

**RELATIONSHIP BETWEEN HIV STAGE IN
ADULTS AND PSYCHOMOTOR SPEED
NEUROCOGNITIVE SCORE AT INITIATION OF
CARE AT KANGUNDO SUB-COUNTY HOSPITAL**

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**A THESIS SUBMITTED IN PARTIAL
FULFILLMENT FOR THE AWARD OF DEGREE OF
MASTERS OF MEDICINE IN FAMILY MEDICINE
(MMED- FM), MOI UNIVERSITY**

2015

DECLARATION

By Candidate

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DEDICATION

I dedicate this work to all people living with HIV and AIDS

ABSTRACT

Background: Human Immunodeficiency Virus (HIV) and acquired immunodeficiency syndrome (AIDS) is associated with cognitive impairment which affects psychomotor speed. Psychomotor slowing is a predictor of dementia and death in people living with HIV and AIDS. The purpose of this study is to assess the relationship between HIV disease stage and psychomotor speed neurocognitive score which will add to the body of knowledge required to manage patients with HIV and AIDS.

Objective: To determine the relationship between psychomotor speed neurocognitive score and the HIV disease stage in adults at initiation of care

Study design and methods: This was a cross sectional study which was conducted at Kangundo sub-county hospital comprehensive care centre. All newly initiated into care HIV seropositive patients aged 18-50 years were studied. A pretested questionnaire was used to collect data from participants. The grooved pegboard test was used to award psychomotor speed neurocognitive scores. Participants were classified into world health organization stage I to IV. Blood samples were obtained for the measurement of cluster of differentiation 4 cell (CD4) counts. Descriptive statistics were used to summarize data. Mann Whitney U test, spearman's rho and multiple linear regression were employed in the analysis. Z scores were used to determine those with abnormal scores. All analysis was done in statistical package for social sciences. P value <0.05 was considered significant.

Results: A total of 72 patients participated in the study, mean age was 35.5(±7.6) and 36(±8.3) for asymptomatic and symptomatic groups respectively. The median CD4 count was 434(216, 561) and 76(27.25, 296) for asymptomatic and symptomatic groups respectively. The WHO stage did not have a significant effect on the psychomotor speed neurocognitive score ($p > 0.05$). The CD4 count had a significant effect on psychomotor speed neurocognitive score ($p = 0.001$)

Conclusions: The WHO stage did not have a significant effect on psychomotor speed neurocognitive score. There was a significant correlation between CD4 counts and psychomotor speed neurocognitive score.

Recommendations

Efforts should be made to ensure that the CD4 counts of people living with HIV and AIDS do not continue to fall after initiation into care in order to preserve psychomotor function.

Limitations

The study did not exclude patients suffering from diabetes and hypertension which may act as confounding factors.

Brain imaging studies were not done to rule out any other brain pathology.

TABLE OF CONTENTS

ABSTRACT	iv
TABLE OF CONTENTS	v
LIST OF TABLES	vii
LIST OF FIGURES	viii
ACKNOWLEDGEMENT	ix
ACRONYMS	x
DEFINITION OF KEY TERMS	xi
CHAPTER ONE	1
1.0 INTRODUCTION	1
1.1 Background.....	1
1.2 Problem statement.....	2
1.3 Rationale and justification of the study	3
1.4 Research questions, objectives and hypothesis	4
1.5 Hypotheses	5
1.5.1 Broad objective	5
1.5.2 Specific objectives.....	5
CHAPTER TWO	6
2.0 LITERATURE REVIEW	6
2.1 Cognitive impairment in HIV	6
2.1.1 Pathophysiology of cognitive impairment in HIV	6
2.1.2 Diagnosis of HIV associated cognitive impairment.	7
2.1.3 Screening tools for cognitive impairment in HIV	7
2.2 Psychomotor speed.....	9
2.2.1 Psychomotor speed and cognitive impairment in HIV	9
2.2.2 Tests of psychomotor speed.....	10
2.2.3 Correlation between the grooved pegboard and other tests of psychomotor speed.....	12
2.2.4 Psychomotor speed and adherence to medication	12
2.2.5 Demographic effects on psychomotor speed	13
2.2.6 Psychomotor speed and use of social services in HIV	13
2.3 Conceptual framework	13
CHAPTER THREE	16

3.0 METHODOLOGY.....	16
3.1 Study site	16
3.2 Study design	16
3.3 Study population	16
3.4 ELIGIBILITY	17
3.4.1 Inclusion criteria:.....	17
3.4.2 Exclusion criteria.....	17
3.5 Sample size determination.....	17
3.5.1 Description of Sample and Sampling Procedure.....	17
3.5.2 Procedures.....	19
3.5.3 Validity	20
3.5.4 Reliability	21
3.6 Data management.....	21
3.7 Study limitations	22
3.8 Ethical considerations	22
CHAPTER FIVE	33
5.0 DISCUSSION.....	33
CONCLUSIONS	38
RECOMMENDATION	38
REFERENCES	39
APPENDICES	49
Appendix I : INFORMED CONSENT FORM	49
Appendix II: Enrollment Questionnaire.....	56
Appendix IV: Revised WHO HIV/AIDS clinical staging.....	68
Appendix V: APPROVAL LETTER.....	70

LIST OF TABLES

Table 1: Social demographic characteristics of the participants	24
Table 2: Difference in median psychomotor speed neurocognitive score HIV by disease stage.....	26
Table 3: Difference in median Psychomotor Speed neurocognitive score by patients CD4 count	27
Table 4: Relationship between gender and psychomotor speed neurocognitive score.....	28
Table 5: Correlation between age and psychomotor speed neurocognitive score.....	29
Table 6: Correlation between education and psychomotor speed neurocognitive score	29
Table 7: Multiple linear regression (dominant hand)	30
Table 8: Multiple linear regression (non- dominant hand)	30
Table 9: Percentage of normal versus abnormal scores by disease category	31
Table 10: Percentage of normal versus abnormal scores by CD4 count category	32

LIST OF FIGURES

Figure 1: International Classification of Functioning, Disability and health (ICF) framework (WHO, 2001)	15
Figure 2: Patient source or entry Point.....	24
Figure 3: Patients WHO stage (N= 72).....	25

ACKNOWLEDGEMENT

I would like to express my gratitude to the following people for their contribution to the writing of this thesis report:

Medical superintendent, Kangundo District Hospital for allowing me to conduct the research at the CCC

My supervisors Dr Benson Gakinya and Dr J Thigiti for guidance and input

Research participants

The dean, Moi University School of Medicine

Head of department and faculty, Department of family medicine

Agnes, Mbato, Priscilla and the entire CCC staff

My family- Mary Kinuthia, Grace, Josephine and Solomon for their encouragement and support

ACRONYMS

AIDS	Acquired Immune Deficiency Syndrome
ANI	Asymptomatic Neurocognitive Impairment
CCC	Comprehensive Care Centre
CD4	Cluster of Differential Four
CNS	Central Nervous System
HAD	HIV associated dementia
HAND	HIV associated neurocognitive disorders
HIV	Human Immunodeficiency Virus
IREC	Institution Research and Ethics Committee
MND	Minor Neurocognitive Disorder
PLWHA	People Living with HIV and AIDS
SPSS	Statistical Package for the Social Sciences
WHO	World Health Organization

DEFINITION OF KEY TERMS

Asymptomatic neurocognitive impairment – impairment in neuropsychological tests which is not symptomatic, activities of daily living are not affected.

Early HIV or asymptomatic HIV disease stage - WHO stages 1 and 2

Grooved pegboard test- a test used to measure psychomotor speed.

HIV- associated dementia- neurocognitive impairment arising from HIV infection where the test performance is more than 2 standard deviations below average in two cognitive domains with marked evidence of impaired daily function.

Initiation of care- time of registration or first visit to the comprehensive care clinic

Late HIV or symptomatic HIV disease stage - WHO stage 3 and 4

Minor neurocognitive disorder - neurocognitive disorder in which test performance is more than 1 standard deviation below average in two cognitive domains with impairment in daily function but to a lesser degree.

Neurocognitive or neuropsychological tests- tasks which are specifically designed to measure function related to a particular brain structure or pathway.

Neurocognitive impairment- a disorder in the brain in which thinking ability is impaired, there is difficulty in everyday function, remembering things e.g. names of people met recently, flow of conversation.

Psychomotor speed – an individual's ability to perceive instructions and perform motor responses

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Studies done in western countries have revealed that half of HIV- infected patients treated with combination antiretroviral therapy have cognitive impairment. In this era of combination antiretroviral therapy, severe form of cognitive impairment is rare (Vivithanaporn et al., 2010). Previous studies classified HIV- associated neurocognitive disorders into asymptomatic neurocognitive impairment, mild neurocognitive disorder and HIV- associated dementia (Antinori et al., 2007).

Psychomotor speed is one of the cognitive domains affected by HIV infection. Abnormal scores in psychomotor speed have been significantly associated with time to develop HIV- associated dementia (Stern et al., 2001). A high viral load in HIV has been linked with decline in psychomotor speed (Sacktor et al., 2003). Combination antiretroviral therapy has been linked with improved performance in psychomotor speed, memory and executive function (Sacktor et al., 2006). HIV- infected individuals with cognitive dysfunction are at risk for poor medication adherence especially those with complex drug regimens (Hinkin et al., 2002, Becker, Thames, Woo, Castellon and Hinkin, 2011).

Statistics indicate that 67 % of people infected with HIV live in Sub-Saharan Africa. Cognitive impairment in HIV is less commonly described compared to CNS opportunistic infections (Lawler et al., 2011, Robertson et al., 2010). Investigators in Ethiopia found minor evidence of HIV- associated neurocognitive deficits which varies

from findings of studies done in South Africa which found that HIV positive patients performed significantly worse on tests of cognition (Clifford et al., 2007, Joska et al., 2011). Researchers in Uganda demonstrated that different HIV subtypes may differ in their capacity to cause cognitive impairment (Sacktor, Nakasujja, Robertson, and Clifford, 2007).

In Kenya, there is limited data on HIV - associated cognitive impairment due to a limited number of neurologists and limitations in diagnostic capabilities (Zaheer et al., 2011, Kwasa et al., 2012).

No documented study has looked at the relationship between psychomotor speed neurocognitive score and the World Health Organization HIV disease stage in Machakos County.

1.2 Problem statement

HIV and AIDS is a leading cause of disability. Almost 40 million people were living with HIV at the end of 2012 all over the world (Sacktor et al., 2003). Sub - Saharan Africa remains the most severely affected region with almost 1 in 20 adults living with HIV and accounting for two thirds of people living with HIV globally (Holguin et al., 2011). In Kenya, according to the Kenya AIDS indicator survey 2012, HIV prevalence was 5.6 % (Kenya AIDS Indicator Survey (KAIS), 2012).

Neurocognitive impairment in HIV infection has emerged as a very important issue over the years (Lawler et al., 2011). Psychomotor speed is one of the cognitive domains significantly affected by cognitive impairment in PLWHA and can be used to predict cognitive impairment, dementia and death (Sacktor et al., 1996). Abnormal scores in

psychomotor speed have been associated with time to develop severe cognitive impairment in HIV (Stern et al., 2001). PLWHA who have deficits in psychomotor function are at risk of poor medication adherence especially when complex drug regimens are prescribed (Hinkin et al., 2002, Becker et al., 2011). In Kenya, diagnosis of HIV-associated cognitive impairment is a challenge in primary care settings and there is limited data on cognitive impairment in HIV (Kwasa et al., 2012). No documented study has looked at the relationship between psychomotor speed neurocognitive score and the World Health Organization HIV disease stage in Machakos County.

1.3 Rationale and justification of the study

Psychomotor slowing is an early symptom of HIV-associated neurocognitive impairment which affects adherence to medications, increases the chances of high risk behaviors that could lead to new infections if unrecognized (Lawler et al., 2011, Sacktor et al., 2010, Baldewitz et al., 2004). HIV- associated neurocognitive impairment can be treated by use of combination antiretroviral therapy which can halt progression or reverse symptoms (Sacktor et al., 2010, Von Giesen, Koller, Theisen and Arendt, 2002). Since psychomotor slowing is a predictor of progression to AIDS and death, it is important to understand the relationship between disease stage and psychomotor speed neurocognitive score at baseline so as to guide the clinician in patient management.

Determining the relationship between the psychomotor speed and HIV disease stage will help add to the body of knowledge required in the management of HIV patients in order to improve quality of life and health outcomes

1.4 Research questions, objectives and hypothesis

Research questions

1. What is the relationship between HIV stage and psychomotor speed neurocognitive score at the time of entry into HIV care?
2. What is the relationship between CD4 count and psychomotor speed neurocognitive score at the time of entry into HIV care?

1.5 Hypotheses

Null hypothesis

HO1: There is no significant difference in psychomotor speed neurocognitive scores between early and late HIV disease

HO2: There is no significant correlation between CD4 and psychomotor speed neurocognitive score.

1.5.1 Broad objective

To determine the relationship between the HIV and AIDS stage, CD4 count and the psychomotor speed neurocognitive score at initiation of care at Kangundo Sub- county Hospital comprehensive Care centre.

1.5.2 Specific objectives

1. To determine the patients baseline CD4 count at initiation into care.
2. Determine the psychomotor speed neurocognitive score of HIV seropositive patients at the time of initiation into care.
3. Determine association between HIV and AIDS WHO stage and psychomotor speed neurocognitive score
4. Determine association between baseline CD4 count and the psychomotor speed neurocognitive score

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Cognitive impairment in HIV

HIV- associated neurocognitive disorders (HAND) range from mild to severe (asymptomatic neurocognitive impairment, mild neurocognitive disorder and HIV-associated dementia (Antinori et al., 2007, Heaton et al., 2010) Cognitive impairment in HIV presents as lethargy, apathy, deficient memory and attention as well as loss of fine motor control (Anand, Springer, Copenhaver, and Altice, 2010). As HIV disease progresses, there is decline in executive function, motor functioning and speed of information processing (Reger, Welsh, Razani, Martin and Boone, 2002).

2.1.1 Pathophysiology of cognitive impairment in HIV

Neurological dysfunction related to HIV infection occurs when infected CD4 cells and monocytes transport virus across the blood brain barrier after the initial infection. Inflammation mediators such as chemokines, excitotoxins, proteases and HIV proteins Tat and Gp120 induce neuronal apoptosis and cerebral atrophy (Li, Galey, Mattson and Nath, 2005). Cognitive deficits in HIV predispose to risky behavior. Patients with deficits in memory have impaired ability to plan and execute (Woods, Moore, Weber and Grant, 2009). Substance abuse may predispose to infection through disinhibition and has also been strongly linked to cognitive impairment (Mayer and Pizer, 2008). Opioid use in HIV patients can stimulate viral replication and worsen HAND. Alcohol dependence impairs attention, memory, and learning. Alcohol and HIV have synergistic effects on the brain. Alcohol causes a number of neuropsychiatric disorders arising from vitamin B deficiency

for instance wernicke korsakoff syndrome which is characterized by ataxia, hallucinations and confusion (Green, Saveanu and Bornstein, 2004)

2.1.2 Diagnosis of HIV associated cognitive impairment.

The presence of symptomatic cognitive impairment predicts non- central nervous system morbidity and overall HIV mortality. HIV associated dementia which is the most severe form of impairment requires a test performance of more than two standard deviations below the mean in at least two cognitive domains for example memory and executive function and evidence of marked impairment in activities of daily living. Mild neurocognitive disorder requires impairment in neuropsychological tests with performance of more than one standard deviation below the mean with confirmation of impairment in activities of daily living but to a lesser degree. Asymptomatic neurocognitive impairment is when there is impairment in neuropsychological tests of more than one standard deviation below the mean without functional deficits (Davis, Skolasky, Selnes, Burgess and McArthur, 2002)

2.1.3 Screening tools for cognitive impairment in HIV

HIV dementia scale

This tool provides a rapid assessment of eye movement, motor function, attention and simple learning. Sensitivity for mild disease is poor. The HIV dementia scale has shown a modest ability (70% sensitivity) to identify impairment (Berghuis, Uldall, and Lalonde, 1999, Bottigi et al., 2007, Richardson et al., 2005, Morgan et al., 2006)

Modified HIV dementia scale

This tool is a modified version of the HIV dementia scale and compares with the grooved pegboard test in identifying patients with HIV- associated dementia (Davis et al., 2002).

International HIV dementia scale

This test is made of three sub-tests namely timed finger tapping, timed alternating hand sequence and recall of four items at three minutes. Timed finger tapping test measures the number of finger taps over a five second period. During the alternating hand sequence test, the subject is asked to perform the following movements with the non-dominant hand over a ten second period as quickly as possible: clench fist on a flat surface, put hand flat on surface with the palm down then put hand perpendicular to flat surface on the side of the fifth digit. The verbal recall subset assesses new learning or registration and recall. The timed finger tapping and alternating hand sequence are tests of motor and psychomotor speed. This test was shown to have a sensitivity of 80 % and specificity of 55 % in a Ugandan cohort. (Antinori et al., 2007, Zaheer et al., 2011)

Computer delivered tests**Sequential and choice reaction time program (CALCAP)**

This test provides a measure of reaction time, attention, psychomotor speed and memory. Limitations of the test include inability to test verbal learning, a need to train staff, cost burden and that it can't be used for illiterate and non-English speakers (Gonzalez et al., 2003, Worth, Savage, Baer, Esty and Navia 1993)

A combination of tests performs better at differentiating those who are impaired from those without impairment (Carey et al., 2004).

The gold standard for the diagnosis of neurocognitive impairment in HIV is a neurocognitive test battery covering seven domains (speed of information processing, verbal fluency, attention and concentration, abstraction or executive function, working memory, motor ability, learning and delayed recall) which have been found to be frequently affected by HIV- associated CNS dysfunction. Test administration time is usually about two hours (Heaton et al., 2010)

2.2 Psychomotor speed

Psychomotor speed refers to how fast the mind is able to interact with the body. Psychomotor abilities enable the perceptual systems or the five senses, the brain and the body to interact effectively (Vorster, 2012)

2.2.1 Psychomotor speed and cognitive impairment in HIV

Reduction in psychomotor speed is one of the most frequent manifestations of cognitive impairment in HIV (Alvarez, Failde Garrido and Simon Lopez, 2007). Psychomotor speed is one of the sensitive indicators of HIV- associated cognitive impairment and a predictor of HIV- associated dementia (Sacktor et al., 1999, Birren and Fisher, 1995) Psychomotor speed is sensitive to the effects of age and age associated co morbidities (Mitrushina, 2005)

2.2.2 Tests of psychomotor speed

Trail making test

The trail making test is a test of psychomotor speed and visual attention. The test has part A and B. Trail making test part A is a page with numbers one to twenty five which are scattered within circles. Subject is required to connect the lines connecting the numbers in order as fast as possible. Trail making part B is a page with numbers one to thirteen and letters A to L. Subject is instructed to draw lines connecting the numbers in order. Two scores are obtained reflecting total time in seconds taken to complete the tasks. Errors are not scored but when they occur, patient is alerted to correct them thus slowing overall performance.

The trail making test has a high sensitivity for detecting presence of cognitive impairment (Kvalsund, 2008)

Color trails 1 and 2

This test is designed for cross cultural use and assesses attention, psychomotor speed and executive function. These domains are frequently affected by HIV- associated cognitive impairment. Color trails 1 and 2 are variations of the trail making test but replace the use of English alphabet in trail making B. In Color trails 1, the subject is required to draw lines connecting numbers one to twenty five. Color trails 2 contains two sets of numbers, each of different colors, subject must alternate each advancing number with a different color (Feinstein, 2005)

Reaction time tests

In simple reaction time, subjects are presented with a stimulus on a computer screen and respond by pressing a button. Responses are timed therefore test is a measure of basic psychomotor speed. In choice reaction time, the subject is presented with a choice of responses only one of which is correct which adds an element of problem solving (O'bryant, Humphreys, Bauer, McCaffrey and Hilsabeck, 2007).

Symbol digit modalities test

This test is a widely used measure of attention, visual scanning and psychomotor speed. The test takes about 5 minutes to administer, is easy to administer and reliable (Nocentini, Giordano, Vincenzo, Panella and Pasqualleti, 2006, Merker and Podell 2011)

The grooved pegboard test

The grooved pegboard test assesses eye-hand co-ordination and motor speed. The test therefore requires sensory motor integration. It is considered a more complex task than other tests and more sensitive to psychomotor speed. The grooved pegboard test can also be used to identify general slowing resulting from disease progression and medications (Davis et al 2002, Lafayette Grooved Pegboard test Manual, 2002). The test is a manipulative dexterity test which contains twenty five holes with randomly placed slots and pegs. The pegs have a key along one side and must be rotated to match the hole before they are inserted. The procedure measures performance speed in fine motor tasks. The grooved pegboard is equipped with pegs and an examiners manual with test norms.

Other tests of psychomotor speed include finger tapping and grip strength (Zaheer et al., 2012, Lafayette Grooved Pegboard Test Manual, 2002).

2.2.3 Correlation between the grooved pegboard and other tests of psychomotor speed

A study done in 2006 compared choice reaction time, simple reaction time and grooved pegboard test. Grooved pegboard test correlated with simple choice reaction at 0.57 for dominant hand, 0.42 for the non-dominant hand. Grooved pegboard test correlated with choice reaction time at 0.62 for the dominant hand and 0.47 for the non-dominant hand (Cysique, Maruff, Darby and Brew, 2006)

2.2.4 Psychomotor speed and adherence to medication

Previous research findings have shown that severe decline in psychomotor speed is associated with non-adherence to medication in HIV injecting drug users (Waldrop-valverde, Jones, Weiss, Kumar and Metsch, 2008). Lower motor and psychomotor speed is linked to lower adherence levels. While the exact reason is not known, it thought to be due to the fact that using and manipulating pill boxes, pills and medication bottles requires fine motor dexterity. It is possible that poor motor mobility may result in inability to manage aspects of one's adherence resulting in frustration thus reducing the likelihood of maintaining adherence (Reuben, 2008)

Poor performance on a medication management test has been associated with scores of one standard deviation below the norms in tests of psychomotor speed, memory, and executive function (Albert et al., 1999)

Psychomotor speed has been noted in previous studies to reduce with disease progression in people living with HIV and AIDS (Ogunrin, Odiase and Ogunniyi, 2007, Perdices and Cooper, 1989, Kanmogne et al, 2010)

2.2.5 Demographic effects on psychomotor speed

Studies done in the past have demonstrated that demographic effects such as age, education, cultural and ethnic differences affect performance of neuropsychological tests (Kanmogne et al 2010)

2.2.6 Psychomotor speed and use of social services in HIV

Poor performance in tests of psychomotor speed, learning, and memory has been correlated with receiving more social services among people living with HIV and AIDS (Umaki et al, 2013)

2.3 Conceptual framework

International classification of functioning, disability and health

The world health organization has proposed that health conditions affect people in different ways. Most obvious changes occur in structures of the body or function of these structures. The resulting effect is referred to as impairment. Impairment can be temporary or permanent and may or may not restrict one's ability to perform day to day activities. According to the world health organization any impairment, limitation or restrictions are likely to be influenced by environmental barriers or facilitators. This conceptual framework has been used in studies of HIV and its effect on people (Ranka, 2010). This conceptual framework relates to this study because the purpose of the study is to determine the effect of HIV and AIDS disease stage (health condition) on the function of

the brain in those affected. Psychomotor speed is a function which is mediated by the brain and is impaired when HIV enters the brain causing inflammation which in turn leads to neuronal death as well as brain atrophy. The effect of HIV disease on the brain as an organ is then manifested in the inability to perform day to day activities for example manipulating pill bottles among other tasks required for everyday living such as remembering to take drugs, driving. The health service provider can help improve the outcomes or quality of life of people living with HIV and AIDS by providing the much needed support in adherence, involving the family in care and treatment of a patient living with HIV and AIDS. This can only take place if he understands the disease process and how it affects the patient's psychomotor function. The health service provider can act as a facilitator or a barrier to health as shown in the conceptual framework.

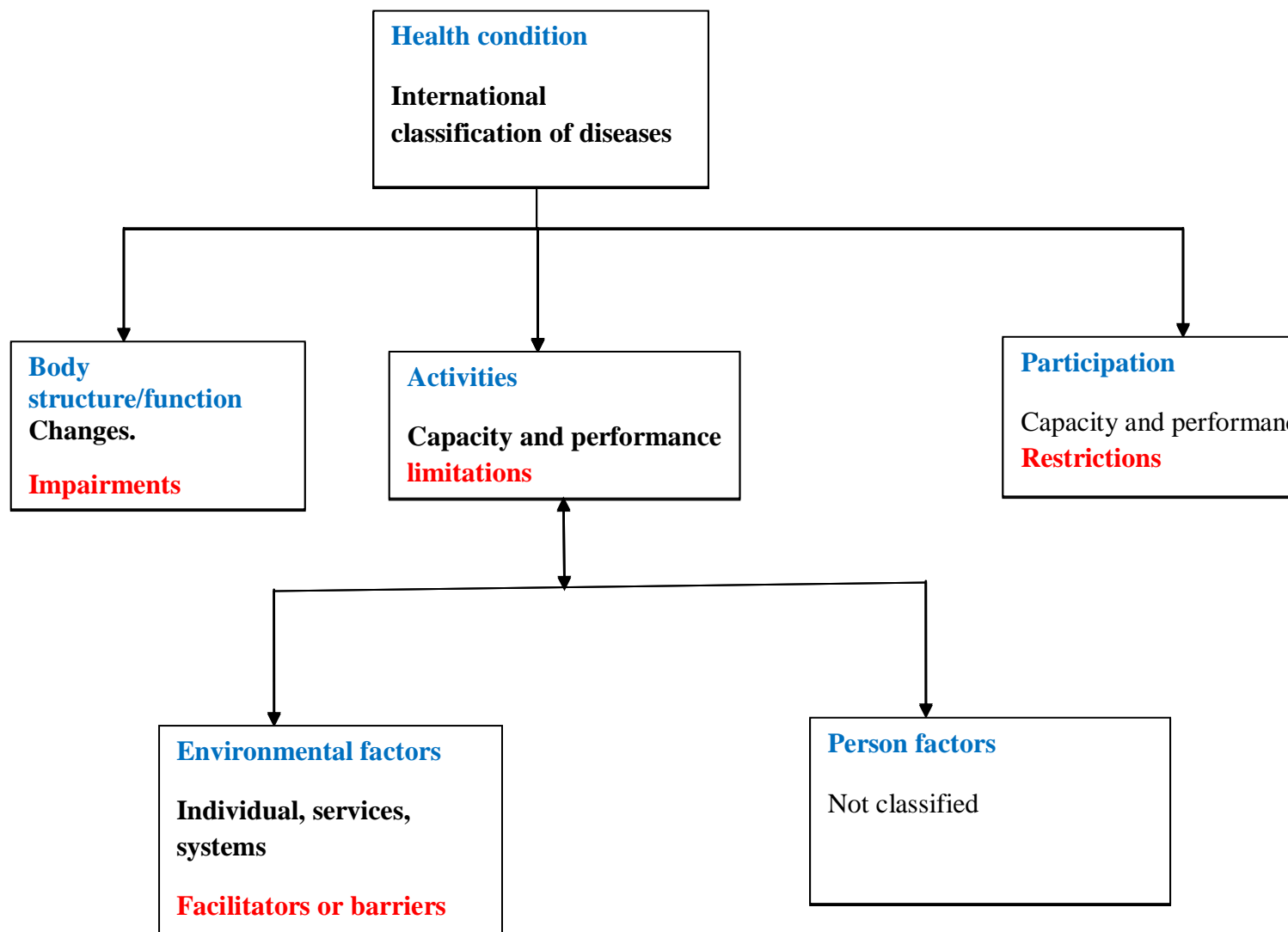


Figure 1: International Classification of Functioning, Disability and health (ICF) framework (WHO, 2001)

CHAPTER THREE

3.0 METHODOLOGY

3.1 Study site

The study was conducted at Kangundo Sub-county hospital; this hospital has a bed capacity of 174. Kangundo Sub-county Hospital is a level 4 hospital in Machakos County about 70 km to the east of the capital city of Kenya, Nairobi. The Hospital has a catchment population of 229,485 people.

3.2 Study design

This was a cross sectional study.

3.3 Study population

All adult HIV positive patients newly initiated into care at Kangundo Sub-county Hospital who met the inclusion criteria were eligible. This hospital's comprehensive care centre (CCC) attends to an average of 60 people daily. The CCC has 3,269 registered PLWHA on care and 1,970 on HAART (39%). The study population comprised of newly diagnosed 18-50 years old adult HIV seropositive patients at initiation of care.

This study was carried out at the Kangundo Sub-county hospital comprehensive care centre between June 2013 and December 2013

3.4 ELIGIBILITY

3.4.1 Inclusion criteria:

All Patients who were included in this study were HIV seropositive

Participants were between 18 and 50 years -The study did not include individuals less than 18 years of age because study population was adults. Aging is associated with a risk of systemic illness; individuals aged more than 50 years are at higher risk of co-morbid conditions which can contribute to changes in cognitive performance (Norman, Basso, and Malow, 2009)

3.4.2 Exclusion criteria

Newly initiated into care HIV seropositive patients who were already on HAART were excluded since the aim of this study was to assess the baseline psychomotor speed at start of treatment. Those who had history of past or current substance abuse, chronic psychiatric illnesses, and history of head injury were excluded as this may act as confounding factors

3.5 Sample size determination

3.5.1 Description of Sample and Sampling Procedure

To measure and compare the proportion of patient with psychomotor slowing in both the late (symptomatic) and early (asymptomatic) HIV/AIDS, the sample size estimation formula was;

$$N = (Z_{\alpha/2} + Z_{1-\beta})^2 (P_1 (1-P_1) + P_2 (1-P_2))$$

$$(P_1 - P_2)^2$$

Where:

P_1 = Proportion of PLWHA expected to have psychomotor slowing in early (asymptomatic) HIV.

P_2 = Proportion of PLWHA expected to have psychomotor slowing in late (symptomatic) HIV.

Z_α = the standard normal deviate for α .

Z_β = the standard normal deviate for β .

N = Total number of subjects (sample size)

Since choice reaction time has been shown to correlate with the grooved pegboard test (0.47-0.62), prevalence obtained from a Nigerian study that utilized choice reaction time to assess psychomotor speed was used (Cysique et al., 2006, Ogunrin et al., 2007) $P_1 = 0.385$, $P_2 = 0.827$, $Z_\alpha = 0.05$, $Z_\beta = 0.9$, $N = 72$ so total sample consisted of 36 patients in early HIV and 36 patients in late HIV (total of 72)

Consecutive sampling was used to recruit participants in both asymptomatic (early HIV disease) and symptomatic (late HIV disease); this is because the sampling frame was unknown. Recruitment into the two groups run concurrently as the new patients came into the comprehensive centre and were assessed and recruited into either asymptomatic or the symptomatic group. The WHO disease stage was not previously known and was

assigned by the principal investigator and her research assistant following history taking and physical examination of each of the participants after which laboratory work-up was done to obtain among other investigations the CD4 counts for each of the participants.

3.5.2 Procedures

This study was carried out at the Kangundo Sub-county hospital comprehensive care centre between June 2013 and December 2013

An interviewer administered questionnaire was used to collect data. This questionnaire consisted of sections on participant biodata and the grooved pegboard test where psychomotor neurocognitive scores were recorded in seconds. The questionnaire was pretested on 8 HIV seropositive patients from both asymptomatic and symptomatic HIVdisease stages at the Nguluni Health Centre Matungulu Sub-County before the beginning of the study.

The principal investigator and a research assistant who was trained on data collection and procedures for administration of the groove pegboard test collected the data.

Blood samples were drawn for the measurement of CD4 count at the Kangundo Hospital laboratory. The sample container used to collect the blood had the participants study number; it took about three days to get results from the laboratory which was then recorded on the corresponding questionnaire.

Psychomotor speed neurocognitive scores were obtained using the grooved pegboard test. The grooved pegboard test was chosen to test for psychomotor speed in this study because it does not require the participant to know how to write and therefore is easier to administer compared to other tests. The test is sensitive for general slowing with the non-

dominant hand being more sensitive in detecting psychomotor slowing compared to the dominant hand. The grooved pegboard test has two trials, the dominant and the non-dominant hand trials. The participant was asked to place 25 keyed pegs into an array of 25 slotted holes as fast as possible, both hands were tested separately. The dominant hand was assumed to be the hand used by the participant to write. Dominant hand trial was offered first followed by the non-dominant hand trial. The score was recorded separately for both hands and reflected number of seconds taken to complete the task. Using the accompanying grooved pegboard test manual, Z scores were calculated from the scores obtained in the test using the formulae:

$$\text{Z-Score} = \frac{\text{Total Time} - \text{Age Mean}}{\text{Standard Deviation}}$$

Negative Z-scores on this task (the participant Performing in less time than the age mean) demonstrate performance in the average to superior range whereas positive z-scores on this task (the participant performing in more time than the age mean) demonstrate performance in the average to well below average range. The grooved pegboard test manual provides normative data which is age and sex specific. Participant with Z scores of more than 1.5 standard deviations were classified as having abnormal scores (Davis et al., 2002, Lafayette Grooved Pegboard Manual 2002)

3.5.3 Validity

The grooved pegboard test together with the questionnaire was reviewed by the supervisors before the study began to ensure that the test could accurately measure psychomotor speed neurocognitive scores.

3.5.4 Reliability

The questionnaire was pretested at Nguluni health centre, Matungulu sub-county on 8 adult HIV positive patients newly initiated into care (1.e 10% of the sample size according to mugenda and mugenda (2003)).

The split half technique was used and the Pearson product moment correlation was used as a measure of reliability. In this study the Pearson product moment correlation coefficient was 0.709 and this was considered reliable

3.6 Data management

Hardware and software

Questionnaires were checked for completeness and errors. Information from completed questionnaires was entered in a database designed in Epidata data entry software version 3.1 and later exported to SPSS version 17 for analysis

Data analysis

Descriptive statistics (percentages, means, frequencies, medians, interquartile range) were used to summarize data.

Non- parametric Mann Whitney U test was used to compare the medians because the data was skewed.

Spearman's rho was used to assess for correlation between age and psychomotor speed neurocognitive scores.

Multiple linear regression analysis was used to assess for linear relationship between WHO stages, CD4 count, gender, age and psychomotor speed neurocognitive score.

P value < 0.05 was considered significant

3.7 Study limitations

The study did not exclude patients suffering from diabetes and hypertension which may act as confounding factors.

Brain imaging studies were not done to rule out any other brain pathology.

3.8 Ethical considerations

Risks

There is a slight risk of bleeding, infection at venipuncture site which was countered by using aseptic technique, employing pressure technique to control bleeding. The investigators ensured minimal pain by reducing trauma to the participants through avoidance of multiple or repeated pricking and use of proper technique.

Benefits

By participating in this study, newly initiated into HIV care seropositive individuals got an opportunity to be screened for psychomotor slowing.

Consent

Informed consent was obtained from the participants

Confidentiality

Participants' information was confidential and was not used for any other purpose other than the study. All interviews were conducted in secluded room with one individual subject at a time and the filled questionnaires were kept in safe custody by the principal investigator in order to ensure that confidentiality was maintained throughout the study.

Budget

The research was funded by the principal investigator.

CHAPTER FOUR

4.0 RESULTS

Table 1: Social demographic characteristics of the participants

		Asymptomatic	Symptomatic	P value
Gender	Male	7(28%)	18(72%)	0.013 ¹
	Female	29(61.7%)	18(38.3%)	
	None	0	1(100%)	0.134 ¹
	Primary	17(63%)	10(37%)	
	Secondary	18(47.4%)	20(52.6%)	
	Tertiary	1(16.7)	5(83.3%)	
Employment	Yes	17(45.9 %)	20(54.1%)	0.84 ¹
	No	15(51.7%)	14(48.3%)	
Age mean(SD)		35.5(±7.6)	36.0(±8.3)	0.680 ²

1-chi square, 2- t-test

Seventy two HIV seropositive patients participated in the study. Majority of the participants were female, most had attained secondary or primary education. The mean age was 35.5(±7.6) and 36.0(± 8.3) in the asymptomatic and symptomatic groups respectively.

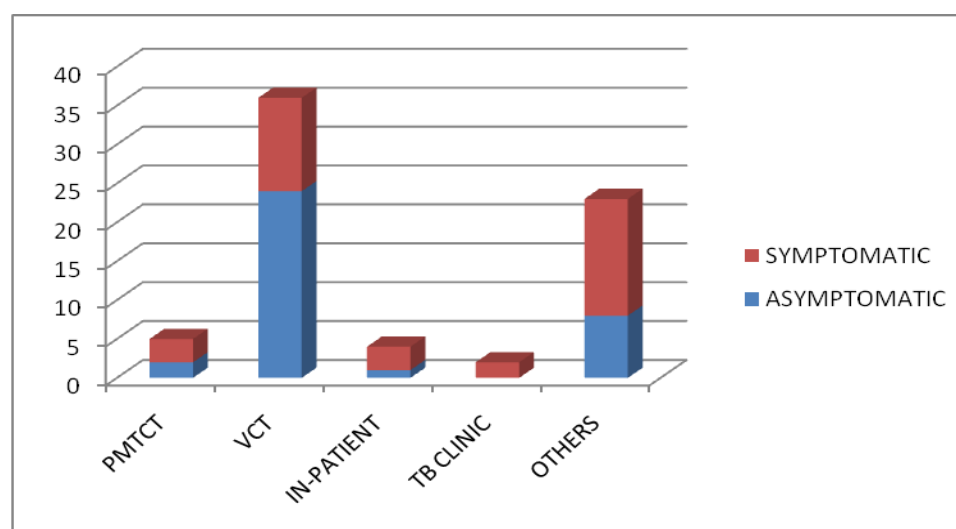


Figure 2: Patient source or entry Point

Majority of the participants entered into HIV care through voluntary counseling and testing as shown in figure 2 above.

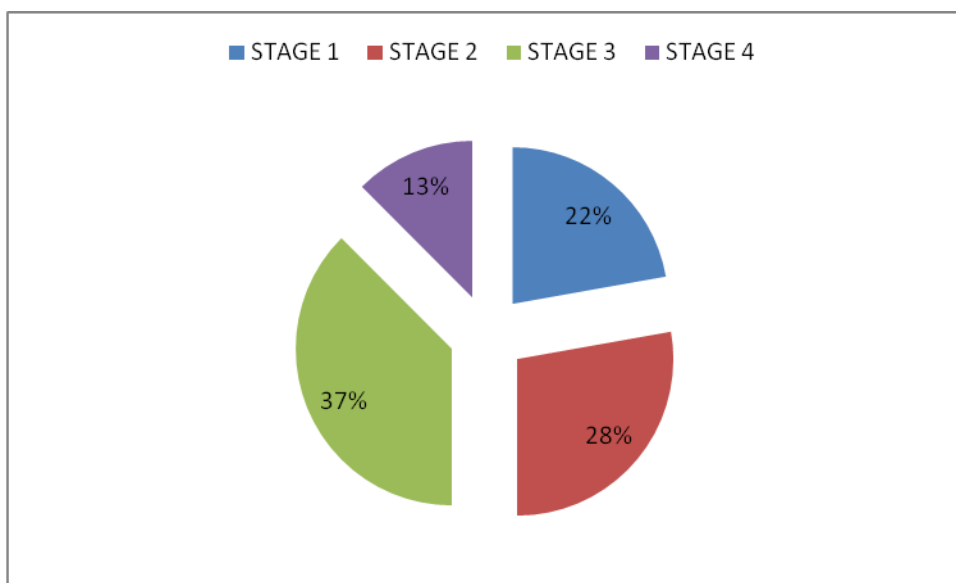


Figure 3: Patients WHO stage (N= 72)

Most of the participants in the study were in WHO stage 3 as shown in figure 3 above

The median CD4 count was 434(216.5, 561) in the asymptomatic group. In the symptomatic group median CD4 was 76(27.25, 296), $p < 0.001$.

Majority of the patients in the asymptomatic (32) and symptomatic group (34) reported right hand as the dominant hand

Table 2: Difference in median psychomotor speed neurocognitive score HIV by disease stage

	Dominant Hand psychomotor speed neurocognitive score Median (IQR)	Non- dominant hand psychomotor speed neurocognitive score Median (IQR)
Asymptomatic (n=36)	80.5(68.25, 92.75)	87.5 (79,98.5)
Symptomatic (n=36)	100.5(79,121.5)	98(82, 137.5)
P value	0.003 ¹	0.081 ¹

1- Mann Whitney U test

There was a significant difference in psychomotor speed neurocognitive score in the dominant hand between the symptomatic and asymptomatic groups. ($p= 0.003$) as shown in table 2 above. There was no significant difference in psychomotor speed neurocognitive score between the symptomatic and asymptomatic groups in the non-dominant hand as shown in table 2 above ($p= 0.081$)

Association between CD4 and Psychomotor speed neurocognitive score (speed)

Table 3: Difference in median Psychomotor Speed neurocognitive score by patients CD4 count

Indicator	psychomotor Speed	
	Dominant hand	Non-dominant hand
	Median (IQR)	Median (IQR)
CD4		
<200, n= 29	103(79, 124)	109(85.5, 138)
≥200, n=43	81(70, 102)	85(79,96)
p-value	P=0.006 ¹	P= 0.04 ¹

1- Mann Whitney U test

After classifying the CD4 count into below 200 cells per mm³ and above 200 cells per mm³, there was a significant difference in psychomotor speed score between those with CD4 counts less than 200 cells per mm³ and those with more than 200 cells per mm³ psychomotor speed. (Table 3)

Table 4: Relationship between gender and psychomotor speed neurocognitive score

DISEASE CATEGORY	MEDIAN(IQR)	P VALUE
ASYMPTOMATIC	Dominant hand	0.845 ¹
	Male	
	Female	0.969 ¹
	Non-dominant hand	
Male	85(79, 119)	
Female	88(79, 98)	
SYMPTOMATIC	Dominant hand	0.055 ¹
	Male	
	Female	0.059 ¹
	Non-dominant hand	
Male	120.5(85.75, 152)	
Female	86(78,119.5)	

1- Mann Whitney U test

As indicated in table 4, there was no significant difference in psychomotor speed neurocognitive score by gender in both the asymptomatic and symptomatic group ($p>0.05$).

Table 5: Correlation between age and psychomotor speed neurocognitive score

	Dominant hand	Non-dominant hand
Asymptomatic	rho= 0.199 p= 0.244 ¹	rho=0.360 p= 0.031 ¹
Symptomatic	rho=0.277 P=0.102 ¹	rho=0.161 p=0.348 ¹

1- Spearman's correlation

A significant weak positive correlation was found between age and psychomotor speed neurocognitive score only in the non-dominant hand in the asymptomatic group (table 5)

Table 6: Correlation between education and psychomotor speed neurocognitive score

Level of education	Dominant hand	Non-dominant hand
	Median psychomotor speed score (IQR)	Median psychomotor speed score (IQR)
None/Primary		
Secondary/Tertiary	92(79,127) 92.5(67.75, 139)	96(85,134) 111(74.5, 184.25)
P value	0.420 ¹	0.252 ¹

1- Mann Whitney U test

Level of education did not significantly influence psychomotor speed neurocognitive score in both dominant (p=0.42) and non-dominant hand (p= 0.252) respectively as shown in table 6 above.

Table 7: Multiple linear regression (dominant hand)

Variable	t	significance	Collinearity statistics	
			Tolerance	VIF
Male versus female	2.181	0.033 ¹	0.783	1.278
WHO stage 1	-1.648	0.104 ¹	0.431	2.319
WHO stage 2	-0.772	0.443 ¹	0.342	2.926
WHO stage 3	0.306	0.761 ¹	0.373	2.681

1- Independent sample t test.

Dependent variable is psychomotor score in the dominant hand, WHO stage 4 is the reference for disease stage, female is the reference for gender.

It appears **multicollinearity** is not a concern because the VIF scores are less than 3

The slope of **gender** is 0.159. This means that, on average, predicted psychomotor scores for males are 0.159 points higher than for females, after controlling for WHO stage

Table 8: Multiple linear regression (non- dominant hand)

Variable	t	Significance	Collinearity statistics	
			Tolerance	VIF
Age	1.434	0.156 ¹	0.843	1.187
Gender	0.502	0.617 ¹	0.781	1.281
CD4	-3.513	0.001 ¹	0.885	1.129

1- Independent sample t test

Dependent variable is psychomotor speed (Non-dominant hand)

It appears **multicollinearity** is not a concern because the VIF scores are less than 3. The slope of **CD4** is -0.072. This means that for every one unit increase in CD4, predicted psychomotor score decreases by 0.072 units, after controlling for age and gender.

Table 9: Percentage of normal versus abnormal scores by disease category

WHO stage 1 and 2(asymptomatic)	Dominant hand		Non-dominant hand	
	Normal	Abnormal	Normal	Abnormal
	14 38.9%	22 61.1%	18 50 %	18 50%
WHO stage 3 and 4(symptomatic)	10 27.8 %	26 72.2 %	15 41.7 %	21 58.3 %
P value	0.454 ¹		0.637 ¹	

1- Chi square test

After conversion of the raw scores into Z scores and classifying participants into those with Z scores of 1.5 SD above the mean and those whose Z scores fell 1.5 SD below the mean, there was no significant difference between percentages of those with abnormal score in the asymptomatic and symptomatic groups as illustrated in table 5.9 above in both dominant (p=0.454) and non-dominant hand (p=0.637)

Table 10: Percentage of normal versus abnormal scores by CD4 count category

CD4 category	Dominant hand		Non-dominant hand	
	normal	abnormal	normal	Abnormal
CD4 < 200	6 20.7 %	23 79.3 %	9 31 %	20 69 %
CD4 > 200	18 41.9 %	25 58.1 %	24 55.8 %	19 44.2%
P value	P= 0.077 ¹		P= 0.054 ¹	

1- Chi square test.

Participants were also classified into those with normal and abnormal scores depending on CD4 count category, there was no significant difference between those with abnormal scores in asymptomatic and symptomatic group in both dominant($p= 0.077$) and non-dominant hand($p=0.054$)

Since the ability of the participants to perceive and perform motor responses (psychomotor speed) does not differ significantly between those in asymptomatic and symptomatic disease stages, we can accept that the initial assumption of this study that performance between the two groups is not that different is true.

According to the findings of this study, the level of immune function(CD4 count) relates to the ability of participants to perceive and perform motor responses, we therefore do away with the initial assumption of the study that there is no relationship between immune function and ability to perceive and execute motor responses.

CHAPTER FIVE

5.0 DISCUSSION

The majority of participants in this study were women, this could be attributed to health seeking behavior as previous research has shown that there are important differences between women and men in underlying mechanisms of HIV and AIDS infection as well as the social and economic consequences which arise from differences in biology, sexual behavior, and socially constructed gender differences (World Health Organization (WHO), 2003). Responsibilities, gender roles, access to resources, decision making power may result in women being more vulnerable to HIV compared to men (Mills, Singh, Nelson and Nachega, 2006, De vogli and Birbeck , 2005, Ashford , 2006).

The mean age was 35.5(\pm 7.6) and 36.0(\pm 8.3) in the asymptomatic and symptomatic groups respectively. This is consistent with findings from studies which have shown that HIV and AIDS affect people in their prime years (Fouad, 2005, F Njororai and W. Njororai , 2003). Studies done in South Africa revealed that most deaths due to HIV and AIDS occurred in people between 29 and 40 years of age (Ashford, 2006)

Most of the participants had attained a primary or secondary school education. Past research has demonstrated that education alone may not prevent people from acquiring HIV infection; other factors like income and religion interact with education to influence HIV infection rates (Brent, 2006)

With regard to employment status, about half of the participants in symptomatic and asymptomatic disease stage were in some form of employment. This may be explained by the fact that this study took place in a rural area and bearing in mind that most of the

participants were women, they were likely to be house wives or farmers or self-employed. PLWHA may also find it difficult to continue full time employment due to challenges which include job discrimination, ongoing medical needs which necessitate a change of schedules (Brooks and Klonsinki, 1999). This may also explain why half of the respondents were not in fulltime employment.

Most of the participants entered into care through the VCT which is similar to a study in South Africa where participants enrolled entered into care through VCT (Singh et al., 2010). Reports have shown that VCT is a good point of entry into care for people with communicable diseases, reproductive health needs. In our study, most of the participants may have come to test as they sought for other curative services since the VCT is located within the hospital outpatient department leading to majority of case detection through the VCT.

During this study, participants were able to understand instructions on the grooved pegboard test and complete the test.

Relationship between HIV disease stage and psychomotor speed neurocognitive score

Although initially there was a significant association between the HIV disease stage and psychomotor speed neurocognitive score in the dominant hand, this was not found to be the case in the non-dominant hand. This could be due to practice effect so that after being offered the dominant hand trial, the participants became more confident and were able to perform the non-dominant hand trial within a shorter time compared to the time used to complete the dominant hand trial. This is consistent with findings from a previous study

which showed that lack of prior exposure to neuropsychological tests may affect performance (Vo et al., 2013)

After multiple regression analysis, there was no significant difference in psychomotor speed neurocognitive score between the asymptomatic and symptomatic HIV disease stages. This differs from the finding of Kanmogne et al who found that advancing disease stage significantly affected performance in a study done in Cameroon where the grooved pegboard test was also used to assess motor function. Study participants with AIDS were found to perform poorly compared to those in the non-AIDS group (Kanmogne et al., 2010). The findings of this study also differ from those of Heaton et al who found that grooved pegboard test completion time was related to stages of HIV infection (Heaton et al., 1995). The differences in finding could be attributed to ethnic or cultural differences across groups which have been noted in previous studies to affect performance in neuropsychological tests. The HIV and AIDS disease classification used by Kanmogne et al was the Center for disease control staging which also takes into account the CD4 count, those participants with CD4 counts of less than 200 are in the advanced disease stage. The effect of advancing disease observed in their study could have been due to falling CD4 count which was found to affect psychomotor speed score in this study. In our study, the World Health Organization disease staging was used and does not take into account the CD4 count (Kanmogne et al 2010)

Demographic effects

Other studies have noted demographic effects age, education level, gender may affect performance in neuropsychological tests (Kanmogne et al 2010). In this study, gender

was found to affect performance in psychomotor speed neurocognitive scores as demonstrated in the multiple linear regression analysis. This differs from finding in another study which did not find any significant effect of gender on test performance. The grooved pegboard was also used as part of the neuropsychological test battery to test for fine motor skills and dexterity (Kanmogne et al 2010).

Older age has been associated with poor performance in previous studies (Kanmogne et al., 2010, Vo et al., 2013). Findings in this study show that age did not have a significant effect on psychomotor speed neurocognitive score.

Lower education levels have been associated with poor neuropsychological test performance in previous studies; in this study education did not significantly affect test performance (Vo et al., 2013)

Association between CD4 count and psychomotor speed neurocognitive score

In this study there was a significant association between CD4 count and the psychomotor speed neurocognitive score after controlling for effects of age and gender. The psychomotor speed neurocognitive score is the time taken to complete test in seconds. The psychomotor speed score decreased by 0.072 for every one unit increase in CD4 count such that those with higher CD4 counts took lesser time to complete the test as compared with those whose CD4 counts are lower. This differs from a previous study which compared test outcomes for participants with CD4 counts and found no significant difference. This finding could be attributed to the fact that the study recruited HIV-1 seroconverters who may have had higher levels of CD4 counts compared to this study

and therefore did not exhibit clinically significant impairment in cognitive performance. About 5.1 % of the participants were on antiretroviral therapy which could also have had a protective effect and therefore affected the results obtained (Vo et al., 2013)

Percentage of participants with abnormal scores depending on disease stage and CD4 count

In this study, normative scores from general united states population were used to convert raw scores obtained from the grooved pegboard test into standardized scores(Z scores) because there is currently no published normative data from Kenya or East Africa (Kwasa et al., 2013) There was no significant difference observed between percentages of those with abnormal scores between those in asymptomatic or symptomatic groups(p value >0.05), there was also no significant difference in percentages of abnormal scores between those with CD4 counts of less than 200 and more than 200 cells per milliliter. This may be explained by the findings from previous research which showed that normal individuals were classified as abnormal when normative data from the United States was used to convert raw scores into Z scores which could have affected the percentages of abnormal scores in both asymptomatic, symptomatic participants groups and both CD4 cell categories (Kwasa et al., 2012)

CONCLUSIONS

1. There was no significant correlation between WHO stage and psychomotor speed neurocognitive score
2. There was a significant correlation between CD4 count and psychomotor speed neurocognitive score

RECOMMENDATION

1. Since CD4 count correlates with psychomotor speed neurocognitive score and falling CD4 adversely affects psychomotor speed scores, care should be taken to ensure that CD4 counts do not continue falling after initiation into care in order to preserve psychomotor function in people living with HIV and AIDS.
2. There is need for development of culturally appropriate normative scores for the grooved pegboard test before further use in research.

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APPENDICES

Appendix I : INFORMED CONSENT FORM

Study No-----

‘Relationship between HIV stage in adults and psychomotor speed neurocognitive score at initiation of care at Kangundo district hospital’

Invitation to participate

You are invited to participate in this research study investigating relationship between the stage of HIV in adults at initiation into care and psychomotor speed neurocognitive score at Kangundo district hospital

Basis for selection

You are eligible to participate in this study because you have been recruited in order to help us understand the how the stage of HIV affects psychomotor speed among HIV seropositive patients at initiation in to care.

Purpose of study

The main aim of this study is to determine the relationship between the HIV/AIDS stage, CD4 count and the psychomotor speed neurocognitive score of adult patients at initiation of care

Procedures

You will be asked some questions about your point of entry into care, date of diagnosis and taken through the grooved pegboard test, a test of psychomotor speed

A blood sample will be drawn for CD4 count which will help us determine the stage of HIV infection

Potential benefits

There is no reward for participation in this study. Potential benefit to you as a participant is that you will have contributed to a better understanding of how HIV disease stage affects performance in psychomotor speed. You will also have a chance to be screened for psychomotor slowing which can be treated by use of antiretroviral therapy if present.

Potential risks

There is a slight risk of infection, bleeding while blood is drawn for the CD4 counts. The investigators will take precautions to ensure that you don't contract any infections from the venipuncture site by employing aseptic technique. Excessive bleeding from venipuncture site will be prevented by use of pressure

Guarantee of confidentiality

To ensure confidentiality, at no time will your name appear on any materials or reports of the research findings (including web-site postings of the results, conference presentations, or professional publications). Materials associated with this study will be kept under lock and key in a cabinet. Your signed consent form will be stored separately from your data to insure complete confidentiality. At the conclusion of this study, all materials will be destroyed.

Withdrawal from participation

Participation in this study is voluntary. Your decision to participate or not to participate

Will not affect your follow up at the comprehensive care clinic If you decide to participate, you are free to withdraw your consent and to discontinue your participation at any time

Offer to Answer Any Questions

If you have any questions about the procedures at any time, please do not hesitate to ask. If you think of questions later, please feel free to contact the principal investigator. All questions about the procedures and this study in general will be answered. However, some questions may not be answered until after you have completed the procedures to ensure that your responses will not be affected by your knowledge of the research.

Participant's statement

I am voluntarily making the decision to participate. My signature certifies that I have heard and understand the aforementioned information. My signature also certifies that I have had an adequate opportunity to discuss this study with the research investigator and have had all of my questions answered to my satisfaction. I understand that by signing this document, I waive no legal rights.

Participant's Signature Date

Research Investigator's Statement

In my judgment, the aforementioned participant is voluntarily and knowingly giving Informed consent and possesses the legal capacity to do so.

Research Investigator's Printed Name

Research Investigator's Signature and Date

0725 294225, njambi@gmail.com

Research Investigator's Telephone Number Research Investigator's E-mail Address

FOMU YA IDHINI

Namba ya uchunguzi.....

'Uhusiano Kati ya ukimwi kwa watu wazima na muda anaochukua mtu kutatua changamoto zinazohusiana na fikira wakati wa kuanzia matibabu.

Mwaliko wa kushiriki

Unaalikwa kushiriki katika utafiti, 'uhusiano kati ya ukimwi na muda anaochukua mtu kutatua changamoto zinazohusiana na kufikiria wakati wa kuanzia matibabu kati ya watu wazima wenye ukimwi wanaohudhuria kliniki katika hospitali ya wilaya ya Kangundo.

Madhumuni ya somo hili

Lengo la utafiti huu ni kusaidia kuboresha matibabu kwa wagonjwa, kutafuta njia ya kuzuia adhari zinazoletwa na virusi vya ukimwi kwa ubongo, na pia kujua wale walioadhirika ndio kuufanya uchunguzi au matibabu zaidi.

Taratibu

Utaulizwa maswali na kufanyiwa uchunguzi mojawapo ikiwa ni kuchukuliwa kiwango kidogo cha damu yako ili kukifanyia kipimo cha CD4.

Hatari za utafiti

Kuna uwezekano wa hatari ndogo zinazotokana na kushiriki kwako katika utafiti. Huenda ukapoteza damu au kupatwa na uchungu au uchafu kuingia katika ile sehemu ya mwili wakati wa kutoa damu

Faida ya utafiti

Hakuna malipo au zawadi kwa ajili ya kushiriki katika utafiti huu. ingawa faida ya wewe kushiriki katika utafiti huu ni kwamba utachangia pakubwa katika kuelewa na kuzuia adhari za ukimwi kwenya ubongo.

Dhamana ya Usiri

Kuhakikisha siri, jina lako halitaonekana kwenye nyenzo yoyote au taarifa ya matokeo

ya utafiti (ikiwa ni pamoja na mtandao, matangazo ya matokeo, maonyesho ya mkutano huo, au machapisho ya kitaaluma). Vifaa vinavyohusiana na uchunguzi vitahifadhiwa na mpelelezi mkuu na ataziweka siri zote.

Kujitoka kutoka kushiriki kwa utafiti

Kushiriki katika utafiti huu ni kwa hiari. Uamuzi wako wa kushiriki au kutoshiriki hautaadhiri matibabu na kufuatiliwa katika kliniki. Uko huru kujitoka wakati wowote na kuacha kushiriki bila madhara yoyote.

Kutoa na kujibu maswali yoyote

Kama una maswali kuhusu taratibu wakati wowote, tafadhali usisite kuuliza.

Kama utakuwa na maswali baadaye, tafadhali jisikie huru kuwasiliana na mpelelezi mkuu. Maswali yote juu ya taratibu na utafiti huu kwa ujumla yatajibiwa. Hata hivyo, baadhi ya maswali yatajibiwa baadaye ili yasiadhiri uchunguzi.

Taarifa ya mshiriki

Mimi nimefanya uamuzi kushiriki kwa hiari katika utafiti. Sahihi yangu inaonyesha ya kwamba nimeelewa habari niliyoelezewa pia ni dhahirisho kuwa nimepata muda wa kutosha kujadiliana na watafiti wanaohusika na nimeridhishwa na majibu niliyopewa. Ninaelewa kuwa kwa kutia sahihi yangu kwenye hati hii sijaziondoa haki zangu za kisheria.

Sahihi ya mshiriki

Mpelelezi

Katika maoni yangu, mshiriki aliyetajwa ana hiari na amepewa habari ya kutosha kuweza kutoa ridhaa na ana uwezo wa kisheria kufanya hivyo.

Jina la mpelelezi

Sahihi ya Mpelelezi wa utafiti na tarehe

0725-294 225, P.O BOX 100627 NAIROBI, njambi09@gmail.com

Simu ya Mpelelezi wa utafiti, anwani ya Mpelelezi wa Utafiti, na barua pepe

1. VOOMU YA LUUSA Namba ya isomo.....

Ukulyo wa kulika

Nukulwa ulike nthini wa isomo yii. Vata wa isomo yii ni kuthuthya na kutetheesya kuthinikia awau ma ukimwi, kumantha mathina ala maetawa ni tulinyu twa ukimwi akilini.

Vata wa isomo yii

Vata wa isomo yii ni kuthuthya na kutetheesya kuthinikia awau ma ukimwi, kumantha mathina ala maetawa ni tulinyu twa ukimwi akilini.

Mutalatala

Nukulwa makulyo ma uwau uu na kwikwa ukunikili kwivo kumwa kiasi kinini kya nthakame yaku kwondu wa ukunikili wa cd4

Uthuku wa iseso yii

Nutonya kuasya nthakame yaku kana ukakwata ni kyalya kana kiko kikalika nthini wa vala waumya nthakame

Vaita wa iseso yii

Vai vaita, ituvi kana mithinzio kwondu wa kwiyumilya isesoni yii indi vaita ni kwaku mwene niundu wa kwiyiendeesya na kwikwatania na kikundi kii kya ukunikili

Kimbithi

Nikana tuikithiye kimbithi, vai isitwa yaku yikakunithwa mathanguni ma mauvoo kana ivindani ya kutangaasya kwa mosungio.masine ila sikutumika kwiwa na kivuli. Saii waku kuiwa utee na uvo ukiwa ni kana kuikiithwa kwa kimbithi kuviikwe.

Kwiyumya na kutia kwithiwa kati wa ukunikili

Kulika nthini a ukunikili uu ni kwiyeendea.

Kukulya na kusungia makulyo

Ndukakie kukulya makulyo onthe ma mutalatala witu.kethiwa wina makulyo itna, tihiwa wimuthasye kuneena na munene wa kikundi kii ,kati wa makulyo amwe nimekusungywa muthyani wa iseso yii.

Wivito wa kwiyumya

Nyie ni ninaamua kwa ngoo ya kuenda kukwatana na kikundi kii. Saii yakwa yionanya kana ninaelewa ni uvoov wonthe ula uandikitw vaa. Ninaelewa kana kwikia sai vaa kuina mbungia kwithiwa nina haki syakwa.

Saii ya muatii

.....

Mumanyithya wa kikundi

Isitwa na sai.....

Matuku.....

Namba ya simu, 0725294225, isanduku ya posta, 100627 Nairobi,

njambi09@gmail.com

Appendix II: Enrollment Questionnaire**Demographic data.**

Date.....

Age..... Gender/Sex Male Female

Patient source/Entry point:

 PMTCT VCT In-patient TB clinic Others (specify).....Education level..... Employment YES NO Date confirmed HIV +ve..... Disclosure YES NO

Date enrolled on HIV care..... WHO stage.....

CD4 count.....

a. “Which hand is missing or has a finger or finger-part missing?”

Right 1

Left 2

Both..... 3

A6. “Do you have impaired hand or finger movement for any reason?”

Yes..... 1

No 2

a. “Which hand?”

Right..... 1

Left 2

Both 3

A7. “Are you wearing a bandage or splint on either hand?”

Yes..... 1

No 2

Are you currently experiencing any pain, weakness, numbness, or arthritis of the hand?”

Yes..... 1

No 2

a. “Which hand is experiencing pain, weakness, numbness, or arthritis?”

Right 1

Left 2

Both 3

A8 DOES THE PARTICIPANT HAVE VERY LONG AND/OR FAKE
FINGERNAILS?

Yes..... 1

No 2

A9. “Which hand is your dominant hand?”

Right 1

Left 2

SECTION B: TEST ADMINISTRATION – DOMINANT HAND TRIAL

(1) DOMINANT HAND TRIAL:

PROMPT: PLACE THE PEGS IN THE CIRCULAR PEG HOLDER. PLACE THE PEGBOARD IN FRONT OF THE PARTICIPANT SO THAT IT IS CENTERED WITH THE BOARD AT THE EDGE OF THE TABLE AND THE CIRCULAR PEG HOLDER ABOVE THE BOARD

Say to the participant, “Please try not to move this board at any time throughout this task.”

Give instructions to the participant:

“I’d like to see how quickly you can put these pegs into these holes, like this,”

(Demonstrate by filling the top row with pegs. Put the pegs back in the peg holder.)

“The pegs are all alike, but as you can tell, the holes are oriented in different directions. You can try out a couple just to get a feel for how they fit.”

Allow the participant to insert two pegs into the holes and then put the pegs back in the peg holder.

“When I say, ‘Go,’ begin here (point to the top left hole if the participant is right-handed and to the top right hole if the participant is left-handed) and put the pegs into the board as fast as you can using only your dominant hand. Fill the top row completely from this side to this side.” If the participant is right-handed, run your finger along the top row from the participant’s left to right and from the participant’s right to left if the participant is left-handed.

“Do not skip any; fill each row the same way you filled the top row. Do you have any questions? If you are ready, go as fast as you can, go!”

- Start timing as soon as you tell the participant to begin.
- The participant may only use her dominant hand.
- **Record the number of times the participant drops a peg during the trial in Question B2.**

A “Drop” is anytime the participant unintentionally drops a peg from the time she attempts to pick up the peg from the tray until it is placed correctly in the hole.

A “Drop” is not recorded if:

The participant accidentally knocks a peg out after placing it in the hole.

The participant accidentally picks up two pegs and drops one back in the peg holder in order to only have one peg

Once the participant places the last peg in the last hole, record the task duration as minutes and seconds in Question B1. If the participant took longer than five minutes to complete the task, record as 8 minutes, 88 seconds

IF	THEN
The participant picks up more than one peg.	Say, “Remember that you may only pick up one Peg at a time.
The participant starts placing pegs in the wrong direction	Stop them and remind of correct direction WITHOUT stopping the time
A peg is dropped	Record it. Neither the examiner nor the participant should pick up the peg until after the trial and or if the peg is interfering with the task
The participant takes longer than five minutes.	Stop the task and record the time as 8min 88 seconds

DOMINANT HAND TRIAL SCORING:

B1 Length of time to complete the trial: |__|__|: |__|__|

MIN SEC

B2. Number of drops: |__|__|

B3. The Grooved Pegboard dominant hand trial was:

Completed..... 1

(SECTION C)

Attempted but not completed 2

Not Attempted 3

B4. The Grooved Pegboard dominant hand trial was not attempted or completed due to:

Participant Refusal..... 1

(SECTION C)

Cognitive Impairment 2

(SECTION C)

External Disturbance..... 3

(SECTION C)

Fingernails were too interfering 7

(SECTION C)

Physical/Health-Related Limitation 8

(a)

Other Reason 9

(b)

a. SPECIFY physical/health limitation: _____

(SECT. C)

b. SPECIFY other reason: _____

(SECTION C)

NON-DOMINANT HAND TRIAL ADMINISTRATION:

- Administer the non-dominant hand trial EXACTLY the same as the previous trial except that the Participant is using her non-dominant hand.

- Remove all pegs from the board and put them back in peg holder.

Give instructions to the participant:

“Now I would like you to repeat the task exactly as you did before, except this time, using your non-dominant hand. When I say go, begin here (point to the top right hole if the participant’s non- dominant hand is left and to the top left hole if the participant’s non-dominant hand is right) and put pegs into the board as fast as you can using only your non-dominant hand. Fill the top row completely from this side to this side.”

If the participant’s non-dominant hand is left, run your finger along the top row from the participant’s Right to left and from the participant’s left to right if the participant’s non-dominant hand is right. “Do not skip any. Fill each row the same way you filled the top row. Any questions? Ready, as fast as you can, go.”

- Start timing as soon as you tell the participant to begin.
- Record the number of peg drops in Question C2.
- Once the participant places the last peg in the last hole, record the task duration in minutes and Seconds in Question C1, if the participant took longer than five minutes to complete the task, record as 8 minutes, 88 seconds

NON-DOMINANT HAND TRIAL SCORING:

C1. Length of time to complete the trial: |__|__|:|__|__|

MIN SEC

C2. Number of drops: |__|__|

C3. The Grooved Pegboard non-dominant hand trial was:

Completed 1
(C5)

Attempted but not completed 2

Not Attempted 3

The Grooved Pegboard non-dominant hand trial was not attempted or completed due to:

Participant Refusal..... 1 (C5)

Cognitive Impairment 2 (C5)

External Disturbance..... 3 (C5)

Fingernails were too interfering 7 (C5)

Physical/Health-Related Limitation 8 (a)

Other Reason 9 (b)

a. SPECIFY physical/health limitation: _____ (C5)

b. SPECIFY other reason: _____ (C5)

C5. TIME MODULE ENDED: |__|__|:|__|__| AM..... 1

PM.....

Appendix III: Revised WHO HIV/AIDS clinical staging**Stage 1**

Asymptomatic

Persistent generalized lymphadenopathy

Stage 2

Moderate unexplained weight loss (under 10 % of presumed or measured body weight)

Recurrent respiratory tract infections (sinusitis, otitis media, tonsillitis and pharyngitis)

Herpes zoster

Angular cheilitis

Recurrent oral ulceration

Papular pruritic eruptions

Seborrheic dermatitis

Fungal nail infections

Stage 3

Unexplained weight loss (more than 10 % of presumed or measured body weight)

Unexplained chronic diarrhea for longer than one month

Unexplained persistent fever (above 37.6, intermittent or constant, for > 1 month)

Persistent oral candidiasis

Oral hairy leukoplakia

Pulmonary tuberculosis (current)

Severe bacterial infections (e.g. pneumonia, empyema, pyomyositis, bone or joint infection, meningitis or bacteremia)

Acute necrotizing ulcerative stomatitis, gingivitis, or periodontitis

Unexplained anemia (<8 g/dl), neutropenia and/ or thrombocytopenia)

Stage 4

HIV wasting syndrome

Pneumocystis pneumonia

Recurrent severe bacterial pneumonia

Chronic herpes simplex infection (orolabial, genital, or anorectal for > one month's duration or visceral at any site)

Esophageal candidiasis (or candidiasis of trachea, bronchi or lungs)

Extra pulmonary TB

Kaposi's sarcoma

Cytomegalovirus disease (retinitis or infections of other organs)

Central Nervous System toxoplasmosis

HIV encephalopathy

Extra pulmonary cryptococcosis including meningitis

Disseminated nontuberculous mycobacterial infection

Progressive multifocal leukoencephalopathy

Chronic isosporidiosis (with diarrhea)

Chronic isosporiasis

Disseminated mycosis (coccidiomycosis or histoplasmosis)

Recurrent non-typhoid salmonella bacteremia

Lymphoma (cerebral or B cell non-Hodgkin's) or other solid HIV associated tumors

Invasive cervical carcinoma

Atypical disseminated leishmaniasis

Symptomatic HIV associated nephropathy or symptomatic HIV associated

cardiomyopathy.

Appendix I V: APPROVAL LETTER.



MOI TEACHING AND REFERRAL HOSPITAL
P.O. BOX 3
ELDORET
Tel: 334711/2/3

INSTITUTIONAL RESEARCH AND ETHICS COMMITTEE (IREC)



MOI UNIVERSITY
SCHOOL OF MEDICINE
P.O. BOX 4606
ELDORET
Tel: 33471/2/3
30th August, 2012

Reference: IREC/2012/168

Approval Number: 000880

Dr. Rachael Njambi Kinuthia,
Moi University,
School of Medicine,
P.O. Box 4606-30100,
ELDORET-KENYA.

Dear Dr. Njambi,

RE: FORMAL APPROVAL

The Institutional Research and Ethics Committee have reviewed your research proposal titled:

"Relationship between HIV Stage in Adults and Psychomotor Speed Neurocognitive at Initiation of Care at Kangundo District Hospital."

Your proposal has been granted a Formal Approval Number: **FAN: IREC 000880** on 30th August, 2012. You are therefore permitted to begin your investigations.

Note that this approval is for 1 year; it will thus expire on 29th August, 2013. If it is necessary to continue with this research beyond the expiry date, a request for continuation should be made in writing to IREC Secretariat two months prior to the expiry date.

You are required to submit progress report(s) regularly as dictated by your proposal. Furthermore, you must notify the Committee of any proposal change (s) or amendment (s), serious or unexpected outcomes related to the conduct of the study, or study termination for any reason. The Committee expects to receive a final report at the end of the study.

Yours Sincerely,

PROF. E. WERE
CHAIRMAN
INSTITUTIONAL RESEARCH AND ETHICS COMMITTEE



cc: Director - MTRH
Principal - CHS
Dean - SOM
Dean - SPH
Dean - SON
Dean - SOD