

**COMPARATIVE EFFECTIVENESS OF CLINIC-BASED AND
TELEREHABILITATION APPLICATION OF MCKENZIE THERAPY AMONG
PATIENTS WITH CHRONIC NON SPECIFIC LOW-BACK PAIN**

BY

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REG NO: BMSP12/13/H/1683

**A THESIS SUBMITTED TO THE DEPARTMENT OF MEDICAL REHABILITATION,
FACULTY OF BASIC MEDICAL SCIENCES, COLLEGE OF HEALTH SCIENCES
OBAFEMI AWOLOWO UNIVERSITY,
ILE – IFE, NIGERIA**

**IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF
MASTER’S DEGREE IN PHYSIOTHERAPY**

MARCH, 2016

CERTIFICATION

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DEDICATION

This work is dedicated to my children, Zainab Opeyemi Olaoye and her siblings for their love and encouragement towards the successful completion of this Master's degree program.

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ACKNOWLEDGEMENT

In the name of Allah, the Gracious, the Merciful. All praises and adorations are due to Almighty Allah the Lord of the worlds. For his mercies and kindness in making this research work a success, I say Al-hamdullilah Robilalamin.

My deepest appreciation goes to my supervisor, Dr. C. E. Mbada whose immeasurable advice, guidance, and sacrifices made it possible for me to complete this work. Thank you so much sir. I express my profound gratitude to the Head of Department of Medical Rehabilitation, Prof. R.A. Adedoyin for his support and encouragement during the period of this program. I appreciate the efforts of Dr. M.O. Egwu (Reader), the postgraduate co-ordinator of the Department of Medical Rehabilitation, Obafemi Awolowo University, Ile –Ife. My special appreciation goes to Professor M.O.B. Olaogun, Dr A. T. Onigbinde and Dr. A.O. Ojoawo, for their fatherly advice and encouragement at all times. I also thank Dr T.O. Awotidebe, for his immense help with this work. Dr (Mrs) O. E Johnson, Dr (Mrs) A. Obembe, Col. (Mrs) A.A.I. Emechete (Rtd) and Mr O. Olaoye for their valuable contributions to this study. My gratitude also goes to the non academic staff of the department in persons of Mrs T. Bibilari, Mr T. Adeleke, and Miss T. Olatunbosun. May God Almighty continue to be with you all (Amen). My sincere appreciation goes to Mr.Babatope Oni for preparing the App. I am immensely grateful to Mr.Kayode Folorunsho, Head of Unit, Physiotherapy, General Hospital, Ejigbo, for his kind assistance during data collection. I also appreciate the acting Head, Mr S. Olufemi and entire staff, Physiotherapy Department, Osun State Specialist Hospital, Osogbo,. My special thanks goes to all my colleagues in the Department of Physiotherapy, Ladoke Akintola University of Technology Teaching Hospital (LAUTECH) Osogbo, especially Messers O.A. Adeyemi, S.O Oyewo, A.A. Ojeyinka, and K. Lasisi for their understanding and encouragement during the

course of the program and to my wonderful ladies, Mrs. T. F. Elugbaju, Mrs. I .A. Aghedo and Mrs. A. B. Adeoye, I say a very big thank you. To the entire staff of the department, I say thank you for your cooperation during this program. I thank all the subjects who participated in this study.

I am full of gratitude to my parents for my upbringing and for giving me a sound background both moral and academic. I hereby register my heartfelt appreciation to my entire family especially Master Abdullah Olaoye for the uncommon patience, tolerance and understanding demonstrated throughout the duration of this programme. To my darling, Dr. Shuaib Adenrele Alade Olaoye I say thank you for your love, care, and understanding.

I am very grateful to the following people for their prayers and encouragement towards the successful completion of this programme; Mrs Rasidah Olubunmi Hassan, Mrs M. A. Muibi, Mrs Bilkis Bolanle Oriola, Mrs Sherifat Adebisi, Mrs Rodhiat Shittu, Miss Risqot Ahmed Mr. Sheriff Akintunde, Engr. Musa Makinde, and other people who have in one way or the other contributed to the successful completion of this study. May the Almighty Allah reward you abundantly for sharing my path to success. Thank you so much. Jazakumullahu Khairan.

Olaoye Mistura Iyabo.

March, 2016

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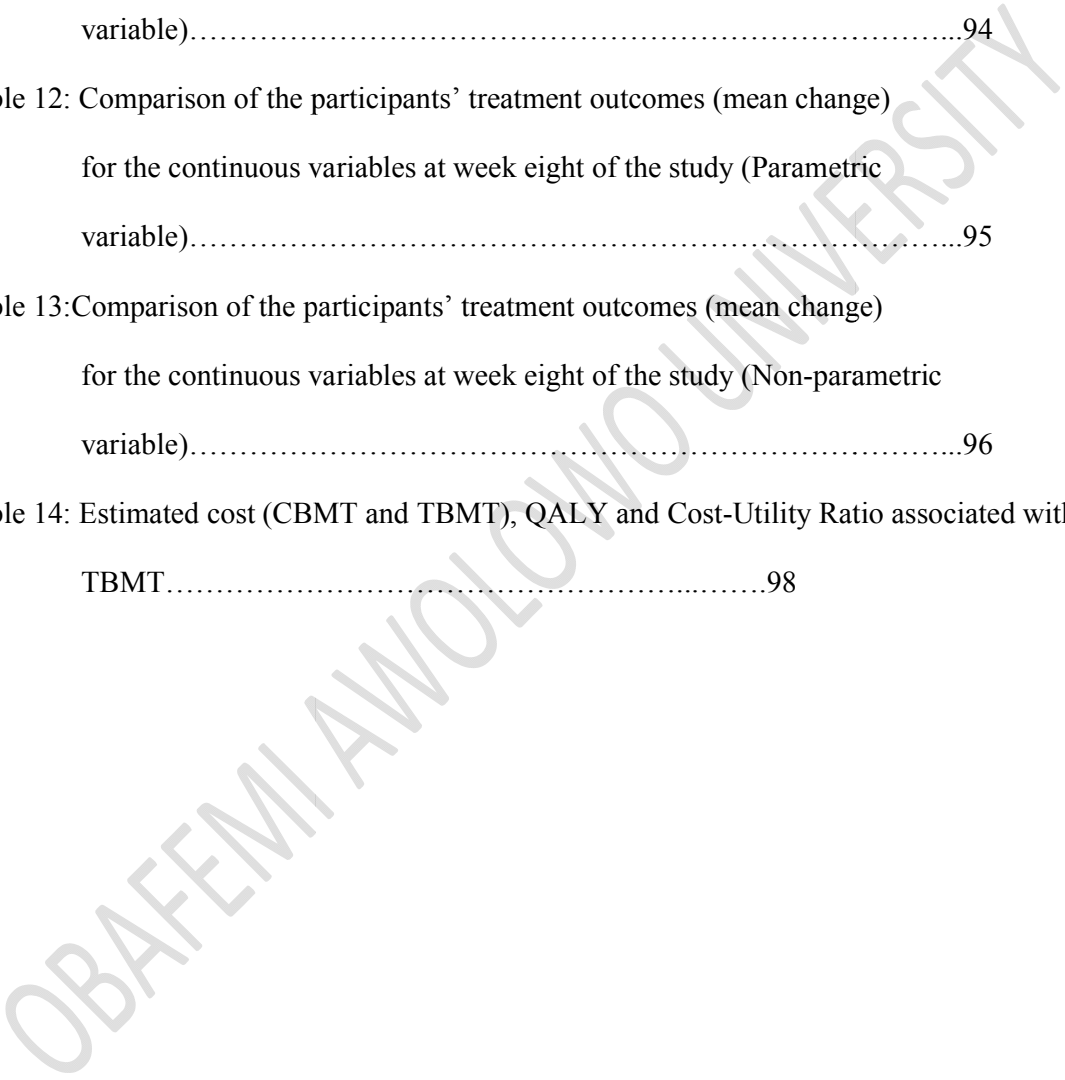
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ABSTRACT

This study evaluated the effect of Telerehabilitation-Based McKenzie Therapy (TBMT) on Pain Intensity (PI), Back Extensors Muscles' Endurance (BEME), Activity Limitation (AL), Participation Restriction (PR), General Health Status (GHS) and Cost-Utility (CU) in patients with Chronic Non-Specific Low-Back Pain (CNSLBP). Also, the study evaluated the effect of Clinic-Based McKenzie Therapy (CBMT) on PI, BEME, AL, PR, GHS and CU in patients with CNSLBP. In addition, the study compared the effects of TBMT and CBMT on PI, BEME, AL, PR, GHS and CU at 4th and 8th week of the study with a view to providing a validated telerehabilitation platform for management of CNSLBP and to increase cost-effectiveness.

This study was a randomized-controlled trial involving 70 patients with CNSLBP. The patients were randomly assigned into either CBMT or TBMT group using block permuted randomization. Participants in both groups received standard McKenzie extension protocol. The protocol involves a course of specific lumbosacral repeated movements in extension that cause the symptoms to centralize, decrease or abolish. TBMT is the mobile-phone application platform of the CBMT. Treatment was applied thrice weekly for eight weeks. Outcomes' data assessed at the end of 4th and 8th week were used for analysis. Data were analyzed using Independent t-test, Mann Whitney U-test, repeated measure ANOVA, Friedman's ANOVA, Kruskal-Wallis tests and multiple comparisons post-hoc tests. Alpha level was set at $p < 0.05$.

Participants' mean age and pain duration was 48.8 ± 11.1 years and 8.96 ± 3.04 months respectively. Within-group comparison across baseline, 4th and 8th week indicate that TBMT had significant effects on PI (4.95 ± 0.92 ; 3.00 ± 0.71 vs; 0.76 ± 0.94 $F=317.377$, $p=0.001$), BEME (25.8 ± 15.2 ; 35.5 ± 15.0 ; 40.1 ± 13.6 $F=97.815$, $p=0.001$), AL (10.2 ± 4.66 ; 5.38 ± 3.14 ; 2.29 ± 2.47 $F=78.362$, $p=0.001$), PR (23.9 vs. 21.4 vs. 22.8 ; $p=0.001$) and the eight items of GHS ($p=0.001$).

CBMT had significant effect on PI (5.31 ± 1.44 ; 3.46 ± 1.07 ; 1.77 ± 0.91 $F=139.21$, 0.001), BEME (20.4 ± 12.8 ; 29.1 ± 12.8 ; 35.4 ± 11.4 $F=101.397$ $p=0.001$), AL (11.8 ± 4.78 ; 6.38 ± 3.02 ; 2.50 ± 1.72 $F=125.265$, $p=0.001$), PR (24.1 vs. 26.1 vs. 25.0 ; $p=0.001$) and the eight items of GHS ($p=0.001$). However, there were no significant differences ($p>0.05$) in the treatment effects (mean change) between TBMT and CBMT, except for item 'energy fatigue' of the GHS where the TBMT group had significantly higher mean rank than the CBMT (26.7 vs. 21.9 ; ($p=0.010$). Estimated treatment cost per patient was N22, 200.00 and N38, 200.00 for TBMT and CBMT respectively (cost estimate ratio was 0.58:1). The cost utility values for TBMT per Quality Adjusted Life Years (QALYs) was N75,482.30 for ongoing cost only with a range of N67,934.10 and N83,030.50 for 10% increase and decrease in the QALYs.

In conclusion, McKenzie Therapy (MT) conducted via a telerehabilitation platform has comparable outcomes with clinic-based MT. Therefore, telerehabilitation application of MT is effective in management of chronic non-specific low-back pain and has lower cost estimate compared to clinic-based McKenzie therapy (CBMT).

CHAPTER ONE

INTRODUCTION

I.1 BACKGROUND OF STUDY

Low-Back Pain (LBP) is described as a constellation of symptoms of pain, discomfort, muscle tension or stiffness that often originates from the lumbar spine and it is localized below the costal margin and above the inferior gluteal folds which may present with or without sciatica (Waddell, 1998; Ehrlich, 2003; Burton et al, 2004; van den Bosch et al, 2004). LBP is typically classified based on aetiology as being specific or non-specific (Manek and MacGregor, 2005). The non-specific LBP refers to mechanical back pain of musculoskeletal origin in which symptoms vary with physical activity (Waddell, 1996). On the other hand, LBP is classified as acute, sub-acute and chronic according to duration of pain (Bouter et al, 1998). Chronic LBP is defined as spinal pain persisting for at least twelve weeks (Abenheim et al, 2000).

Statistics on incidence and prevalence of LBP is varied. Commonly, literature shows that about 70 to 85 % of all people have LBP at some time in their life (Waddell, 1998; Andersson, 1999; Goodwin and Goodwin, 2000; van Tulder, 2001; Vinod et al, 2011). About 80-90% of these patients with LBP will get better within 6 weeks, in spite of treatment (Spitzer 1987; Indahl et al, 1995; Bronfort et al, 1996; van Tulder et al, 1997; Jackson, 2001; Deyo 2002). Nonetheless, 5-15% of all cases of LBP will become chronic (i.e. lasting for three months and longer) (Carette 1994; Johannsen et al, 1995; Bigos et al, 2001; Quittan 2002). Over 80% of patients with chronic LBP will develop recurrent episodes (Waddell, 1998), 93% will have intermittent or recurrent episode of LBP again in the following 12 months (de Vet et al, 2002)

and about 66% of subjects with recurrent chronic LBP who sought care for complaints at baseline, will seek care again during follow-up (IJzelenberg and Burdorf, 2004).

Chronic LBP is more resistant to therapeutic intervention (Cottingham and Maitland, 1997; Hildebrandt et al, 1997; Frost et al, 2000; Fersum, 2011). Treatment intervention in these patients (i.e. with long-term LBP) is reported to give variable outcomes (CSAG, 1994; Rainville et al, 1997; Carpenter and Nelson, 1999). There is lack of evidence for single treatment interventions for patients with chronic non-specific LBP despite the substantial amount of randomised controlled trials evaluating treatment outcome for this disorder (Fersum, 2011). The Clinic on Low-Back Pain in Interdisciplinary Practice Guideline (Rossignol et al, 2007) reported that there was strong evidence for multidisciplinary programmes, behavioural therapy and exercise for chronic LBP. Similarly, systematic reviews of the evidence concerning the effectiveness of exercise concluded that exercise may be helpful for patients with chronic LBP in terms of decrease in pain and disability (Hayden et al, 2005a), decrease in fear of avoidance behaviour (van Tulder et al, 1997; Liddle et al, 2004) and return to normal activities of daily living and work (van Tulder et al, 2002).

Exercise is the central element in the physical therapy management of patients with chronic mechanical LBP (Bigos et al, 1994; van Tulder et al, 2003; Hayden et al, 2005). Still, there does not appear to be a consensus of opinion on the most effective programme designed to maintain exercise benefits (Bronfort et al, 1996; Faas, 1996; Lahad et al, 1996; Carpenter and Nelson, 1999; Kenny, 2000; Taimela et al, 2000). Some researchers identified not sub-grouping patient samples as a possible flaw with much of the previous research (Fritz et al, 2003; Long et al, 2004; Brennan et al, 2006). Sub- grouping of patients with LBP according to their signs and symptoms where treatment is then prescribed according to these subgroups is considered as an

important advance in the management of LBP (Fritz et al, 2003; Long et al, 2004; Brennan et al, 2006).

One of the more commonly used methods of sub-grouping amongst physiotherapists is the McKenzie Method (McKenzie and May, 2003). The McKenzie method is a popular classification-based treatment for LBP among physical therapists (Battie et al, 1994; Foster et al, 1999; Ayanniyi et al, 2007) with documented effectiveness in some studies (Ponte et al, 1984; Nwuga and Nwuga, 1985; Stankovic and Johnell, 1990; Reddeck, 1997; Cherkin et al, 1998; Machado et al, 2006). This method is based on the patient's directional preference. Directional Preference is defined as the movement or posture that decreases or centralizes pain that emanates from the spine and/or increases range of movement (McKenzie and May, 2003). Directional preference and centralization occur only in the substantial derangement group (McKenzie and May, 2003). The separate, but associated, phenomenon of centralization refers to the abolition of distal pain in response to repeated movements or sustained postures.

The strong association between certification in the McKenzie Diagnostic Therapy (MDT) to obtain best results (Dreisiger, 2007; Mooney, 2005) is a potential limitation in providing access to proven intervention for patients with chronic mechanical LBP who may not have certified faculties and facilities for care. Telerehabilitation is a potential solution to bridge this service delivery gap, especially, in geographically remote areas with shortage of services and lack of access to physical therapy rehabilitation services (Dansky et al, 2001). Telerehabilitation is described as the remote delivery of healthcare services and clinical information using telecommunications and information technologies such as internet, wireless satellite and telephone media to provide a wide array of clinical rehabilitation

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