for skill variables for research sample

Statistics / Mental variables			Type III Sum of Squares	df	Mean Square	F	Sig.	Effect Size (η^2)
Skill variable mark	Experimental group	Within measurements effects	1058.00	1	1058.00	1133.57	0.00	0.99
		Within measurements error	4.67	5	0.93			
		Between measurements effects	169.00	2	84.50	362.14	0.00	
		Between measurements error	2.33	10	0.32			
	Control group	Within measurements effects	612.50	1	612.50	967.11	0.00	0.98
		Within measurements error	3.17	5	0.63			
		Between measurements effects	40.33	2	20.17	201.67	0.00	
		Between measurements error	1.00	10	0.10			

F significance at 0:01 between measurements = 6.61

F significance at 0:05 within measurements =4.10

Table (10) results reveal presence of statistically significant differences between repeated measurements (in-between- post) in skill variables marks for research sample where (F) calculated is higher (F) significance which at 0.05 level equal to (4.10) and at 0.01 level equal to (6.61).

Table (10) results also declare that effect size value (ETA square) is greater than 0.50, indicating the high effect size of the training program on the skill variable mark.

Table (11)
Lowest significant difference (LSD) at 0.05 level between repeated measurements means (pre- in-between- post) for skill variables for research sample

Variables		Repeated measures		Difference between means	Significance level	Significance
Skill variable	Experimental group	Pre	In-between measurement	-3.50*	0.00	Significant
			Post measurement	-7.50*	0.00	Significant
		In-between	Pre measurement	3.50 *	0.00	Significant
			Post measurement	-4.00*	0.00	Significant
		post	Pre measurement	7.50 *	0.00	Significant
			In-between measurement	4.00 *	0.00	Significant
	Control group	Pre	In-between measurement	-1.83*	0.00	Significant
			Post measurement	-3.67 *	0.00	Significant
		In-between	Pre measurement	-1.83*	0.00	Significant
			Post measurement	-1.83*	0.00	Significant
		post	Pre measurement	3.67 *	0.00	Significant
			In-between measurement	1.83*	0.00	Significant

* Significant difference between means at 0.05 level

Table (12)
Improvement percentages between repeated measures for skill mark variables for experimental and control group

Variables	Group	Means		Improvement %		
				Pre	In-between	Post
Muscle Tension	Experimental	Pre	4		87.5	187.5
		In-between	7.5			53.33
		post	11.5			
	control	Pre	4		45.75	91.75
		In-between	5.83			31.56
		post	7.67			

Skill performance mark' s graph

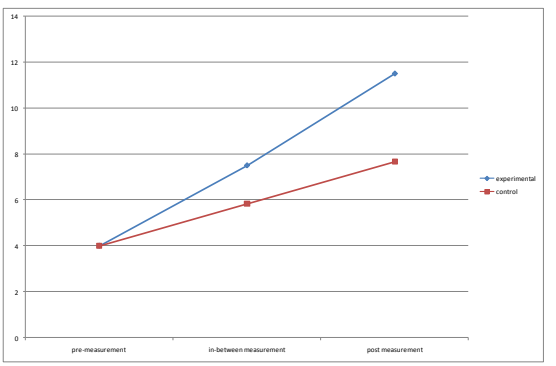

Fig (13) Skill performance mark

Discussion

Table (2) results reveal presence of statistically significant differences between repeated measurements (pre-in-between- post) in motor range variables for research sample search where (F) calculated is higher (F) significance which at 0.05 level equal to (4.10) and at 0.01 level equal to (6.61), and that there is no statistically significant difference in malkha variable for control group, as well as effect size value (ETA square) is greater than

0.50, indicating the high effect size of the training program except for malkha in control group, which indicate the proposed training program effectiveness and this shows that gymnast should has good level of flexibility to be able to learn and master skills. (Ukran. 1967, pp51-52)

Flexibility is important in skills performance, in both terms of quality or quantity it pose with the rest of other physical abilities the base of acquisition and master skill performance (Allawi.1994, pp190)

Flexibility is one of the necessary components in developing gymnasts' skill performance level (Sharaf, 1978, p12) and it is clear that it is necessary to take into account linking motor range exercises with force exercises to ensure work on balanced value of motor nervous system, and avoid one side development (Antenova, 1980, pp 60) also shoulder joint motor range improvement is where selected exercises play a major role beside force in all forms to reach the highest athletic ability.

Movement range effect in improving physical abilities level is more clear after introduction of complicated and difficult elements on parallel bars which are associated with skill under study, which require high training for shoulders joints (Allawia and radwan, 1993, p41)

Within the most important requirements for proper motor performance is to reach to high level of joints motor range (Ukran , 1967, p164)

Table (6) results reveal presence of statistically significant differences between repeated measurements (pre-in-between- post) in mental variables for research sample search where (F) calculated is higher (F) significance which at 0.05 level equal to (4.10) and at 0.01 level equal to (6.61), and that there is no statistically significant difference in vision imagery variable for control group, as well as effect size value (ETA square) is greater than 0.50, indicating the high effect size of the training program except for vision imagery variable for control group, which indicate the proposed mental training program effectiveness, experimental group achieved remarkable progress on favor of post measurement, this is due to proposed program effectiveness, and this is illustrated Tables (6-7) and figures (6 to 12). It is clear from this gymnast should has good level of psychological and mental abilities to be able to master and learn skills

The effect of the proposed mental imagery program on developing relaxation, and mental imagery for experimental group.

I - relaxation

Tables (6-8) illustrates statistical significance for in-between and post mental imagery for control and experimental groups, figure (6) for differences between the three measurement for muscle contraction, it is clear that there are statistically significant differences in muscle contraction level in favor of experimental group where the improvement percentage were 67% compared with 29% for control this result agrees with what mentioned by Alawi (2002, p253m), and Rateb (2000,pp129-130) that mental imagery could be used to train on some of psychological skills such as relaxation skill as mental imagery helps the player to relax in order to control pressure, anxiety and arousal.

This result is also consistent with what reported by Murray (1995, p355), Shamoon (2001, p166), Rateb and Zaki (1992,p345), Bassiouni (200,p22), Nafee (2005,p315), that relaxation exercises help to remove tension and nervous disorder in areas where tension centered during performance, such as the neck, face, arms, shoulders, back, hands and legs, relaxation exercises also help to achieve player's highest level because it allow to control body parts to prevent or mitigate stress occurrence.

Statistically significant difference between the three measurements for both experimental and control group could be returned in the effectiveness of the proposed mental imagery program, which is based on the use of relaxation exercises using progressive relaxation method to access muscle relaxation muscle in addition using breathing control methods and relaxation imagery to access progressive relaxation.

II - mental imagery

Tables (6-8) illustrates statistical significance for pre, in-between and post mental imagery for control and experimental groups, figures (7 to 12) for differences between the three measurement for mental imagery, it is clear that there are statistically significant differences in mental imagery in a;; aspects (vision, auditory, locomotor, emotional state, image control, and overall mental imagery) between control and experimental group in favor of the latest where the improvement percentage were 40.15% compared with 9.27% for control group.

This result is in agreement with what reported by Rajah (1985,pp317-318), Plessinger (1999,pp120-121), Rateb (2000, pp317-318), Shamoon (2001,pp 211-212), Allawi (2002, pp251, 318), Salem (2004,p121) that mental imagery helps to access the best level during training or competition, through development of performance elements sequence initially with slow speed to achieve greater understanding of skills performance nature and strengthen neural pathways for nerve signals sent from the

nervous system to groups leading skills, and then purification and improve and fix the final performance and also improve mental performance associated with level mental imagery.)

This result is in consistent with results Kandil and Morgan (1993, p461) Mahmoud and Elshahed (1998, p750), and Mefreh (1999, p105), which indicated the effectiveness of mental imagery in improving mental imagery skill for athletes (swimmers, fencers, and also gymnasts) and improve their skill level.

Researchers attribute experimental group outweigh the control group in visual in-between and post measurement aspects for experimental and control group in mental imagery variable (vision, auditory, locomotor, emotional state, image control, and overall mental imagery) to the effectiveness of the proposed mental imagery program, which is based on general mental imagery and image control using image imagery, control, and clarity exercises and multi-aspect mental imagery exercises using visual, auditory, emotional and kinesthetic sense, through the various display modes

Differences between post Bhavsar skill performance level for experimental and control groups

Table (10) results and figure (13) reveal presence of statistically significant differences between repeated measurements (in-between- post) in skill variables marks for research sample in favor of experimental group in all measurements for Bhavsar skill performance level

Bhavsar skill performance level improved within experimental group which outperformed control group in post measurement, improvement percentage reached (187.5%) for experimental group compared to (91.75%) for control and this is illustrated in figure (13).

This result is confirmed by Rateb (2000, pp317-318), Shamoon (2001, pp211-212) and Allawi (2002, p14) who assured that imagery plays an important role in the development of athlete level and abilities improve its performance and strengthen neural pathways for neurological indications sent from the nervous system to groups that perform skills and hence access to the best possible level with minimal effort.

This result is in consistent with results of Issawi (1997), Bakhit (2002), Salem (2004), Salem (2006), Al-Hariri (2006), Allam (2008), Oshiba (2009), who assured that mental imagery positively affect performance skills level way to improvement

This result is also in agreement with results Kandil and Morgan (1993, p461) Mahmoud and Elshahed (1998, p750), and Mefreh (1999, p105), which indicated the effectiveness of mental imagery in improving mental imagery skill for athletes (swimmers, fencers, and also gymnasts) and improve their skill level.

This result is also consistent with findings of Salem (1996, p316), and Salah (1998, p30), and Abdel-Razek (2000), which confirmed that using mental imagery raise technical performance level in men's artistic gymnastics and in rhythmic gymnastics as well, in this regard some specialized references indicate the importance of using mental imagery programs as a way for positive development of technical performance positive.

Selection of appropriate and suitable method for performance conditions in addition to employing specific physical ability related to skill, is reflected on learning speed, save time and effort and increase performance level. (Shehata, 1985, p174)

Learner should be supplied with continuous and orderly training to upgrade skills performance, as there is many physical exercise with gradual difficulties which allow using it in teaching and improve skills performance for different age levels from juniors to high levels (Abdel-Salam,1975, pp26-27)

It is clear that gymnastics skills performance development should be done using exercises with muscle work is similar to skill performance requirements in direction and in motor range. Ideal training method is based on using prevailing contractions in the competition exercises for same muscle work type to allow morphological adaptation, and necessity for training which is similar to gymnastics skills performance, aiming to strengthening the neural pathways and improve performance (Ahmad, 1992, p121), (Harra,1971,p155), (Danish,1982,p 69)

It is important for juniors to implement exercises for purpose of learning in various circumstances, which is located in the skill's primary motor area and are similar to different neural pathways' main form (Yusuf,1997,p69)

Researchers Attribute experimental group remarkable superiority over control group in post measurement of Bhavsar skill performance level to the effectiveness of the proposed mental imagery program, which is based on using relaxation exercises using progressive relaxation to access muscle relaxation, in addition to using breathing control methods and relaxation imagery to access mental relaxation and using general imagery and image control using image clarity and control exercises, multidimensional mental imagery using vision, auditory, locomotor and emotional excursuses, through various display modes. This includes locomotor abilities development exercises through development (sense of

force, direction, distance, time and muscular angular), the proposed program has a large part for locomotor abilities' development, mental imagery program was conducted along with with skill training program, which included training on Bhavsar skill through gradual educational steps until reaching the best possible level, and hence improving skill performance level for the skill under study.

So third hypothesis was proven.

From the above it is clear that both experimental and control groups have made significant progress in technical performance of skill under study, and experimental group outperformed the control group significantly in all variables. Researchers attribute this to the effectiveness of the proposed mental imagery program in developing some locomotor abilities and improving Bhavsar skill performance level.

Results:

Within research aim and followed procedures, following could be concluded:

- The experimental group surpassed the control group in in-between and post measurements of Bhavsar skill performance level on parallel bars for junior gymnasts under 15 years.
- The proposed mental imagery program significantly had a positive effect on developing some psychological skills: Relaxation - mental imagery aspects (vision - auditory – locomotor-emotional – image control in the pictures) for experimental group with improvement percentages greater than control group, where relaxation improvement percentage for control group was (67%) compared to (29%) for control group, and mental imagery for experimental group was (40.15%) compared to (9.27%) for control group.
- The proposed mental imagery program significantly had a positive effect on developing Bhavsar skill performance level for experimental group with improvement percentage equal to (187.5%) for experimental group compared to (91.75%) for control group.

Recommendations:

- Developing mental skills: muscular and mental relaxation, mental imagery (visual - auditory – locomotor - emotional – image Control) through mental imagery due to its positive impact on improving some psychological and mental skills.
- Strengthening practical performance in gymnastics skills training with mental imagery, due its positive effect in improving performance.
- More interest to be given to use mental imagery in training because it helps the player to identify skills nature and direct sensory and motor responses with correct image.
- Attention to be given to conduct such research of mental imagery in various sports activities.

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