



## Immediate effect of alternate douche to whole body on autonomic and respiratory variables in healthy volunteers

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### ABSTRACT

*Alternate douche is the one of the therapeutic treatment in naturopathy. Douche is the most satisfactory, flexible and adaptable tonic in hydrotherapy it may be employed at all temperatures like hot, cold and alternative and degrees of pressure can also be varied depending to the conditions. The present study aims to evaluate the physiological effects of alternate douche to whole body on healthy individuals. Totally 30 volunteers were selected. (Group 1) On Day 1 volunteers were given alternate douche intervention for 20 minutes and (Group 2) on day 2 the same volunteers are allowed to stand with their feet together, hands placed by the side of the body, palms facing inward in same room for 20 minutes. Assessments were made for both the groups before and after intervention. The assessments included were blood pressure (BP), heart rate (HR), heart rate variability (HRV), and respiratory rate (RR). Statistical analysis is done by using software SPSS (Statistical Package for the Social Sciences). The level of statistical significance was determined with  $p \leq 0.05$ . On comparison between groups shows significant difference in HR ( $p < 0.05$ ). Group 1 showed statistical significant changes in HF, mean RR, NN50, LF/HF ratio, and mean HR. The present study states that alternate douche stimulates the parasympathetic dominance so it can be effective for disorder of sympathetic dominance.*

**Keywords:** Alternate Douche, Heart Rate Variability, Healthy Volunteers

### 1. INTRODUCTION

Vitalism is a doctrine in the naturopathy philosophy, supported by assisting nature for health and healing using exercise [1], food, herbs [2], hydrotherapy to promote the elimination of internal waste [3]. Hydrotherapy is also called as water therapy, aquatic therapy, pool therapy, and balneotherapy [4]. The use of water therapeutically (hydrotherapy) which is part of naturopathy is nearly as old as medicine itself “water cures the fever’s glow” is the quote described in Rig Veda [5]. Hydrotherapy uses water at different temperature cold, neutral, warm, alternate [6]. On Cold water application as autonomic response that increase cutaneous vasomotor tone i.e. Vasoconstriction [7] and stimulating baroreceptor and cold

receptor [8]. Prolong cold diminishes the pulse rate and winternitz pointed out cold application increases the blood count [9]. Hot application gives reflexive response to the body by dilating the blood vessel to increase blood flow to keep the body cool. A short hot soak increase the production of endorphin- pain killer [10]. Alternate hot and cold application (contrast bath) improves superficial blood flow and skin temperature [11]. Alternate temperatures are used to produce revulsive effect. This effect helps in treating congestion, as it is decongestant also act as an analgesic for pain [12].

Douche is one of the major treatments in hydrotherapy. Douche also known as horizontal jet water may be employed at any temperature applicable to therapeutic purposes. Douches are classified according to their form, as the horizontal douche, vertical douche, fan, broken douche, Scotch douche, alternate douche. It is a compound procedure, combining both thermic and mechanical effects. Thermal effects of hydrotherapy are produced by the application of water at various temperatures. Mechanical effects of are produced by the impact of water upon the surface of the body. When used in its most vigorous and efficient form, it is capable of producing the most profound effects [13]. Douche appears to act by the massage which it which it exerts upon the muscle and increase contractility [14]. Douche is the most satisfactory, flexible and adaptable tonic in hydrotherapy it may be employed at all temperatures like hot, cold and alternative and degrees of pressure can also be varied [15]. In hydrotherapy studies related to the physiological effects of individual treatment modalities are less. It is essential to understand the underlying mechanisms before applying them as therapeutic agents. In hydrotherapy douche is also the line of treatment in the management of various disorders. Though Douche treatment has been used extensively in clinical scenario in both rejuvenation as well as therapy, its underlying mechanisms are less understood.

### 2. METHODS

The study adopts self as control trial. The healthy volunteers who are participating in this study have given their consent for being included in this study. Totally 30 volunteers were selected for this study. To conduct the study Institutional

ethical committee approval was obtained. On Day 1 volunteers underwent alternate douche to whole body and on Day 2 the same volunteers was made to stand in upright position in same chamber for 20 minutes. All the volunteers who have participated in the study were assessed before and after the treatment. Inclusion criteria are the volunteers between age group of 18 to 25 years and Body Mass Index (BMI) varies from 18-25kg/m<sup>2</sup>. Exclusion criteria are females during menstrual cycle [16], hot and cold intolerance and who are consuming alcohol and nicotine. Intervention procedure volunteers are made to stand with minimum dress. Volunteer was made to stand 5 feet apart from the apparatus. The douche is first applied to the posterior part of legs for a few seconds, then back and arms, then lateral part of the body on either side and then over the anterior portions of the legs and arms and the abdomen, ending with a strong dash upon the feet. The whole body may be gone over several times with hot and cold water in the manner suggested each particular region is given appropriate degree of pressure, the patient turning around as directed by the attendant [13]. Care is taken while the application is made to the chest. Arms are crossed over and palms are placed on the shoulders so that the heart and lungs are protected. No application is made to the face [13]. Pressure: 20 psi [13] Temperature: HOT DOUCHE: 100° to 104° F. [13], COLD DOUCHE: 45° to 70° F. [13] The level of statistical significance considered is p≤0.05 for the analysis and interpretation.

**3. RESULT**

**3.1. Comparison between the groups:**

Comparing between the groups Mann Whitney U test is used for variables like HF, LF/HF, RMSSD, NN50, pNN50, SBP, DBP, respiratory rate. Two sample t test is used for variables like LF, mean HR, mean RR. On comparing there is significant difference in HR (p=0.05)

**Table 1: Comparison between group I and group II**

Variables	P value	Name of the test
HF	0.10	Mann Whitney U test
LF	0.11	Two sample t test
LF/HF	0.35	Mann Whitney U test
Mean RR	0.37	Two sample t test
Mean HR	0.01*	Two sample t test
RMSSD	0.1	Mann Whitney U test
NN50	0.08	Mann Whitney U test
pNN50	0.07	Mann Whitney U test
SBP	0.1	Mann Whitney U test
DBP	0.6	Mann Whitney U test
Respiratory rate	0.7	Mann Whitney U test

\*Level of significance p<0.05

**3.2 Within groups:**

**Group I:** Wilcoxon signed rank test is used on comparing pre and post data of group I there is statistical significant difference in HR (p<0.05), LF/HF ratio (p<0.05), HF (p<0.05), NN50 (p<0.05), mean RR (p<0.05).

**Group II:** Analysis was done using Wilcoxon signed rank test there no significant different difference in group II

Wilcoxon signed rank test comparing “Post” with “Pre” values

\* p <0.05, \*\* p <0.01

(Note: ↑: increase; ↓: decrease)

\*Level of significance p<0.05

**Table 2: Pre and Post values of Group I**

Variable	GROUP I		
	Pre (Mean±SD)	Post (Mean±SD)	P value
High frequency(HF)	36.84±18.32	42.77±18.58*↑	0.05*
Low frequency(LF)	63.72±19.09	57.58±18.536	0.06
LF/HF ratio	2.78±3.18	2.29±3.06*↓	0.04*
mean RR	741.33±84.6 7	762.56±80.85* ↑	0.02*
Heart Rate	83.56±10.59	81.46±9.51*↓	0.05*
RMSSD	27.34±12.39	31.07±13.12	0.06
NN50	35.96±40.65	44.13±42.57** ↑	0.01*
pNN50	9.07±11.27	11.94±12.34	0.15
SBP	110.33±13.4 9	111.93±13.84	0.69
DBP	73.33±8.20	72±10.34	0.69
Respiratory rate	15.86±1.20	15.82±1.49	0.90

**Table3: Pre and Post values of Group II**

Variable	GROUP 2		
	Pre (Mean±SD)	Post (Mean±SD)	P value
High frequency(HF)	36.9±19.22	39.68±17.75	0.4
Low frequency(LF)	62.36±17.93	58.73±20.12	0.1
LF/HF ratio	2.79±2.85	2.72±2.52	0.5
mean RR	736.9±96.7	755.13±86.2	0.07
Heart Rate	83.56±10.59	84.13±10.38	0.07
RMSSD	27.74±12.69	27.25±12.04	0.08
NN50	35.96±40.65	36.56±39.65	0.1
pNN50	9.19±11.67	9.31±10.59	0.4
SBP	110.33±13.4 9	106.86±13.3 5	0.1
DBP	74.3±8.2	73.83±9.1	0.8
Respiratory rate	15.52±1.3	15.56±1.46	0.8

No significancy

**4. DISCUSSION**

This study evaluates the immediate effect of alternate douche to whole body in healthy individuals. In group I there is significant reduction in heart rate (HR) observed which is suggestive of parasympathetic dominance immediately after the intervention. This is further supported by the findings observed in components of HRV. There is significant changes in HF component, RMSSD, NN50, pNN50, mean RR and LF component, LF/HF ratio. In addition there are no significant changes in blood pressure and respiratory rate changes in present study.

The study done on hydrotherapy intervention of water immersion explained that hydrostatic pressure of water causes parasympathetic reactivation. The hydrostatic pressure in water reduces the vascular capacitance and shifting peripheral blood

volume into deep vessels of abdomen and thorax results in increase central blood volume [17, 18]. This increase in blood volume in chest region leads to changes in baroreceptor that causes reduction in HR [19]. Previous study by Mourot L and his associates explained dominance of parasympathetic activity and withdrawal of sympathetic activity, leads to a lower HR [17, 20]. In present study also there is reduction in HR which can be attributed to the mechanism explained.

In our present study there is increased central blood flow due to result of parasympathetic dominance and reduction in heart rate compared with the study by Craiem et al explains Increase flow in vessel causes higher levels of friction between blood and endothelium cells, that release NO, synthesized from L-arginine under the influence of the enzyme NO synthase (NOS) [21]. Imamura and Kihara suggest that Nitric oxide produced by the vascular endothelium causes relaxation of smooth muscle cells in the tunica media of the vessel wall. This causes dilation of the vessels, reducing endothelial damage, which subsequently improves blood flow, nutrient delivery and vessel health [22].

In present study water is employed at 20psi with alternate hot and cold creates cutaneous stimulation which is showing mechanical effect on the body is compared with earlier study by kubsch et al. on cutaneous stimulation through hot and cold application, massage concluded that there is reduction in pain and HR leads to shift of sympathetic to parasympathetic activity [23].

Our present study use hot and cold application of water to the body which is having revulsive effect. Previous study done on alternate hot and cold bath by D.J. Cochrane speculate shunting action of the blood caused by vasodilation and vasoconstriction with the use of alternate hot and cold respectively may be one of the mechanisms to removing metabolites in post exercise condition [24]. Our study has parasympathetic dominance which can be correlated with previous Study by Bruno Rodrigues and his colleagues explained that activation of vagus nerve would inhibit cytokine synthesis via cholinergic anti-inflammatory pathway [25].

## 5. CONCLUSION

To conclude after investigating the physiological effect of alternate douche to whole body on autonomic and respiratory variables, shows enhance parasympathetic activity. Based on this finding alternate douche can be applied for those lifestyle disorders with sympathetic dominance on conditions like insomnia, stress, endothelial dysfunction, hypo-gastric secretion, thyroid disorders, hypertension.

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