MEASURING THE EFFICACY OF WHOLE BODY VIBRATION MACHINE WBV 3000 FOR PEOPLE WITH NEUROMUSCULAR CONDITIONS.

Research by

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MEASURING THE EFFICACY OF WHOLE BODY VIBRATION MACHINE WBV 3000 FOR PEOPLE WITH NEUROMUSCULAR CONDITIONS.

1.0 Research Description

There is increasing usage of Whole Body Vibration machines in the market place sold to the public from retail outlets, on line sales and in recent years also as a modality of treatment or adjacent of treatment in clinical settings.

The importance of Whole Body Vibration in the clinical setting has not been explored well nor its efficacy as a adjunctive clinical tool for neuromuscular conditions.

2.0 Aim of Research

This research sets out to examine the efficacy of the machine WBV 3000 for patients with neuromuscular conditions and how the machine used as an adjunctive tool in relation to clinical neuromuscular care has its place in rehabilitation.

3.0 Scientific Trends

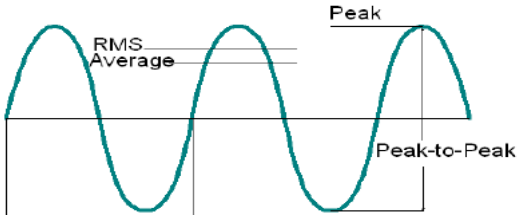
The Bibliography appended herewith provides information on the current and latest research on the science of vibration and / or whole body vibration.

Little has however been documented specifically on the efficacy of neuromuscular systems with WBV hence the importance of this research.

4.0 Vibration and the Neuromuscular System

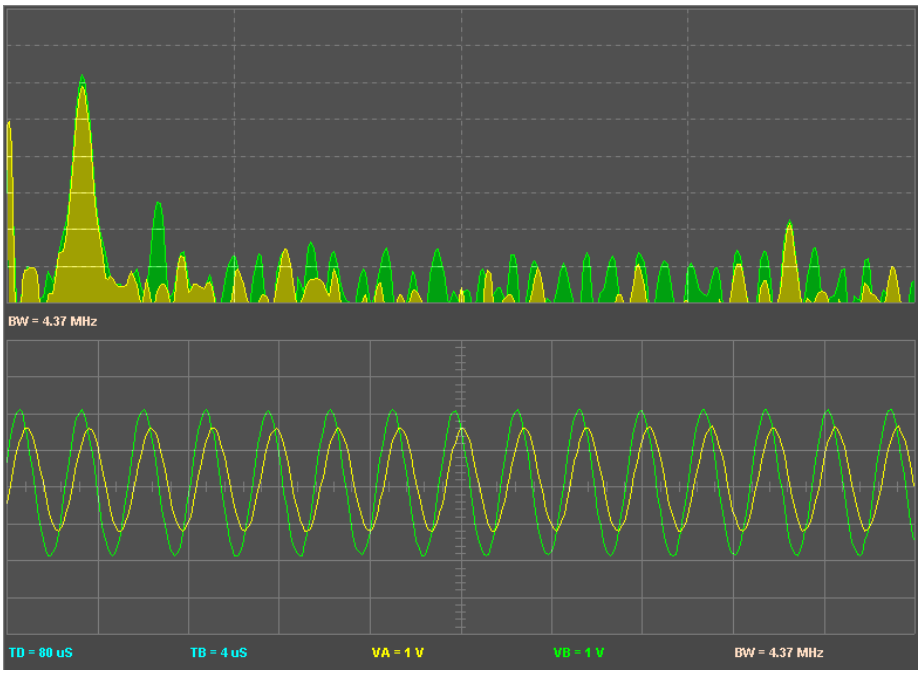
Definitions:

Vibrations: Vibration refers to mechanical oscillations about an equilibrium point. The oscillations may be periodic such as the motion of a pendulum or random such as the movement of a tire on a gravel road



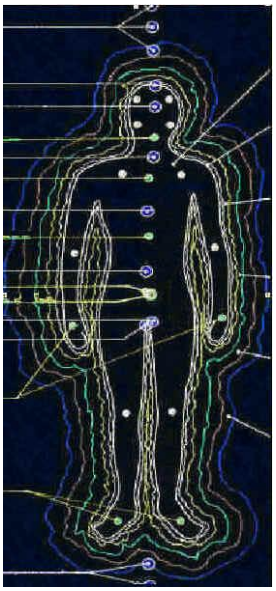
Resonance: when one object vibrating at the same natural frequency of a second object forces that second object into vibrational motion. The result of resonance is always a large vibration. Regardless of the vibrating system, if resonance occurs, a large vibration results

The picture below shows the resonance frequency being found for an antenna. The green shows the generated sine wave and the yellow shows the circuit response. The highest peak in the spectral graph shows the fundamental frequency in near prefect resonance



Neuromuscular System: The nervous system and our muscles operate together to control, direct and allow movement of the body.

Recent studies have suggested that low amplitude, low frequency mechanical stimulation of the human body is a safe and effective way to exercise musculoskeletal structures, increasing muscular strength and power.

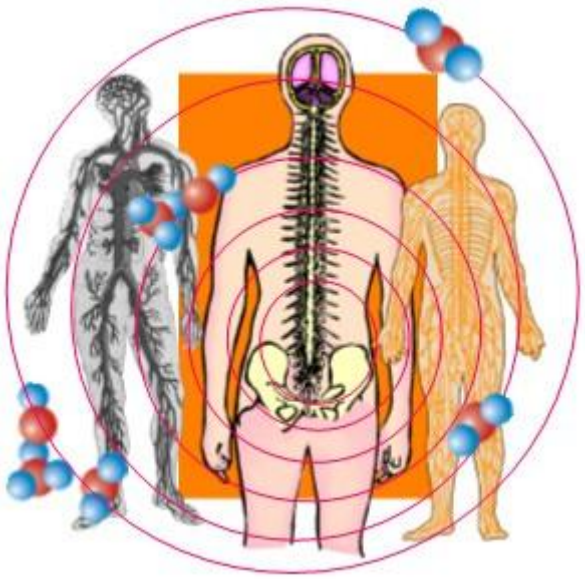


During everyday activities our bodies interact with the external environment and experience externally applied forces. These forces induce vibrations and oscillations within the tissues of the body. Tissue vibrations can be induced from impact related events where either a part of the body or sporting equipment in contact with the body collides with an object. Examples of this are the impact shocks that are experienced through the leg when the heel strikes the ground during each running stride or the impact shock that occurs when a racquet is used to hit a ball. The initial impact causes vibrations within the soft tissues, after which the tissues continue to oscillate as a free vibration—that is, vibrating at their natural frequency, with the amplitude of these vibrations decaying because of damping within the tissues.

Tissue vibrations can also be induced when the body experiences more continuous forms of vibration, such as may occur through the legs during skiing across a groomed slope or through the arms during bike riding. A continuously oscillating input force drives the soft tissue vibrations to be at the same frequency as the input force, but the amplitude of the vibrations will be greatest if the natural frequency of the tissues is close to that of the input force (resonance); however, the amplitude of these larger amplitude vibrations can be reduced by damping from the tissues. Therefore we can expect to experience soft tissue vibrations in all sporting activities, and the amplitude and frequency of these vibrations is partly determined by the natural frequency and damping characteristics of the tissues.

The body relies on a range of structures and mechanisms to regulate the transmission of impact shocks and vibrations through the body including: bone, cartilage, synovial fluids, soft tissues, joint kinematics, and muscular activity. Changes in joint kinematics and muscle activity can be controlled on a short time scale and are used by the body to change its vibration response to external forces. It has been proposed that the body has a strategy of ‘‘tuning’’ its muscle activity to reduce its soft tissue vibrations in an attempt to reduce such deleterious effects. This idea would predict that the level of muscle activity used for a particular movement task is, to some degree, dependent on the interaction between the body and the externally applied vibration forces.

WBV relies on the resonance theory when used in Neuromuscular Therapy. Our bodies have their own natural frequencies and are constantly vibrating. When the Neuromuscular System is out of balance and consequently presenting with symptoms such as pain or muscle tension, the body interacting with the external environment causes changes internal to the body and more specifically, the vibration of the tissues. When standing on the WBV, the vibrating mechanism counteracts the vibrations within the body and muscular system, to bring the body back to the natural vibrating frequency (through resonance).



5.0 Research Design

A clinical setting where the WBV 3000 has been chosen largely because it the protocol for treatment has been inclusive of the WBV 3000 for the past three years.

Patients are selected over the continual basis of two weeks and all patients who use the WBV 3000 as part of their established routine once their treatment plan has been provided.

Patients will be issued a questionnaire which will be a multi choice design with a small section for qualitative input. The primary design of this research is therefore quantitative in nature.

Patients will be asked to rank their experiences on the WBV 3000 in relation to the following categories:

a. Symptomatology

b. Level of perceived Pain

c. Functional changes

d. Perception of the machine

e. Usability outside of the clinical setting

5.1 Researchers Involved

Ian Wee – Project Research Director. Principal Occupational Therapist, Managing Director PIHC

Inez Ngiau – Principal Researcher. Consultant Occupational Therapist.

Lucy Liongue – Researcher. Principal Occupational Therapist.

Julian Mancini – Researcher. Senior Consultant. Exercise Physiologist & Occupational Therapist.

5.2 Selection Criteria

1. Males and females
2. Adults from age of 18 years onwards
3. Patients who have been provided with treatment plans
4. Absence of acute based neuromuscular or neurological symptoms
5. Excluding patents with Neurological Diseases such as Multiple Sclerosis, Parkinson's etc.
6. Excluding pregnant women
7. Participants need to experience the WBV 3000 for more than one time to qualify

5.3 Research Methodology

Patients within the clinic setting are approached by the Principal Researcher, Researchers or Clinical Assistants and asked if they would partake of a short research questionnaire.

Those who provide verbal consent are then issued with the Research Consent Form, instructions on the use of this form and brief explanation of this research prior to commencement.

The research questionnaire proper is attached to these forms and the patients asked to complete these forms once consent has been provided in writing.

The Researchers are not privy nor do they discuss the contents of the questionnaire to the patients (research subjects) unless a query is raised.

These forms are administrated at three possible scenarios namely:

a. Upon entry into the clinic;
b. While waiting for the practitioner for their appointment;
c. Or while waiting for the use of the WBV 3000 or immediately after using it.

Completed questionnaires are then handed back to the front counter by the patients (subjects) and the Administrative Assistants then separate the consent forms from the actual research questionnaire to ensure anonymity.

The consent forms are filed in a separate folder for collation by the researchers as part of the duty of care for research design and protocols.

The completed research questionnaire is deposited by the Administrative Assistant into a covered secure Box labeled "WBV 3000 Research".

The contents of this Box are cleared twice a day by the Principal Researcher at the end of each clinical shift.

Collation of statistical data is then computed on a daily basis without analysis using Excel as the repository for the data collection.

5.4 Research Questionnaire

Please refer to submission labeled Appendix A.

5.5 Consent Form

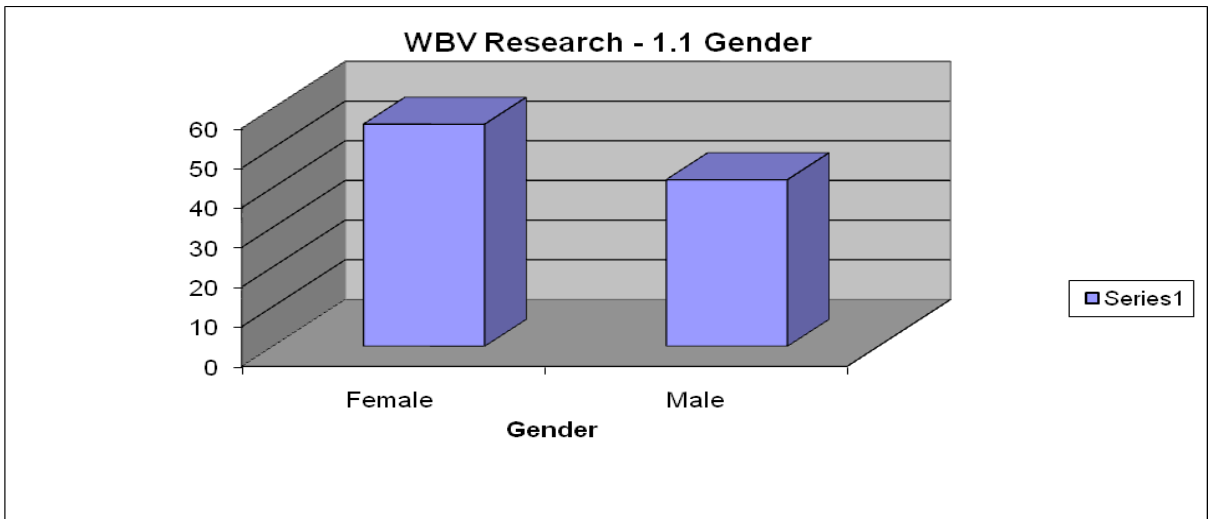
Please refer to submission labeled Appendix B.

6.0 Research Findings

Gender: A total of 98 respondents participated in this research over a period of two weeks. These individuals completed the research on their own volition.

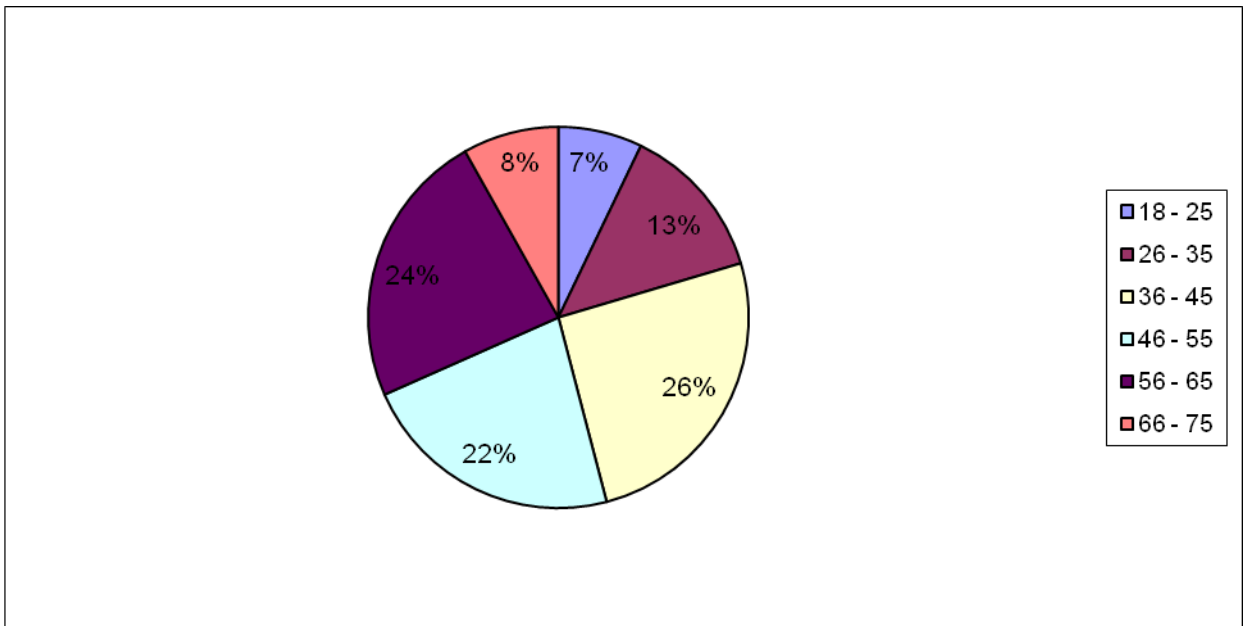
Out of the 98 respondents, 56 were female while 42 were male, thus reflecting the generalized trends also in society here in Australia with more females than males.

The representative chart of these demographics is appended:



6.1 Age Range:

The age range of the respondents once again reflected the generalized trends observed in the Australian population in the following way:

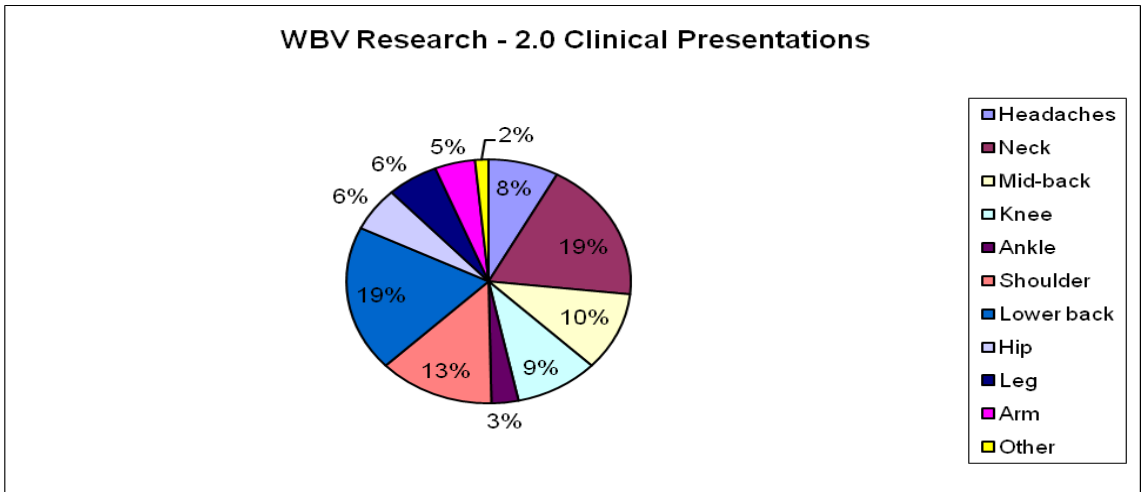


The significance of the age range indicates that those entering into the second phase of life, namely the 56 year old and above category, is represented by a staggering 32% of the population.

It makes a lot of sense that this age group needs to be independent, functional and in as good in health as possible within the next 20 years especially in this era of the shrinking health care dollar.

Independence provided through wellness programs and devices such as the WBV 3000 would aid and assist in this age group.

6.2 Clinical Presentation:



The type of clinical presentation manifested by the respondents reflect the current norms and trends of people with neuromuscular disorders. Research previously has always recorded the highest incident rate of neuromuscular disorders in the Lumbar region (incorporating Lower Back and Hip) at 25% and

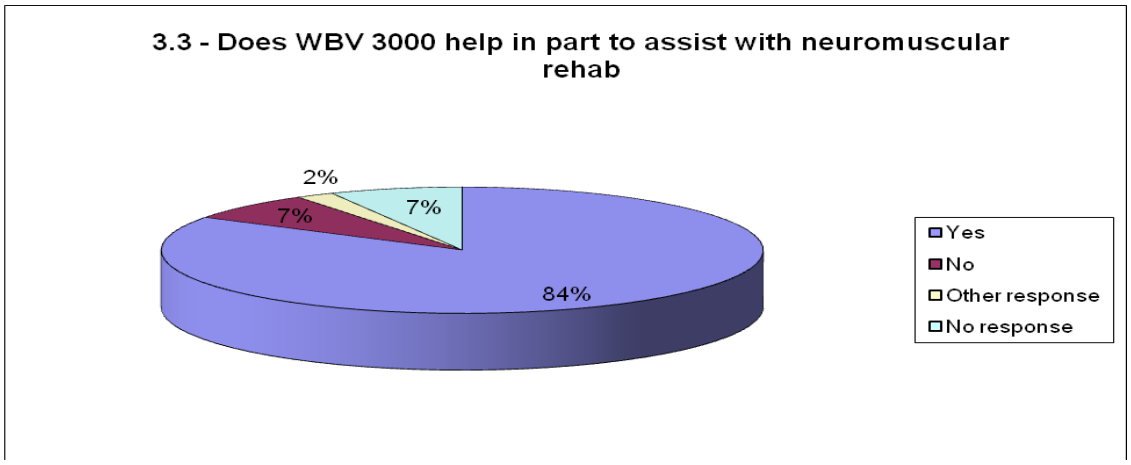
the Cervical or Upper Quadrant region (represented by the Neck, Headaches and Mid Back) at a staggering 37% of respondents.

Detailed analysis of these two main regions indicate a strong correlation to the Lumbar and Brachial Plexuses of the Nervous System respectively once again reinforcing the need for any form of rehabilitation to target and assist in the change in the neural signals and neural output to those regions. The acknowledgement of harmonic frequency as a medium known to assist with muscle and therefore nerve condition generation can therefore not be ignored.

The wide spectrum of clinical conditions manifested also show the broad application of the WBV 3000 to the range of neuromuscular ailments. The fact that it is used an an adjunctive tool for all of the above conditions, is reflective of its diverse nature in application.

6.3 Efficacy of the WBV 3000:

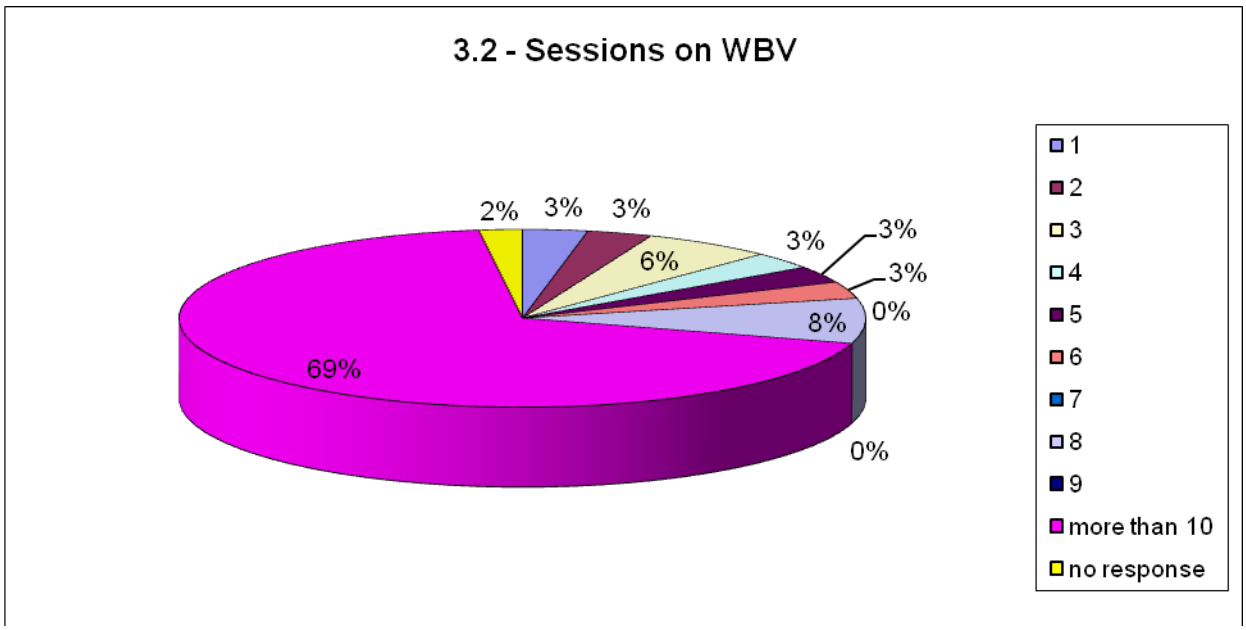
The crux of this research has centred around how the WBV 3000 is perceived by people receiving neuromuscular rehabilitation. The graph below reflects this result:



A staggering 84% report that the WBV 3000 does assist them with their neuromuscular rehabilitation. This is an affirmative response for the efficacy of this machine when dealing with the range of neuromuscular disorders, considering that their presenting complaints ranged from the upper quadrant of the body to the lower quadrant.

The results therefore should that there is certainely a place for the WBV 3000 machine in clinical settings.

The following data appended below also shows the frequency of usage:



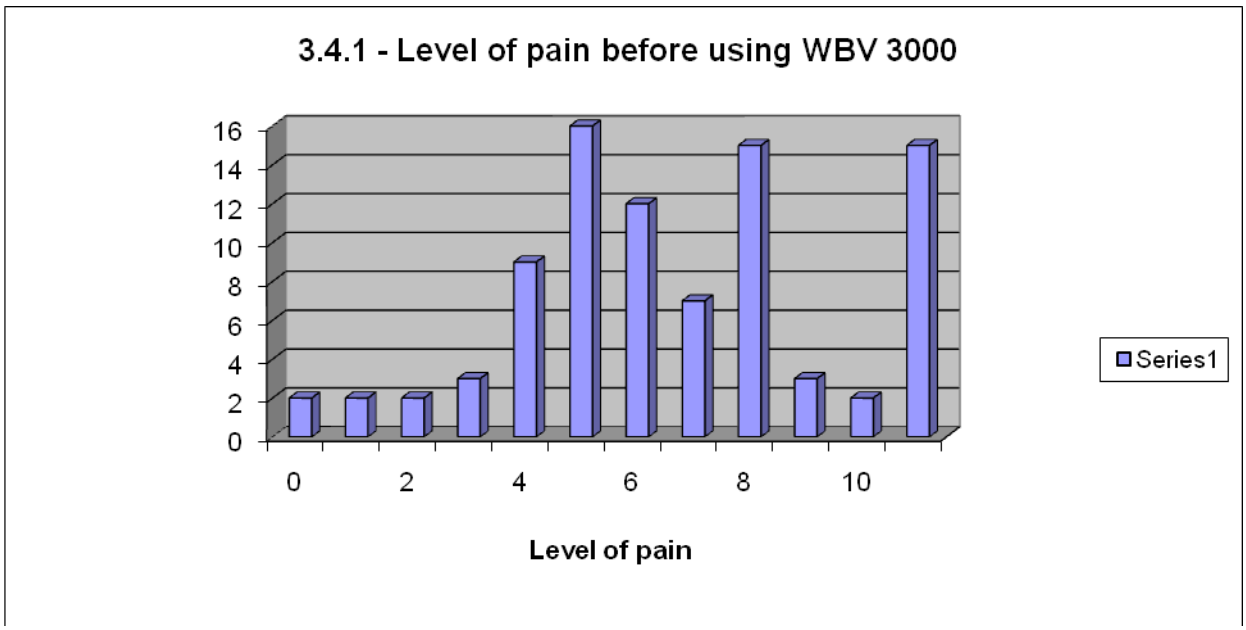
69% of respondents use the WBV 3000 more than 10 times as it is used as a conjunctive device in concert with their clinical treatment.

It should be noted also that if 84% report positive responses to the WBV 3000 over an extended period of time, there can be a strong inference that the WBV 3000 can be used as a repetitive rehabilitation device which may benefit from a organised treatment plan. This correlation paves the way for the WBV 3000 to be used as a clinical tool which clinicians can then grade and plan programs for patients.

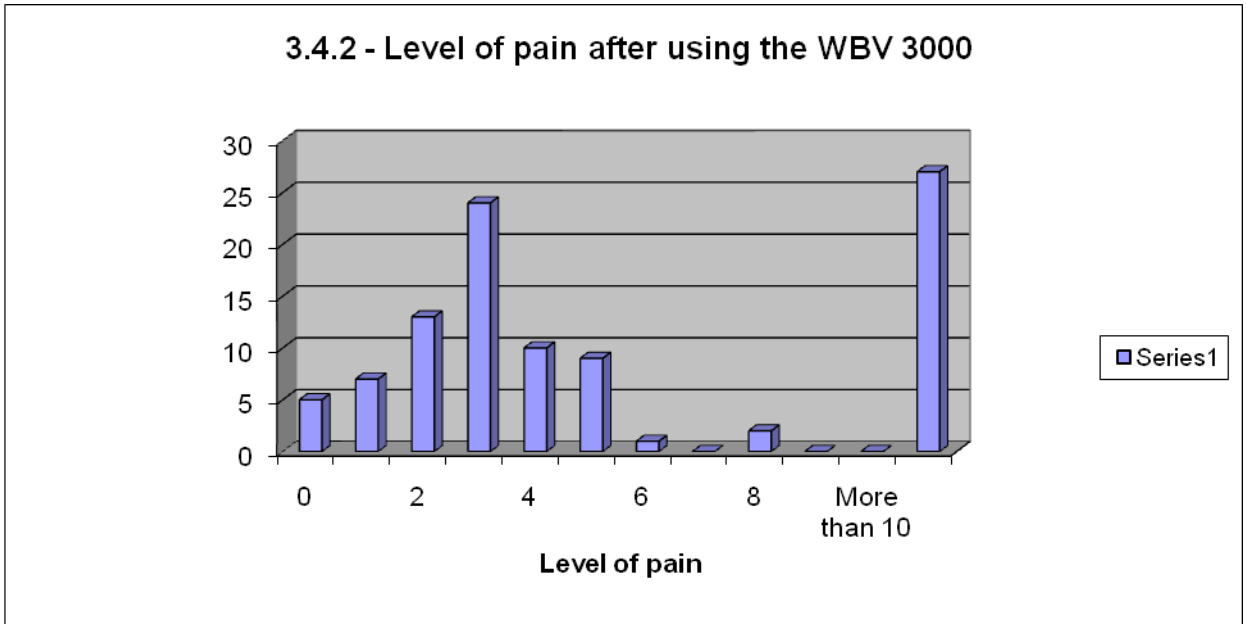
Perception of Pain Before and After Usage of the WBV 3000. Participants were asked to gauge their subjective level of pain over a pain scale of 1 to 10 before and after the use of the WBV 3000. The Level of 1 reflected the lowest level of pain perceived subjectively while the Level of 10 reflected the highest level of pain perceived subjectively. This scale is akin to what is used in the McGill Pain Questionnaire and modified for usage for this research.

The results are as follows:

BEFORE WBV 3000:



AFTER WBV 3000:

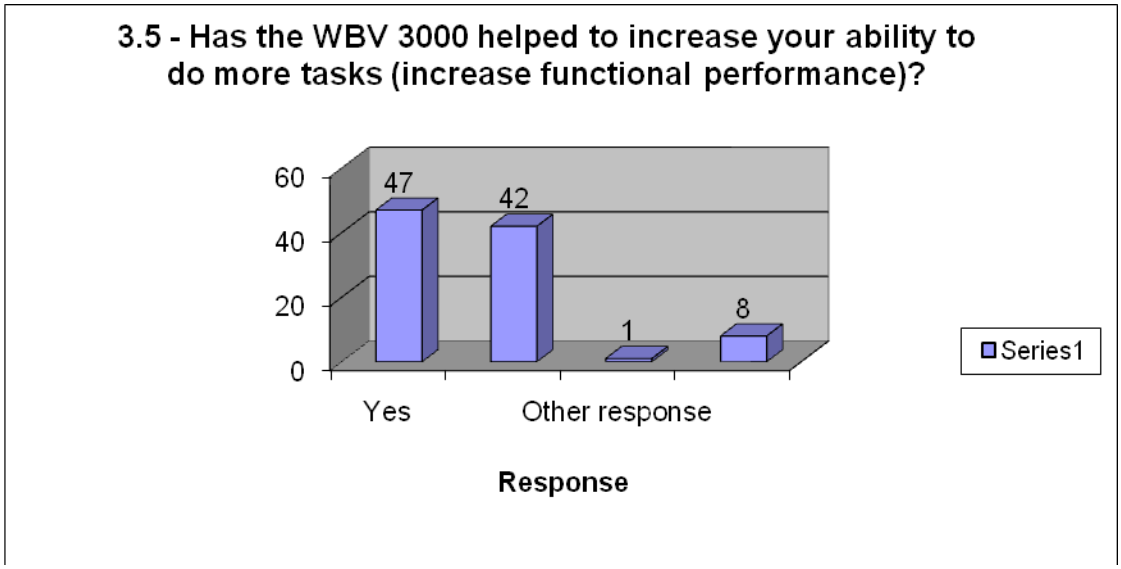


Analysis of the results appended above, once again show a direct and distinct decrease in pain perception by the majority of the respondents AFTER the usage of the WBV 3000.

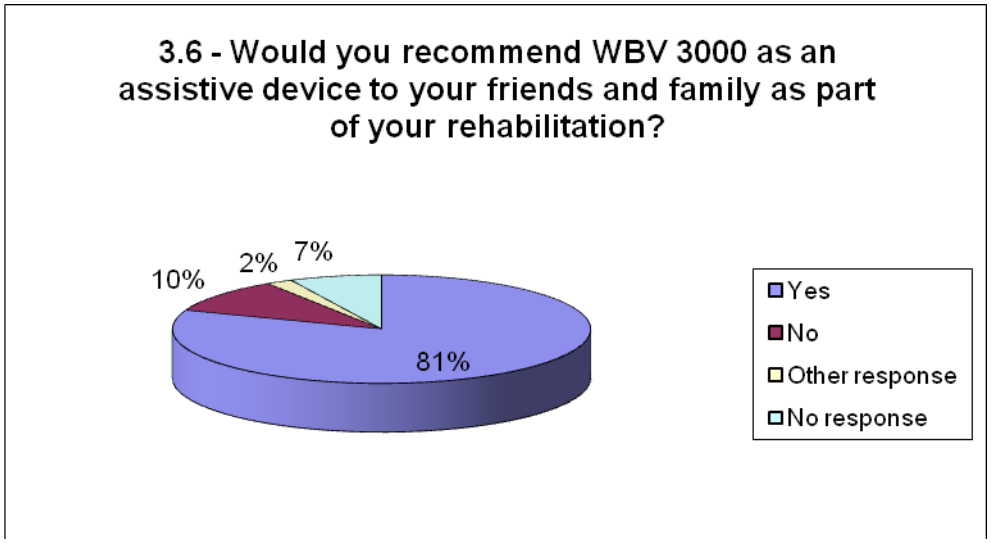
This once again provides research evidence that the WBV 3000 can be used both as a clinical and a non clinical tool to help with the decrease of pain factors in the course of rehabilitation.

When respondents were asked whether the WBV 3000 had assisted them with the increase in functional tasks, 47% responded in the affirmative.

Of the 42% who stated that they did not, many were struggling to understand what functional tasks referred to and the researchers concluded that the question posed could have had further elaboration that functional tasks could include any aspect of work, rest and play.

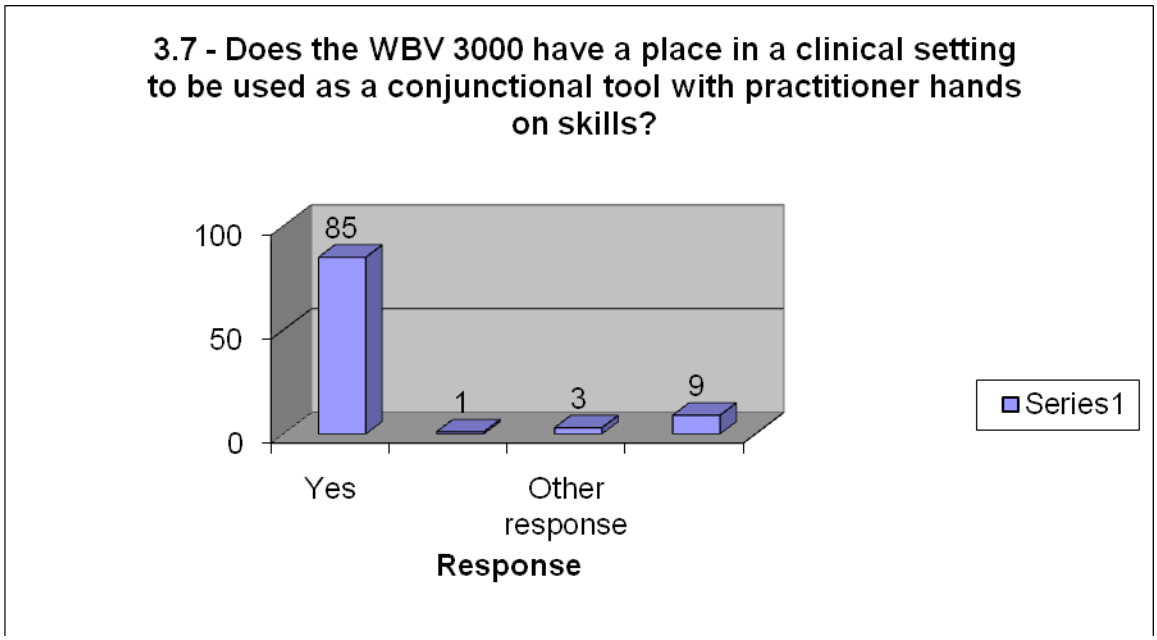


This is further clarified when respondents were asked if they would recommend WBV 3000 to others as a assistive device for rehabilitation, were 81% stated the affirmative.



The results therefore o nce again affirm the importance of this device as a rehabilitation and for that matter a conjunctive treatment tool for patients, who would recommend the same for their family and friends.

Finally when asked if the WBV 3000 has a place as a clinical tool in conjunction with practitioner han ds on skills, 85 of the respondents responded yes with a singular no.



7.0 Conclusion:

The WBV 3000 research set out to determine the efficacy of the device in a clinical condition and its usage for neuromuscular conditions.

The collation of data taken over a three week period with patients willing to participate in an independent manner, separate from any input fro m their treating practiitoners show that this device is indeed usage.

Its ability to be used in a clinical setting from this research is also well documented in the affirmative.

The WBV3000 should really be considered:

1. As a viable device in clinical settings;
2. Recommended as a clinical device for assist practitioners with neuromuscular conditions;
3. Used to assist with the treatment of neuromuscular conditions;
4. Recommmended to help decrease the perception of pain o ver a period of time of usage.

Further Information

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8.0 Clinical Research Bibliography

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