EFFECT OF POWER POSING ON PSYCHOMOTOR PERFORMANCE IN HEALTHY VOLUNTEERS- A SHORT TERM PILOT STUDY

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ABSTRACT

BACKGROUND

The emotional status of an individual can change the body language. However, off late researchers have evidenced that body poses can influence hormones like testosterone and cortisol on immediate basis. The positive power poses are more open, wider and of confident kind, whereas negative power poses are contractive and less confident kind of body postures. We hypothesized that positive power poses might increase testosterone and decrease cortisol and stress on immediate basis, thereby affecting psychomotor function. Hence, it was worthwhile to conduct this study to assess the effect of power poses on psychomotor function.

METHODS

25 healthy participants were divided into 5 groups, each of 5. Group 1 performed positive power posing on 1st day and negative power posing on the next day i.e. the same group acted as positive and negative control on two different days. We did the procedure for the remaining four groups. During each session the participants were given information about the project and were first taught about the use of reaction time app and other instruments. After this we took the 1st set of readings followed by power posing. After power posing we took the 2nd set of readings. Each power pose was of 30 seconds and the total duration of procedure lasted for 4 minutes in each session. This was one time event only on the scheduled date.

RESULTS

The intra group analysis shows that positive power posing increases critical flicker fusion time by the magnitude of 0.73 (p= 0.0038), and has shown a drop in the reaction time by 34.22 seconds (p= 0.0926). The second intra group analysis on negative power posing demonstrated that there is a statistically and clinically relevant drop in the critical flicker fusion time by 1.7 (p= 0.0001) and there is a decrease in the hand steadiness performance which is shown by increased mistake by the performers by a magnitude of 14.57 (p= 0.1122). The reaction time has increased by a big margin of 50.75 seconds (p= 0.0004).

The inter group analysis shows that the positive power posing performance statistically and significantly improved critical flicker fusion test compared to the negative posing. The positive power posing postures have a tendency to improve the performance in hand steadiness test, although the difference is non-significant, when compared to negative poses. The negative power posing adversely affects the reaction time and causes more slowness in reaction which may be very crucial and important in fine motor performance.

CONCLUSIONS

This study suggests that single act of positive power posing affects the various psychomotor performance tests like critical fusion test, hand steadiness test and reaction time, favorably and the negative power posing causes deterioration in above psychomotor performance parameters except hand steadiness performance.

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BACKGROUND

The emotional status of an individual can change the body language. By observing a person's body language and posture, one can judge about the emotional condition. This is a known fact in the world of psychology but the other way round is also true as mentioned by a 20th century pioneering psychologist, William James in his "The Gospel of Relaxation", who stated that, by regulating the action, which is under the more direct control of the will, we can indirectly regulate the feeling.

Off late researchers have evidenced this fact that body posture can influence hormones like testosterone and cortisol on an immediate basis i.e. within minutes.[1] During stress, the body cortisol levels are raised and testosterone levels are decreased.[2,3] Lower testosterone levels are associated with higher mean reaction time,[4] also stress increases tremors as observed by Gomer F.E (the group exhibited greater tremors in post work stress of hand steadiness).[5]

In this project, subjects were given a set of body postures called as positive and negative power poses. The positive power poses being more open, wider and confident kind of body posture and negative power poses being contractive and less confident kind of body postures similar to what is described in the methodology section in this article.

We hypothesized that positive power poses increase testosterone and decrease cortisol and stress on an immediate basis, therefore, it is feasible to assess its effect on psychomotor function. These psychomotor function tests have been selected to monitor central nervous system, sensory and motor components. The tests included reaction time, critical flicker fusion test and hand steadiness test.[6,7] So, practice of positive power posing might increase psychomotor function in high skilled work. Also, negative power posing might adversely affect the psychomotor function.

Hence, the current study was undertaken to study the impact of positive and negative power posing for 4 minutes on psychomotor function.

Objectives

To study the impact of power posing for 4 minutes on psychomotor function which is assessed by mean reaction time, critical flicker fusion and hand steadiness.

METHODS

It was a pilot study carried out on healthy volunteers over a period of one month. The 25 healthy participants were divided in 5 groups, each of 5. Group 1 performed positive power posing on 1st day and negative power posing on the next day i.e. the same group acted as positive and negative control on two different days. We did the procedure for the remaining four groups. During each session the participants were given information about the project and were first taught about using the reaction time app and other instruments. After this we took the 1st set of readings followed by power posing. After power posing we took the 2nd set of readings. Each power pose was of 30 seconds and the total duration of procedure lasted for 4 min in each session. This was one time event only on the scheduled date.

The study did not involve any risk as such. We carried out three simple tests to assess psychomotor function.

1) Reaction time[8]

It was performed using an android mobile application called "REACTION TIME". The participants were explained about the entire procedure before going for the test. Participants were asked to press the START button on REACTION TIME application. Participants had to touch the screen immediately on appearance of green colour on screen. We took two sets of readings; 1st, before power posing and 2nd, after power posing. In each set, three readings were taken, and the average was taken as final reading.

2) Critical flicker fusion[9,10]

This was assessed using critical flicker fusion apparatus. The apparatus consists of a viewing tube at the end of which a red circle of light flickers at the rate of 5-50 cycles/second that is projected on to the non-reflecting surface. The apparatus was kept at a height at which the participant could sit with comfort and view circle of light with a constant diameter through it. The participants were told to view flickering light source through the eyepiece as close as possible to avoid ambient light. They were allowed to adapt to flicker frequency for one minute. They were instructed to rotate the knob that would increase the frequency of light. The knob has to be released when the subject sees fusion i.e. no more flickering or a steady light source is seen. The fusion frequency indicated on the display would be noted. Two sets of readings were taken in the similar way of reaction.

3) Hand steadiness[11,12]

The hand steadiness was tested on a steadiness tester. It is a device with a series of holes of varying sizes, a stylus and a digital counter. The instrument would be set at zero. The participant would be asked to hold the stylus with dominant hand and instructed to insert into the hole without making any contact with boundaries of the holes in a steady and constant manner, starting from the largest diameter hole to the smallest one. The number of errors were displayed on tester. Two sets of such readings were taken in the similar way of reaction time.

Figure 1

Figure 2

The positive and negative power poses were almost similar to as described by Amy Cuddy in her article [1]. There were 8 positive poses (photograph no 1) and 8 negative poses (photograph no 2). Twenty-five participants were divided in 5 groups, each of 5. Group 1 performed positive power posing on 1st day and negative power posing on the next day i.e. the same group acted as positive and negative control on two different days. Like this, we did for the remaining 4 groups.

During each session participants were given information about the project and were first taught about the use of reaction time app and other instruments. After this we took 1st set of readings followed by power posing. After power posing, we took 2nd set of readings. Each power pose was of 30 seconds and the total duration of procedure was 4 min in each session. This was one-time event on the scheduled date. Participants were asked to follow nearly the same and balanced diet prior to days of experiment and to take proper sleep.

The data was analysed by GraphPad Prism Ver. 5. The parameters were analysed by using paired "t" test.

Study was conducted in Department of Pharmacology, tertiary care teaching hospital, Nagpur. Study was carried out in the month of April/May 2016 and completed within one month. Approval from the institutional ethics committee was taken.

Inclusion Criteria

1. Healthy volunteers (on history) of either gender aged (18 -30 years)
2. Willing to participate in study.

Exclusion Criteria

1. The subject who has consumed alcohol or any drugs which affect psychomotor function like sedatives etc.
2. Any history suggestive of addictive behaviour, smoking etc.
3. Subjects receiving any other long-term treatment like antihypertensive, anti-diabetic, anti-tubercular drugs etc.

RESULTS

Sr. No.	Parameter	Baseline	After Positive Power Posing	Difference	p-value
1	Critical flicker fusion	38.22 ± 1.81	38.95 ± 1.91	-0.725	0.0038
2	hand steadiness	102.4 ± 54.24	76.29 ± 52.09	26.15	0.0048
3	Reaction time	390.2 ± 81.82	356 ± 45.53	34.22	0.0926

Table 1. Effect of Positive Power Posing on Various Psychomotor Performance Parameter (n=25)

Sr. No.	Parameter	Baseline	After Negative Power Posing	Difference	p-value
1	Critical Flicker Fusion	38.69 ± 2.48	37 ± 3.42	1.686	0.0001
2	Hand steadiness	95.22 ± 57.59	109.8 ± 54.98	-14.57	0.1122
3	Reaction Time	353.6 ± 45.95	404.4 ± 53.76	-50.75	0.0004

Table 2. Effect of Negative Power Posing on Various Psychomotor Performance Variables (n=25)

Sr. No.	Parameter	After Positive Power Posing	After Negative Power Posing	Difference	p- value
1	Critical flicker fusion	38.95 ± 0.43	37.6 ± 0.76	1.94 ± 0.88	0.0327
2	Hand steadiness	76.29 ± 11.65	109.8 ± 12.29	33.51 ± 16.94	0.0552
3	Reaction time	356 ± 10.18	404.4 ± 12.02	48.40 ± 15.75	0.0039

Table 3. Comparison Between Positive and Negative Power Posing Posture on Psychomotor Variables (n=25)

DISCUSSION

The intra group analysis of our study has shown that positive power posing increases critical flicker fusion time by the magnitude of 0.73 which is statistically significant. (P = 0.0038) (P value <0.05 is considered statistically significant). The critical flicker fusion is a surrogate measure of focus, attention and overall central nervous system integration. The increment in the critical flicker fusion time is an objective parameter indicating that posing activity has shown improvement in hand steadiness test by the magnitude of 26.15 (P = 0.0048) which is also statistical betterment of attention and focus.

The positive power posing causes a significant improvement in the fine motor performance. The positive power person has shown drop in the reaction time by 34.22 seconds, although it is not statistically significant (P = 0.0926), it shows improvement in the reactivity of the individual and is favourable for fine motor performance.

The second intra group analysis on negative power posing demonstrated that there is a statistically and clinically relevant drop in the critical flicker fusion time by 1.7 (P = 0.0001) and there is a decrease in the hand steadiness performance which is shown by increased mistake by the performers by the magnitude of 14.57 (P = 0.1122) although this increase in the hand steadiness test score is not statistically significant. The reaction time has increased by big margin of 50.75 seconds (P = 0.0004) which is statistically significant. Overall there is a detriment in the central nervous system functioning affecting the focus, attention and integration and reaction time as well, although it is not translated into deterioration in the fine motor performance.

The inter group analysis done with the comparison of positive and negative power posing postures shows that the positive power posing performance postures is statistically significantly and improving the critical flicker fusion test which shows that the focus, attention and central nervous system integration is improved with positive power posing than the negative.

There is a non-significant difference in the hand steadiness test performance between the two groups which indicates that positive and negative power posing does not have an immediate effect of the fine motor performance, although the positive power posing postures have a tendency to improve the performance. The reaction time between the two groups indicate that negative power posing adversely affects the reaction time and causes more slowness in reaction which may be very crucial and important in fine motor performance.

Earlier studies by Amy Cuddy on power posing have shown that there is an increase in the testosterone level and decrease in the cortisol levels immediately after the positive power posing activity and vice versa happens with the negative power posing postures. Various authors in various studies have also shown that power posing, particularly positive power posing, improves the confidence level in high stake performances like public speaking and exam performance etc.

Our own study done in healthy volunteers has suggested that there is a decrease in the blood pressure and pulse after positive power posing suggesting an increase in the parasympathetic activity and/or decrease in sympathomimetic activity.

The changes in the cortisol level in the central nervous system after positive and negative power posing seems to be affecting the autonomous nervous system and influencing the various fine motor activity indirectly. It is quite possible that increase or decrease in the cortisol level affects the production of adrenaline and noradrenaline thereby affecting the overall sympathetic and parasympathetic activity.

In our study, the improvement in the psychomotor performance after positive power posing might have been through and under a direct influence of cortisol and testosterone, and ultimately affecting the production of adrenaline, noradrenaline. However direct hormone level measurement studies on positive and negative power posing done simultaneously with psychomotor performance will validate such a claim.

This study was done on a single act of positive or negative power pose. The acquirement of repeated positive and negative power posing activities over a period of time in long-term might have a different effect on the psycho motor performance test.

The musculoskeletal system is playing important role in maintaining the posture through proprioception mechanism. In addition to this the musculoskeletal system may be playing an important role in stimulating emotional responses and then amplifying it. It is a speculative preposition as a proposed possible mechanism which needs to be investigated. A proposed Kinetico-emoticon amplification reflex, which would mean, if we acquire certain body posture or muscular positions then it could create corresponding emotions in amplified manner within the brain. This mechanism may be playing role in be positive implications of power posing and its impact on psychomotor performances through the changes in emotional reactions.

We recommend that the influence of positive and negative psychomotor power posing postures could also be studied in real life situations, in various simulations or video games or mobile games which require high level of psychomotor performance involving fine coordination and reaction time. The habituation effect of positive and negative power posture activities over a period of time could be extrapolated in future studies.

CONCLUSIONS

This present pilot study on healthy volunteers suggests that single act of positive power posing affects the various psychomotor performance tests like critical fusion test, hand steadiness test and reaction time favourably, and the negative power posing causes deterioration in above psychomotor performance parameters except hand steadiness performance.

REFERENCES

[1] Carney DR, Cuddy AJ, Yap AJ. Power posing: brief nonverbal displays affect neuroendocrine levels and risk tolerance. Psychol Sci 2010;21(10):1363-1368.
[2] Perlman RL, Chalfie M. Catecholamine release from the adrenal medulla. Clin Endocrinol Metab 1977;6(3):551-576.
[3] Skosnik PD, Chatterton RT, Swisher T, et al. Modulation of attentional inhibition by norepinephrine and cortisol after psychological stress. Int J Psychophysiol 2000;36(1):59-68.
[4] Muller MJ. Salivary testosterone and simple reaction time parameters. Neuropsychobiology 1994;30(4):173-177.
[5] Gomer FE, Silverstein LD, Berg WK, et al. Changes in electromyographic activity associated with occupational stress and poor performance in the workplace. Hum Factors 1987;29(2):131-143.
[6] Hindmarch I. Psychomotor function and psychoactive drugs. Br J Clin Pharmacol 1980;10(3):189-209.
[7] Broadbent DE. Performance and its measurement. Br J Clin Pharmac 1984;18 Suppl 1:5S-11S.
[8] Miceli L, Bednarova R, Rizzardo A, et al. Development of a test for recording both visual and auditory reaction times, potentially useful for future studies in patients on opioids therapy. Drug Des Devel Ther 2015;9:817-822.
[9] Parkin C, Kerr JS, Hindmarch I. The effects of practice on choice reaction time and critical flicker fusion threshold. Hum Psychopharmacol 1997;12(1):65-70.
[10] Turner P. Critical flicker frequency and centrally acting drugs. Brit J Ophthal 1968;52(3):245-250.
[11] Khade A, Bashir MS, Kale AS, et al. Study of the effect of nortriptyline and fluvoxamine on psychomotor functions in healthy volunteers. Indian J Psychol Med 2010;32(2):104-107.
[12] Kaur G, Sandhu SS, Sandhu JS. Comparison of arm-hand steadiness for shooting perfection in armed forces and Punjab police. The Anthropologist 2007;9(4):299-304.