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Citation: [AIP Conference Proceedings](#) **1691**, 020003 (2015); doi: 10.1063/1.4937018

View online: <http://dx.doi.org/10.1063/1.4937018>

View Table of Contents: <http://scitation.aip.org/content/aip/proceeding/aipcp/1691?ver=pdfcov>

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Hydrotherapy: An Innovative Treatment for Obese Malaysians

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Abstract. Malaysia is ranked as a country with the most obese population in the Southeast Asia region, and placed sixth in the Asia Pacific. Obesity does not only influence the persons' mobility and quality of health, but could also link to medical leaves and absenteeism affecting the overall workforce productivity and efficiency. Routine physical activity is essential for good health and it is particularly important for those who are trying to lose weight or to maintain a healthy weight. However, it is disheartening to note that only 32.6 percent Malaysians above the age of 15 are involved in physical exercise or vigorous sports. There is an emergence of many types of hydrotherapy system, which are either active or passive and these can be at hospital settings, public places or in individual homes. Such hydrotherapy, if properly programmed can promote the physical activity amongst the obese in Malaysia. Current research on the use of active and passive hydrotherapy for obesity treatment was carried out. Subjects of both sexes and diverse age ranges, immersed themselves in a heated pool within hospital setting and in a bath tubs with high energy turbulent movement of medium temperature water. These hydrotherapy sessions provide a form of physical exercise in water as compared to on the land exercise. The findings of the hydrotherapy sessions have shown encouraging results. Quantitative data was analysed, with the help of descriptive statistics and paired sample t-test. Qualitative data was analysed manually with help of thematic analysis and specialised qualitative assessment software. This study reveals that hydrotherapy has improved patient's mobility, flexibility and exercise capability. Results reveal the reduction in the weight of subjects, with both quantitative and qualitative data results show that Hydrotherapy improved the quality of life in term of body pain reduction and general health improvement. Therefore, it can be concluded that the hydrotherapy can be seen as extensions of exercise and one of the methods in reducing body fat and weight.

BACKGROUND OF STUDY

The global burden of obesity and overweight is estimated to involve 1.4 billion adults, with over 200 million men and 300 million women are obese as World Health Organization (WHO) reported in 2013. Obesity is a well-established risk factor for cardiovascular disease and recognized as a major determinant of many other non-communicable diseases such as many types of cancers, gallbladder diseases, and respiratory problems and musculoskeletal disorders [2]. The research undertaken by Cawley, Rizzo and Haas [5] also reaffirmed that obesity has been related to ischemic heart disease, congestive heart failure, stroke, cancer, diabetes, hypertension, asthma, arthritis, degenerative joint diseases and depression.

The alarming rise in obesity amongst Malaysians has ranked Malaysia the most obese country in Southeast Asia region, and placed sixth in the Asia Pacific [10]. The co-morbidities of obesity produce financial costs to the health economy of many developed countries. Similar demands in Malaysia will impose a huge burden on the human and economic resources and are liable to disturb priorities in the health care or other sectors. There are many conventional mainstream strategies to tackle obesity related diseases which among others include the lifestyle and

clinical interventions as recognised by Malaysian Association for the Study of Obesity (MASO). Despite these efforts, national prevalence of obesity increases from 4.4% to 14.0% [12] and 15.1% [4] and overweight increases from 16.6% [12] to 29.1% [9] and 29.4% [4]. This research is aimed to answer the research questions which are: (1) Does hydrotherapy contributes to weight reduction of obese individuals? (2) Does hydrotherapy contributes to the Quality of life improvement of obese individuals?

Researchers have also claimed that water-based exercise is a relatively new concept in the management of people with “chronic obstructive pulmonary disease” (COPD) and documentation of evidence of its effect has only appeared in the literature in the last decade [11]. Researchers also confirm the lack of published trials and research projects on the risk/benefit ratio of such interventions in very old and/or polypathologic subjects [14]. This systematic review confirms that international recommendations for the non-pharmacological and non-evasive treatment of those aged between 70 - 80 with knee and hip problems [14]. The complementary nature of land-based and hydro exercises, and the need for reinforcement requires to be explained further with a strategies to sustain subjects physical activity [14]. Therefore, in order to find an alternative to obesity treatment in Malaysia, this study is conducted to identify role of active hydrotherapy and passive hydrotherapy in weight reduction and to improve quality of life of obese individual.

LITERATURE REVIEW

The rising concern on obesity in Malaysia has initiated several in depth studies on prevalence of obesity in the country. Using the World Health Organization (WHO) guidelines of Body Mass Index (BMI) ≥ 25.0 for overweight and BMI ≥ 30.0 for obesity, it was reported that in Malaysian adult males, 15.1% were overweight and 2.9% obese while in adult females, 17.9% were overweight and 5.7% obese [13]. Adult prevalence of overweight and obesity has been reported as the highest in Asian region and at an alarming rate in Asia-Pacific region. Figure 1.1 shows the prevalence of adult obesity in some Asians country.

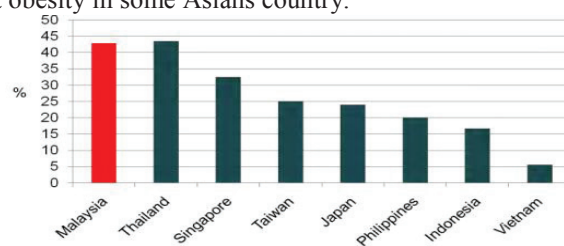


FIGURE 1. Adult Obesity Prevalence in Some Asian Country

Source: [18]

Due to water buoyancy, hydro (water -based) exercise would seem to be the safest way for obese individuals to perform vigorous physical activities as compared to on-land. With body weight reduced to almost 60%, the immersed obese individuals can exercise vigorously without hurting the joints, while at the same time producing increases in VO_2 max quite instantly [3]. However, it is not necessary for obese individual to be involved in very strenuous activities. Rather, low to medium intensity is sufficient, if done persistently [17]. Becker [3] suggested a chest-depth or deeper immersion of the body in the water performing hydro aerobic exercises alternating with balance and coordinated movements.

In current study two types of hydrotherapy are analysed, that are active and passive hydrotherapy. Active hydrotherapy involves in the use of a big pool of warm water where individual would perform their water-based exercises. This concept of therapeutic modality is not new; its roots go back to Roman and Greek times, people use warm baths and spas since Roman and Greek times. Active hydrotherapy normally involves a group of individuals performing those specific movements and exercises with assistance from a certified hydro therapist. Depending on sickness, each session typically lasts an average of 45 to 60 minutes. Most active hydrotherapy treatment research is done to identify the effectiveness of hydrotherapy in pain reduction; very rare research is done to connect this phenomenon with weight reduction initiatives. Therefore, this study aimed to identify the hydrotherapy process role in obese patient weight reduction.

Passive hydrotherapy is typically involved a smaller water body such as in a spa tub. The warm water is energized mechanically by a machine that produces high-energy ultrasonic speed air jets that bubbles the water streams. The water temperature typically ranges from 34 to 40 degrees Celsius. In this modality, the individual

would not be actively involved (passive) in any movements in water. Instead, the high capacity air compressor blower would energised and bubble the warm water. This high-energy water will create water turbulence and that will massage the body and give a therapeutic and soothing feeling to the individual. Some examples of passive hydrotherapy are whirlpool therapy, balneotherapy, ultrasonic bubble bath, etc. Essential oils, mineral salts, and other form of aromatherapy may be added to enhance treatment. Passive hydrotherapy is normally a self-service treatment without the need of any therapist. Each session typically last for few minutes to a maximum 45minutes.

RESEARCH METHODOLOGY

The hydrotherapy intervention experiments for active, passive and controled group involved total 9 subjects. The initial proposal was to conduct these experiments at the established hydrotherapy center within selected government hospitals. However, there were issues in obtaining the necessary permission resulting in few subjects for these experiments.

Subjects were subjected to the protocols for each active, passive as well as for the controlled group. Interviews with the subjects were also conducted during the experiment. Data was collected with the use of a quantitative form, SF-36V2 (SF-36 Version 2.0), an establised and well accepted instrument for a Medical Outcome Study. SF-36V2 measures the health status and quality of life of It consists of an 5-scale and has been documented in more than 4,000 medical related publications [15]. Quantitative data is analysed with the help of descriptive statistic, to analyse the difference between pre and post-test, paired sample t-test is used with the help of Statistical Package for Social Science (SPSS Version 22) to determine the significant level of difference between pre-test and post-test results. Structured interviews were conduted before and after hydrptherpy experiments. Qualitative data is analysed with the help of Nvivo software (Version 10) and thematic analysis.

RESULTS AND FINDINGS

Active Hydrotherapy

Two subjects fully completed the sessions while the third subject had discontinued with the session due to personal reasons. In the course of active hydrotherapy session, all subjects felt the improvement in their mobility, flexibility and exercise capability. This is consistent with the findings by Cider et al. [6] that physical training in warm water provides improvement in muscle function and exercise capability in patients with chronic heart failure (CHF). Tables below show the result on Demographic and on SF-36v2 Questionnaire for both pre and post-active hydrotherapy sessions for all three subjects.

TABLE 1. Result of Active Hydrotherapy for Subject 1 and Subject 2

Parameters	Subject 1			Subject 2		
	Pre	Post	Difference	Pre	Post	Difference
Date	22/08/2013	18/11/2013	-	20/09/2013	18/11/2013	-
Weight (kg)	83.7	84.4	+ 0.7	82.3	82.9	+ 0.6
Height (cm)	152	152	-	156.5	156.5	-
BMI (kg/m²)	37.2	37.51	+ 0.31	33.6	33.85	+ 0.25
Waist Circumference (cm)	100	102	+ 2	103	100	- 3
Waist Hip Ratio	0.84	0.86	+ 0.02	0.85	0.88	+ 0.03
Skinfold – Abdomen	6 cm 19 mm	6 cm 1 mm	-18 mm	6 cm 7 mm	6 cm 2 mm	- 5 mm
Skinfold- Triceps (R / L)	4 cm 52 mm / 4 cm 11 mm	4 cm 25 mm / 4 cm 10 mm	- 27 mm / - 1 mm	4 cm 14 mm / 4 cm 18 mm	3 cm 12 mm / 3 cm 7 mm	- 2 mm / - 11 mm

TABLE 2. SF36v2 Health Survey Questionnaire for Active Hydrotherapy (Subject 1 and Subject 2)

Parameters	Subject 1			Subject 2		
	Pre	Post	Difference (%)	Pre	Post	Difference (%)
Physical functioning (PF)	21.3	31.8	+49.3	33.9	44.4	+31.0
Physical role (RP)	20.1	39.7	+97.5	32.4	34.8	+7.4
Bodily pain (BP)	33	46.1	+39.7	33	32.8	-0.2
General health (GH)	48.2	50.6	+5	35.3	48.2	+36.5
Vitality (VT)	45.8	49	+7	42.7	42.7	0
Social functioning (SF)	40.5	45.9	+13.3	24.1	29.6	+22.8
Emotional role (RE)	24.8	32.6	+31.5	34.8	28.7	-17.5
Mental (MH)	35.9	38.7	+7.8	27.5	35.9	+30.5

Table 1 shows that there is significant difference between the pre-test and post-test results of BMI, weight and skinfold abdomen of subject 1 and subject 2, though weight and BMI increase but skinfold-abdomen reduced. Table 2 shows that there is significant positive difference between pre-test and post-test results for Quality of life improvement after active hydrotherapy sessions. All subjects reaffirmed that they felt tremendous improvement in their quality of life. Active hydrotherapy helped subjects in body pain reduction, reduced emotional behaviour, improved physical activity and overall improved the general health. Subject 3 withdrawn from the intervention due to personal problems.

TABLE 3. Summary of Analysis and QoL Result of Passive Hydrotherapy

	Parameters	Subject A (%)	Subject B (%)	Subject C (%)	Average (%)
Summary of Analysis	Weight (kg/m ²)	-2.69	-2.62	-2.14	-2.48
	BMI (kg/m ²)	-2.11	-4.11	-2.53	-2.92
	WC (cm)	-2.91	-7.29	-7.42	-5.87
	WHR	-1.14	-3.96	-13.59	-6.23
Summary of QoL Result	PCS	+3.2	+3.5	+2.4	+3.03
	MCS	+2.0	+3.7	-0.8	+1.63

Note: - indicate reduction

Passive Hydrotherapy

Table 3 shows, all parameters in passive hydrotherapy showed a good percentage of reduction. A good 2.48% reduction in weight is significant because it was achieved within 10 days. An average of almost 6 cm reduction in the waist line is another evident that passive hydrotherapy procedure is worth considered when treating obesity. On the average, the QoL showed improvement both in the PCS and MCS, though a marginal value for the MCS as shown in Table 3. All subjects had very positive feedback on the passive hydrotherapy sessions: soothing, relaxing and calming effects. Subject A further reaffirms that she immediately experienced the “lightness” in her body and felt easier to move around even at the very first passive hydrotherapy session.

TABLE 4. Paired Sample T-test Results

	Active Hydrotherapy Paired sample-test (p) Value	Passive Hydrotherapy Paired sample-test (p) Value	Controlled group Paired sample-test (p) Value
Quality of Life	0.031	0.042	0.894
Weight Reduction	0.038	0.027	0.95

Table 4 shows the results of Paired Sample t-test, results reveal there is significant difference between pre-test and post results of active hydrotherapy, passive hydrotherapy as value of p is below 0.05. Table 3 shows that significant difference is not observed for pre-test and post-test of controlled group, as value of p is not less than 0.05.

Qualitative Data Analysis

TABLE 5. Data Matrices and Pattern Matching before Hydrotherapy

Themes	Interviewee 1	Interviewee 2	Interviewee 3
Knee Pain	Complained of soreness at the knee and leg, pain in knee	Pain in joints of bones	Feel pain in body
Walk	Cannot walk for long way, difficult to go upstairs, feel backache while climbing stairs	Difficult to walk, breathlessness after fast walk	Difficult to walk
Blood Pressure	High Blood pressure	High blood pressure complain	
Refreshment and Happiness	Never feel fresh	Fear from Health condition	Feel shame for heavy weight, reluctant to join social activities and depressed
Body Weight	Feel heavy body	Feel heaviness when walk	Feel heaviness

TABLE 6. Data Matrices and Pattern Matching after Hydrotherapy

Themes	Interviewee 1	Interviewee 2	Interviewee 3
Pain	No pain in knee and body, easy to climb stairs,	Joint Pain reduced	Body pain reduced while walking
Relax	Feel relax	Feel relax	Feel excited and relax
Walk	Feel easy to walk	Easy to move	Easy to walk
Blood Pressure	Blood pressure reduced	Blood Pressure reduced	
Refreshment and Happiness	Feel Happy, fresh	Feel Excited, best way for exercise and safe way	Fresh, and back to normal life
Body Weight	Body weight reduced up to 2.5 KG. Not feel heaviness	Weight reduced and feel light	She believes that Passive Hydrotherapy is way to reduce weight

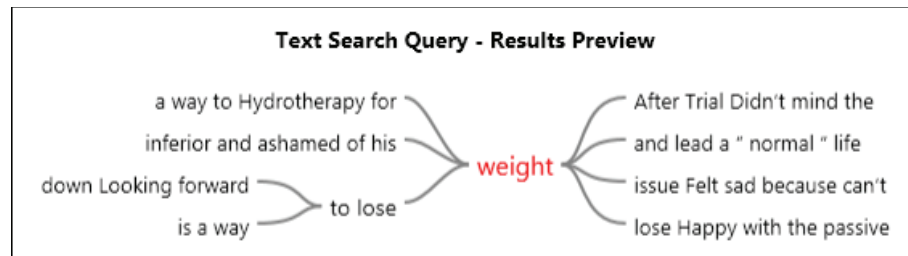


FIGURE 2. Text Search Query Result Interview



FIGURE 3. Text Search Query Result Interview

Figure 2 and 3 shows results of text search query, extracted from Nvivo software. Figure shows that after hydrotherapy sessions significant improvements have been observed by all subjects. Hydrotherapy has made obese subjects life happier and given them a hope to lose the weight and to come back in normal life. Based on Text Search Query themes derived from data, results mentioned in table 6. Table 5, shows subjects were feeling pain in body during and difficulties during walk, this disturbed their social life. Table 6 shows results of qualitative data, from interviews analysis it has been observed that all subjects admired hydrotherapy. All Subjects stated that hydrotherapy keeping them fresh and this is a mean for reduction.

DISCUSSION AND CONCLUSION

In active hydrotherapy physically, Subject 1 and Subject 2 both showed an insignificant increment in their weights of about 0.8% and 0.7% respectively, thus increasing their BMIs accordingly. However, both of them had their Skinfold- abdomen and skinfold - Triceps readings reduced after going through active hydrotherapy treatments with vigorous movements in the pool. Thus though subjects gained weight, the total body fat had reduced. Reduced total body fat means reducing the risk of heart diseases [7].

All parameters in passive hydrotherapy showed a good percentage of reduction. A good 2.48% reduction in weight is significant because it was achieved within 10 days. An average of almost 6 cm reduction in the waist line is another evident that hydrotherapy procedure is worth considered when treating obesity. On the average, the QoL showed improvement both in the PCS and MCS, though a marginal value for the MCS.

Comparing the control group results with the active and passive subjects, most readings in the control group remained unchanged. Result of this study is consistent with previous studies, recently conducted studies [1, 2, and 16] also found that that water-based exercise program could reduce pain and improve symptoms, motor function in daily and sport recreational activities and quality of life. The most recent results found by [8] are also consistent with current study, researcher revealed that based on our findings, WHR, PBF, BMI, trunk muscle mass, and low back pain (both physical and psychological symptoms) were significantly improved after the intervention. Comparing results of Quantitative method and Qualitative method, showing parallel results, therefore triangulation method adopted in this study validate the results of this study. Current study contributes to the body of knowledge of existing literature for hydrotherapy; secondly, current study used mixed research method in term of methodology, which is also methodological contribution to hydrotherapy literature. Thirdly current study attempted to solve

national issue of Malaysia, as obesity is increasing very rapidly, this study introducing a new method for losing weight.

PRACTICAL IMPLICATION, LIMITATION AND FUTURE RESEARCH

The researcher believes this is the first study that tested two types of hydrotherapy (Active and Passive). Results showed that passive hydrotherapy was more effective and result oriented. Results and finding of this study can improve the current system of hydrotherapy as offered by the Malaysian government hospitals and other private healthcare centres. For this matter, passive hydrotherapy can even be used at the convenience of a private home, community centres or other commercial establishments. This will give immediate and easy access by the public to such kind of new type of hydrotherapy, without having to go through the hospital rigorously protocol and time-consuming procedures. Significant reduction in weight and improved quality of life is observed from current results. Therefore, the government should come up with strategized planning to make this type of simplified and user-friendly hydrotherapy system, which should be easily accessible to the overweight and obese individuals as well as general Malaysian public. Information retrieved from this research will add value to the body of knowledge for hydrotherapy. However, researcher tried to cover all aspects of the hydrotherapy but still there are few limitations. A major limitation was access to hydrotherapy centres at the government hospitals for experiment purposes, resulting in only few numbers of subjects in this experiment. In future sample size may be increased and other statistical tools can be used to further scrutinize and analyse data.

Acknowledgments

First of all, I am grateful to Allah S.W.T for giving me the opportunity, motivation and strength to complete this study. I am thankful to co-authors, for their support during entire study. I would like to give many thanks my mother HjH Hawa binti Hj Ali for her prayers and understanding throughout my study.

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