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EDITORIAL

The Cerebellum: Not Just an Anatomical Structure

*Adekomi AD.¹, Adewole OS.², Tijani AA.³, Shallie P.⁴

In human, the cerebellum occupies about ten percent of the total skull. It contains numerous cells one of which is the Purkinje cell. Traditionally, the cerebellum is made up of four important types of neuronal cells namely Golgi cells, granules cells, Purkinje cells, and; stellate cells (basket cells). However, with the rapid advances in medical sciences, it is now known that the cerebellum contains many other cells, these includes; candelabrum cells, Lugaro cells, and unipolar brush cells. The fact that these neuronal cells are usually not cited in the standard basic expression of the microscopic anatomy of the cerebellum, or even in standard anatomy, physiology, or histology literatures, indicate that our knowledge of the existence of these cells is fractional (1).

Recent microscopic study by Tang et al. (2016) (2) has shown that the cerebellum contains the significant number of neuronal cells and synapses compared with any other structure within the central nervous system. The functions of these wide arrays of neurons are determined by a set of biological stimulus (i.e. excitatory or inhibitory inputs). According to Heshmat (2016) (3), excitatory inputs are generated by many mossy fibers which developed from the pontine nuclei and climbing fibers originating from the inferior olivary nucleus. On the other hand, large inhibitory inputs arise from the Purkinje cells situated in the cerebellar cortex. Observations made from the neurobiology of the cerebellum showed that there is need for integration between excitatory and inhibitory inputs so as to develop the output signal required for the functional integrity of the cerebellum. The inhibitory input from a single cerebellar nucleus is usually opposed by depolarizing potentials in the recipient cerebellar nuclei cells due to spontaneous depolarization activity in the presence of such an inhibitory input (3).

Evidences from cognitive studies further suggest that cerebellar pathology may be associated with alterations mainly in mental function, instead of motor processes. These pools of evidences continue to attract a sizeable number of researches into the neuroanatomy, neurobiology and neurobehavioral role of the cerebellum and the theories associated with its functions.

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ÉDITORIAL

Le cervelet: pas seulement une structure anatomique

***Adekomi AD.¹, Adewole OS.², Tijani AA.³, Shallie P.⁴**

Chez l'homme, le cervelet occupe environ 10% du crâne total. Il contient de nombreuses cellules dont l'une est la cellule de Purkinje. Traditionnellement, le cervelet est composé de quatre types importants de cellules neuronales, à savoir les cellules de Golgi, les cellules de granules, les cellules de Purkinje et; Cellules étoilées (cellules de panier). Cependant, avec les progrès rapides dans les sciences médicales, on sait maintenant que le cervelet contient beaucoup d'autres cellules, cela inclut; Les cellules candélabres, les cellules Lugaro et les cellules brosses unipolaires. Le fait que ces cellules neuronales ne soient habituellement pas citées dans l'expression de base standard de l'anatomie microscopique du cervelet, ou même dans les littératures normalisées d'anatomie, de physiologie ou d'histologie, indiquent que notre connaissance de l'existence de ces cellules est fractionnaire (1).

Une étude microscopique récente de Tang et al. (2016) (2) a montré que le cervelet contient le nombre significatif de cellules neuronales et de synapses par rapport à toute autre structure dans le système nerveux central. Les fonctions de ces réseaux étendus de neurones sont déterminées par un ensemble de stimulus biologiques (c'est-à-dire des entrées excitatrices ou inhibitrices). Selon Heshmat (2016) (3), les intrants excitateurs sont générés par de nombreuses fibres moussues qui se sont développées à partir des noyaux ponctuels et des fibres d'escalade provenant du noyau olivaire inférieur. D'autre part, des intrants inhibiteurs importants proviennent des cellules de Purkinje situées dans le cortex cérébelleux. Les observations faites à partir de la neurobiologie du cervelet montrent qu'il est nécessaire d'intégrer les entrées excitatrices et inhibitrices pour développer le signal de sortie nécessaire à l'intégrité fonctionnelle du cervelet. L'apport inhibiteur provenant d'un seul noyau cérébelleux est habituellement opposé par des potentiels dépolarisants dans les cellules nucléaires cérébelleuses receveuses en raison de l'activité spontanée de dépolarisation en présence d'une telle entrée inhibitrice (3).

Les preuves des études cognitives suggèrent en outre que la pathologie cérébelleuse peut être associée à des altérations principalement dans la fonction mentale, au lieu des processus moteurs. Ces pools de preuves continuent d'attirer un nombre considérable de recherches sur la neuroanatomie, la neurobiologie et le rôle neurocomportemental du cervelet et les théories associées à ses fonctions.

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Adherence of adult Chronic Kidney Disease patients with regard to their dialysis, medication, dietary and fluid restriction

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Abstract

Objective: Chronic Kidney Disease (CKD) has become a major health problem as a result of complicated interrelationships with diabetes mellitus, hypertension and other associated diseases. Effective management of CKD depends on patient's adherence to their dialysis plan, medications, dietary and fluid restrictions. This study aimed at systematically reviewing the adherence of adult Chronic Kidney Disease (CKD) patients with regard to their dialysis, medication, dietary and fluid restriction.

Methods: Key words were used for the search in various data bases: “adherence”, “Chronic Kidney Disease”, “dialysis”, “medication”, “dietary” and “fluid restriction”. Online data bases namely Medline, PubMed, Ebsco Host, CINAHL, google scholar and grey literature were used to identify published research from 1993 – 2016. Forty three (43) articles were identified regarding adherence of CKD patients to dialysis, medication, dietary and fluid restriction.

Results: Medication non adherence ranged from 3 to 80% through self-report, structured interview and biological markers. Fluid non-adherence was 10-74%. Using self-report and biological markers, non-adherence to diet was 2-39% and 19-57% respectively. With regards to dialysis, skipping and shortening hemodialysis adherence ranged from 2.5% - 19% and 20.3% - 32.3 % respectively. Globally, adherence rates to CAPD are not well documented in literature.

Conclusion: Non-adherence to dialysis, medication, dietary and fluid restriction is an area of concern internationally in CKD population. Furthermore, non-adherence rates are not well researched and documented in African literature. Therefore, Nephrology professionals in clinical practice are agents of improving adherence of CKD patients to ensure effective management of the disease.

Keywords: Adherence and non-adherence to medication, fluid, diet and dialysis, Chronic Ambulatory Peritoneal Dialysis (CAPD), Chronic Kidney Disease (CKD) and hemodialysis.

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Adhésion de patients adultes atteints de maladie rénale chronique en ce qui concerne leur dialyse, leurs médicaments, leur régime alimentaire et leur restriction

*Geldine Chironda G.^{1,2}, Bhengu B.³, Manwere A.⁴

Resume

Objectif: La CKD est devenue une menace majeure pour la santé en raison d'interactions compliquées avec le diabète sucré, l'hypertension et d'autres maladies associées. La prise en charge efficace de l'affection dépend des patients adhérant à leur plan de dialyse, de médicaments, de restrictions alimentaires et fluides, mais il s'agit d'un problème omniprésent. L'étude visait à revoir systématiquement l'adhésion des patients adultes atteints de maladie rénale chronique (CKD) en ce qui concerne leur dialyse, les médicaments, les restrictions alimentaires et de liquide.

Méthodes: Les mots clés suivants ont été utilisés pour la recherche: l'observance, la maladie rénale chronique, la dialyse, la médication, la restriction alimentaire et la restriction des fluides. La recherche a identifié 47 articles qui quantifient l'adhésion des patients CKD à la dialyse, à la médication, à la restriction alimentaire et à la restriction des fluides.

Résultats: La non-adhésion aux médicaments variait de 3 à 80% grâce à l'auto-évaluation, à l'entrevue structurée et aux marqueurs biologiques. La non-adhésion fluide de 30-74% en utilisant l'auto-rapport et de 10 à 60% sur la base d'un gain de poids interdialytique inapproprié. À l'aide de marqueurs biologiques et d'auto-évaluation, la non-adhésion à l'alimentation était respectivement de 2 à 39% et de 19 à 57%. En ce qui concerne la dialyse, le saut et le raccourcissement de l'hémodialyse ont varié respectivement de 2,5% à 19% et de 20,3% à 32,3%. Globalement, les taux d'adhésion à la CAPD ne sont pas bien documentés dans la littérature.

Conclusion: Des preuves documentées ont révélé une non-adhésion à la dialyse, aux médicaments, à la restriction alimentaire et à la restriction des fluides, un domaine de préoccupation internationale dans la population à CKD. En outre, les taux de non-adhérence ne sont pas bien étudiés et documentés dans la littérature africaine. Par conséquent, les professionnels de néphrologie et / ou de soins intensifs dans la pratique clinique sont des défenseurs d'améliorer l'adhésion des patients de CKD pour assurer la gestion efficace de la maladie.

Mots-clés: Adhérence et non-adhérence aux médicaments, aux fluides, à l'alimentation et à la dialyse, à la dialyse péritonéale ambulatoire chronique (CAPD), à la maladie rénale chronique (ERC) et à l'hémodialyse.

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INTRODUCTION

Chronic Kidney Disease (CKD) affects individuals and health systems in low, middle and high income countries (1) and the global prevalence is estimated at 5 to 10% (2). CKD is also common in Africa although very limited data is collected on prevalence. Moreover, there are no reliable statistics about prevalence of CKD in all African countries due to lack of registries. The available data reveals consistent increase in the incidence of newly diagnosed individuals with CKD with a prevalence of about 10% (3, 4).

CKD is deterioration in kidney function that results in kidney's inability to eliminate waste products, maintain acid base, fluid, and electrolyte balance (5). The disease progression starts with acute kidney injury, which is rapid loss of renal function over hours to a few days, resulting from ischaemic or toxic injury to the kidney causing retention of nitrogenous wastes (6). Untreated acute kidney injury will progress to CKD, an irreversible condition (7) with persistent decrease in estimated Glomerular Filtration Rate (GFR) for at least 3 months (8) and continuous albuminuria which increases gradually from mild to severe levels (9).

According to Kidney Disease International Guidelines Organisation (KDIGO) CKD Work Group (9), the progression is from normal glomerular filtration rate (GFR) of $>90\text{ml/min/1.73m}^2$ (stage 1) to mild impairment (GFR $60\text{--}90\text{ml/min/1.73m}^2$) (stage 2), then moderate impairment (GFR $30\text{--}59\text{ml/min/1.73m}^2$) (stage 3) leading to severe impairment (GFR $15\text{--}29\text{ml/min/1.73m}^2$) (stage 4). Ultimately, it leads to CKD stage 5 (Morton & Fontaine, 2009) which is complete failure of the kidneys to function at a level that is necessary for day-to-day life and kidney function less than 15% of normal GFR (9).

Integrated management of CKD puts emphasis on dialysis, medication, and dietary and fluid restriction. Individuals with CKD have comorbid conditions namely diabetes mellitus and hypertension which contributes to more than 36% and 24% of cases of ESRD respectively (4) as well as an increased risk of developing complications that affect all systems of the body. Other causes of CKD includes glomerulonephritis, interstitial nephritis, congenital malformations, genetic disorders and obstructive uropathy (4). Therefore, medication is needed to manage comorbid and other conditions associated with CKD conditions as this slows the progression of CKD to end-of-life

stages (10).

Similarly, nutritional therapy in CKD minimises uremic and anaemia symptoms, reduce the incidence of fluid, electrolyte and acid base imbalances, reduce patient's vulnerability to infections and limit catabolism (11). Moreover, removal and control of excess fluid is the cornerstone of volume management in CKD patients (12) as this prevent fluid overload. More importantly, Renal Replacement Therapy (RRT) is essential for management of advanced CKD and encompasses Chronic Ambulatory Peritoneal Dialysis (CAPD), haemodialysis and renal transplant (13). Chronic peritoneal dialysis and haemodialysis are dialytic therapies which remove toxins; solutes and fluid from blood through three principal mechanisms namely osmosis, diffusion and filtration (14).

In this regard, patients' adherence to dialytic procedures, medications, dietary and fluid restrictions is paramount in proper management of CKD population. Yet, low adherence to dialysis, medication, diet and fluid control is evident in more than half of the patients treated for CKD (15). Furthermore, patients with CKD need to cope with dependence in performing activities of daily living such as detrimental physical symptoms, limitations in dietary and fluid intake, changes in body image, work and a crippled economic status (16). The end result of these challenges is a cause of changed normal routines hence prediction of their control over treatment is difficult (18). Although the available literature still indicates problems of adherence among CKD population, little or no summative reviews that document and quantify adherence in four modalities namely dialysis, medication, fluid and dietary restriction exist. . Therefore, this systematic literature review aims to document and quantify the level of adherence to dialysis, fluid, diet and medication from the results of previous studies and to identify instruments and methods of measuring adherence among CKD adult population.

MATERIALS AND METHODS

A conclusive literature search was conducted to identify studies that quantify adult CKD patient's adherence to medication, diet, fluid intake and dialysis. The following data bases were used to find the research articles: Medline, PubMed, Ebsco Host, CINAHL, google scholar and grey literature. The key words used for the search were: adherence, Chronic Kidney Disease, dialysis, medication, dietary and fluid

restriction. The inclusion criteria included all research articles from 1993 to 2016. Included also in the review were quantitative articles written in English that accurately indicate and quantify the rate of adherence to medication, diet, fluid intake and dialysis among adult CKD population. Excluded in the review were qualitative articles, articles with pediatric adherence (<18), intervention studies and case studies. Duplicates were also excluded after critical review by two independent reviewers. Figure 1 shows a flow chart of the search strategy for identified articles.

RESULTS

Overall, there were forty three (43) articles identified from the comprehensive search on CKD adherence. Operational definition of adherence was highlighted. Instruments and methods of measuring adherence in CKD population were also revealed. Moreover, studies that quantify adherence rates to dialysis, medication, fluid and diet control were identified. Of the forty three articles, seven (7) were identified for dialysis adherence, nine (9) were for medication adherence, 14 articles were for fluid adherence and 13 articles were for dietary adherence. The results of the review are presented as follows:

Adherence

Cramer et al (17) defined adherence as following the recommendations made by the provider with respect to timing, dosage, and frequency of medication taking where the patient follows the prescribed interval and dose. The same author highlighted adherence as a measure implemented over a period of time in percentage form. Sabate (18) echoed the same sentiments and included person's behavior in taking medication, following a diet and making changes in lifestyle according with health professional recommendations. In this review, adherence was conceptualised as CKD patients' ability and behaviour to follow a dialysis plan, medication, diet and fluid restriction with respect to right timing, right dosage at prescribed intervals.

Methods for measuring adherence in CKD patients

The methods of measuring adherence to dialysis, medication, fluid and dietary restriction in CKD patients were identified. The identified methods of assessing adherence in CKD patients were: self-report, biological markers and

Intradialytic Weight Gain (IDWG) (Table 1)

Instruments used in measuring adherence for CKD patients

The instruments used in measuring adherence among CKD patients that have been developed and tested for use. The identified instruments include dialysis, diet and fluid non-adherence questionnaire (DDFQ) (19) and End Stage Renal Disease Adherence Questionnaire (ESRD: AQ) (20) which measures treatment adherence behaviors in four dimensions namely dialysis attendance, medication use, fluid restriction and diet recommendation (Table 2).

Dialysis adherence

Table 3 displays seven (7) studies identified for dialysis adherence. Sample size ranged from 40 in Turkey to 6251 in USA. The percentage of patients who are non-adherent through skipping varies from 2.5% in Turkey to 19% in USA (21, 22, 23, 24, 25, and 26) and through shortening from 20.3% to 32% in USA (22, 23). In a study from Africa, Zimbabwe showed non-adherence rate of 97.6% which was very high (27). On the contrary, non-adherence is virtually nonexistent in Japan and Sweden (25).

Medication adherence

Nine (9) studies revealed for medication adherence are shown in Table 4. Sample sizes ranged from 30 to 5478 and rates of medication non-adherence were measured using self-report. Non adherence to phosphate binders, antihypertensive, calcium supplements and vitamins ranged from 3% to 80%, antihypertensive and phosphate binders from 21% to 73% and phosphate binders alone ranged from 17.4% to 24% (28, 29, 30, 31, 32, 33, 34, and 35). Still, there are no documented adherence rates to medication in literature for African region

Fluid adherence

Table 5 shows fourteen (14) studies identified for fluid adherence of adult CKD patients and their non-adherence rates. The sample size ranged from 21 in the United Kingdom to 6251 in the USA. Self-report and intradialytic weight gain were used to measure fluid adherence in CKD participants. Non adherence using inter-dialytic weight gain ranged from 9.7% in USA to 70% in UK (24, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44). Through self-report, non-adherence to fluid intake ranged from 40.3% in China to 72% in Belgium (19, 45). Studies and

documentation on adherence rates to fluid intake in African region were limited

Dietary adherence

There are thirteen studies selected for adult dietary adherence as shown in Table 6. Sample size ranged from 62 in Hong Kong to 6251 in USA. In the case of potassium and phosphorus intake, dietary non-adherence is estimated at 2% in USA to nearly 39% in Hong Kong (18, 22, 24, 32, 35, 42). Self-reported estimates of potassium and phosphorus intake ranged from 44% in Hong Kong to 81% in Belgium (19, 32, 46, 47). Protein non-adherence ranged from 4.5% in Iran to 77% in USA. In South Africa, self-reported non adherence to renal diet was 84% (36). Still, few documented published research studies on adherence rates in the African continent were found.

DISCUSSION

Methods of measuring adherence

Direct questioning and self-report instruments are most effective measures (19) if they are validated. The disadvantage of self-report is bias as patients usually underestimate their non-adherence rates (48). Biochemical markers are also important in measuring adherence in CKD patients. However, they are influenced by many other variables such as residual urine volume, dialysis sessions and body weight. Nonetheless, the continual lack of accepted value for each biochemical marker gives doubt to reliability of the tools that assesses rates adherence in CKD population (35). For instance, potassium and phosphate values reflect residual renal function, dialysis adequacy and adherence with medication (35, 49) in addition to food intake (50, 51).

Studies have shown that Intradialytic Weight Gain (IDWG) is a valid and objective measure of fluid restriction assessment in patients with CKD (24, 49, 52,) thus being widely used as an outcome measure (50, 52) in assessment of fluid restriction. Mean IDWG expressed as percent dry weight is one of the methods to measure fluid adherence (38). However, it is seen as an unfit measure since dry weight can only be estimated. Nevertheless, the researchers continue to agree that IDWG should be defined as a percentage of dry weight (38, 53). Furthermore, the point which defines fluid adherence is different in literature (54). However, research based practice states that IDWG should be less than 2.5 kg or 3.5% of dry body weight so

as to reduce the excess fluid during dialysis sessions (53).

The disadvantage of biological markers is that they are influenced by many other variables such as residual urine volume, duration of dialysis session, the length of the intervals between 2 sessions and body weight. Nonetheless, lack of universally accepted cut off value for each marker raises the question of whether these measures are reliable tools to assess non adherence rates in CKD population (35). Potassium and phosphate values reflect not only food intake (49, 50) but residual renal function, dialysis adequate, time at which blood was taken for analysis between dialysis, acid base and hormonal status and adherence with medication (32, 35)

Instruments for measuring adherence

There are differences in non-adherence rates due to lack of reliable instruments. Nevertheless, literature reveals two adherence scales that have been tested for use in patients with CKD. The dialysis, diet and fluid adherence instrument measures adherence to dialysis, fluid intake and dietary restrictions for the past two weeks (19). However, the weakness of DDFQ lies in not addressing medication use among CKD patients. Therefore measurement of adherence was limited. In view of this, Kim et al (20), developed an End Stage Renal Disease Adherence Questionnaire (ESRD: AQ) which measures adherence behaviors in four modalities namely; dialysis, medication, fluid restriction and dietary intake. Therefore, this instrument maybe used to measure adherence in all the four dimensions which encompasses the comprehensive care of patients with CKD.

Adherence to medication, fluid, dialysis and diet in CKD patients

Different rates of adherence are reported globally (Table 7). The non-adherence rates to dialytic procedures, medication, fluid and dietary changes ranges from 0-53%, 1.2-81%, 3.4-74% and 1.2-82.4% respectively (21, 24, 28, 32, 35, 36, 37,38). This support documented evidence of poor adherence in all key aspects of integrated management among CKD patients. Dialysis has transformed the prognosis of patients with kidney disease but its effectiveness is unfortunately compromised by non-adherence (18). Because of the demands of haemodialysis, many patients do not adhere to the prescribed regimen there by jeopardising successful clinical outcomes.

Inadequate adherence is common in CKD patients undergoing chronic haemodialysis and as many as 86% of the patients in the United Kingdom may be considered non-adherent to the treatment (17).

The availability of data that reveals adherence rates to haemodialysis of renal failure patients is lacking in all African countries. The study done by Chironda et al (27) showed non-adherence to haemodialysis of 97.6%. This high rate of non-adherence in African countries is exacerbated by low socioeconomic status as most patients have no access to haemodialysis procedures and health insurance making care for CKD unaffordable (36). World Kidney Day (2012) echoed the same sentiments of CKD patients discontinuing dialysis due to limited economic resources in developing nations

Similarly, non-adherence to Peritoneal Dialysis (PD) dialysis procedure is scarce in literature although the dialytic procedure is available in all continents. Dean and Cruz (55) expressed the same sentiments and explained peritoneal dialysis as an inexpensive procedure which requires less infrastructure. Again, peritoneal dialysis is a convenient procedure which a patient can implement in their own homes. However, Lim et al (56) highlighted diminished and impairment of quality of life among patients on peritoneal dialysis. Griva et al (21) reveals the rates of non-adherence to Continuous Ambulatory Peritoneal Dialysis (CAPD) procedures ranged from 2.6–53%. The same author highlighted that missed PD exchanges were reported to be in a range of 2.5–53%, shortening by 4–15% of patients and performing less than 90% of prescribed exchanges was evident in 2–40% of patients. Indirect biochemical/ physiological measures reveals adherence rates at 74–78%.

Medication non-adherence remains a major obstacle among patients with CKD. Individuals with CKD have comorbid conditions as well as an increased risk of developing complications that affect all systems of the body, are more likely to die from these complications than CKD. Diuretics, antihypertensive and anti-diabetics are of importance and these drugs have proved to slow progression of CKD (11). Moreover, medications to manage pulmonary, gastrointestinal, neuromuscular, haematological, skeletal, integumentary and dietary intake alterations are needed (11). These medications can only work effectively if CKD patients are fully adherent with their treatment.

Prevention of fluid overload is the basis for fluid management in patients with CKD. Available literature indicates a daily fluid allowance of 0.5 litres in addition to the volume equal to daily urine output (12). Dietary sodium intake and medication containing sodium increase fluid overload (52) in patients with CKD. However, adequate dialysis removes excess fluid (57) in CKD patients. Therefore, effective fluid management in CKD population centres on dialysis, medication and dietary adherence.

Chronic Kidney failure needs dietary management in energy intake and nutrients to decrease morbidity and mortality (58). CKD patients should avoid high sodium and potassium diet to manage hypertension thereby decreasing the incidence of stroke. Furthermore, diet low in saturated fats is advised as evidence highlight this group of patients as high risk for development of coronary artery disease due to elevated levels of serum triglycerides and low high density lipoproteins (59).

CONCLUSION

Low adherence is of concern in CKD patients as previous studies reveal a greater number of patients deviating from dialysis, medication, fluid and dietary restrictions. There is need for more research and documentation of adherence rates among CKD patients especially in African countries. Controlling and managing the detrimental effects of CKD is the main focus. Therefore, the nephrology team which includes nephrologist, nurses, dieticians, social workers, dialysis technicians and pharmacists should implement a multidisciplinary approach in engaging CKD patients with their management. This will promote positive adherent behaviors and consequently effective management of the CKD population.

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Table 1: Methods of measuring adherence in Chronic Kidney Disease (CKD) patients

Management modality	Method of measuring adherence
Medication	❖ Self-report ❖ Biological markers
Diet	❖ Self-report ❖ Biological markers
Fluid	❖ Self-report ❖ Intradialytic weight gain (IDWG)
Dialysis	❖ Self-report missed dialysis ❖ Self-report shortened dialysis ❖ Biological markers

Table 2: Instruments for measuring adherence in Chronic Kidney Disease (CKD) patients

Name of instrument	Management modality
The Dialysis, Diet and Fluid non-adherence Questionnaire (DDFQ) (2001)	Dialysis, Diet and fluid
End Stage Renal Disease Adherence Questionnaire (ESRD: AQ)(2010)	Diet, medication, fluid and dialysis

Table 3: Studies identified for dialysis adherence in Chronic Kidney Disease (CKD) patients

Author, year	Sample	Measurement	Non adherence	Adherence	Country
Sherman, 1994	860	Skipped Shortened	5.1 – 7.9% 26.8 – 32.3%	92.1 – 94.9% 67.7 – 73.2%	USA
Leggat et al, 1998	6251	Skipped Shortened	8.5% 20.3%	91.5% 79.7%	USA
Bleyer et al, 1999	Japan 194 Sweden 84	Skipped	Japan- 0 Sweden- 0	Japan- 0 Sweden- 0	Japan Sweden
Kutner et al, 2002	119	Skipped Shortened	19% 31%	81% 69%	USA
Hecking et al, 2004	France 672 Germany 571 Italy 600 Spain 576 UK 620	Skipped Shortened	France -0.3% Germany-0.9% Italy- 8.8% Spain- 6.6% UK – 12.6%	France-99.7% Germany99.1% % Italy- 91.2% Spain- 93.4% UK – 87.4%	France Germany Italy Spain UK
Chironda et al, 2014	80	Skipped and missed	97%	3%	Africa
Griva et al, 2014		Missed Shortened Self-report Biological	2.5 – 53% 4– 15% 2 – 40% 22 – 26%	47 – 97.5% 85 – 96% 60 – 98% 74 – 78%	Singapore

Table 4: Studies identified for medication adherence in Chronic Kidney Disease (CKD) patients

Author, year	Sample	Medication	Non adherence	Adherence	Measurement
Bame et al, 1993	1230	PB, AHT, CAS	50%	50%	Phosphorus > 6.0 mg/dl
Kaplan et al, 1994	30	PB, AHT	67%	33%	Self-report
Cleary et al, 1995	51	AHT, PB, CAS, VITS	61%	39%	Phosphorus > 5.5 mg/dl & self-report
Lin & Liang, 1997	86	PB CAS	24% 61%	76% 39%	Phosphorus > 4.59mg/dl & self-report
Curtin et al, 1999	135	AHT & PB	73%	27%	Mems & self-report
Tornasello, 2004	129	PB	23%	77%	Phosphorus > 5.5 mg/dl and self-report
Holley & Devore, 2006	39	AHT, PB	21%	79%	Self-report
Hirth, 2008	5478	AHT, PB, CAS	3-29%	71-97%	Self-report
Magacho, et al, 2011	149	PB	17.4%	82.6%	Self-report

PB- Phosphate binders, AHT – Antihypertensive, CAS – Calcium supplements, VITS – Vitamin

Table 5: Studies identified for fluid adherence in Chronic Kidney Disease (CKD) population

Author, year	Sample	Measurement	Non adherence	Adherence	Country
Bame et al, 1993	1230	IDWG	49.5%	51.5%	USA
Leggat et al, 1998	6251	IDWG	9.7%	90.3%	USA
Christensen, 1995	57	IDWG	42%	58%	USA
Casey et al, 2002	21	IDWG	60%	40%	UK
Vlamnick et al, 2001	564	SR	72%	28%	Belgium
Durose, et al 2004	82	IDWG	23%	77%	UK
Barnet et al, 2007	26	IDWG	53%	47%	Australia
Kara et al, 2007	160	SR	68.1%	31.9%	Turkey
Russel et al, 2007	107	IDWG	40%	60%	USA
O Connor et al, 2008	73	IDWG	70%	30%	UK
Lindberg et al, 2009	4498	IDWG	30%	70%	Sweden
Chan et al, 2012	Not stated	IDWG	24.5%	75.5%	Malaysia
Khalil, & Darawad, 2014	90	IDWG SR	17%- 80%	20% - 83%	Jordan
Chironda & Bhengu, 2016	90	IDWG SR	89%	11%	South Africa

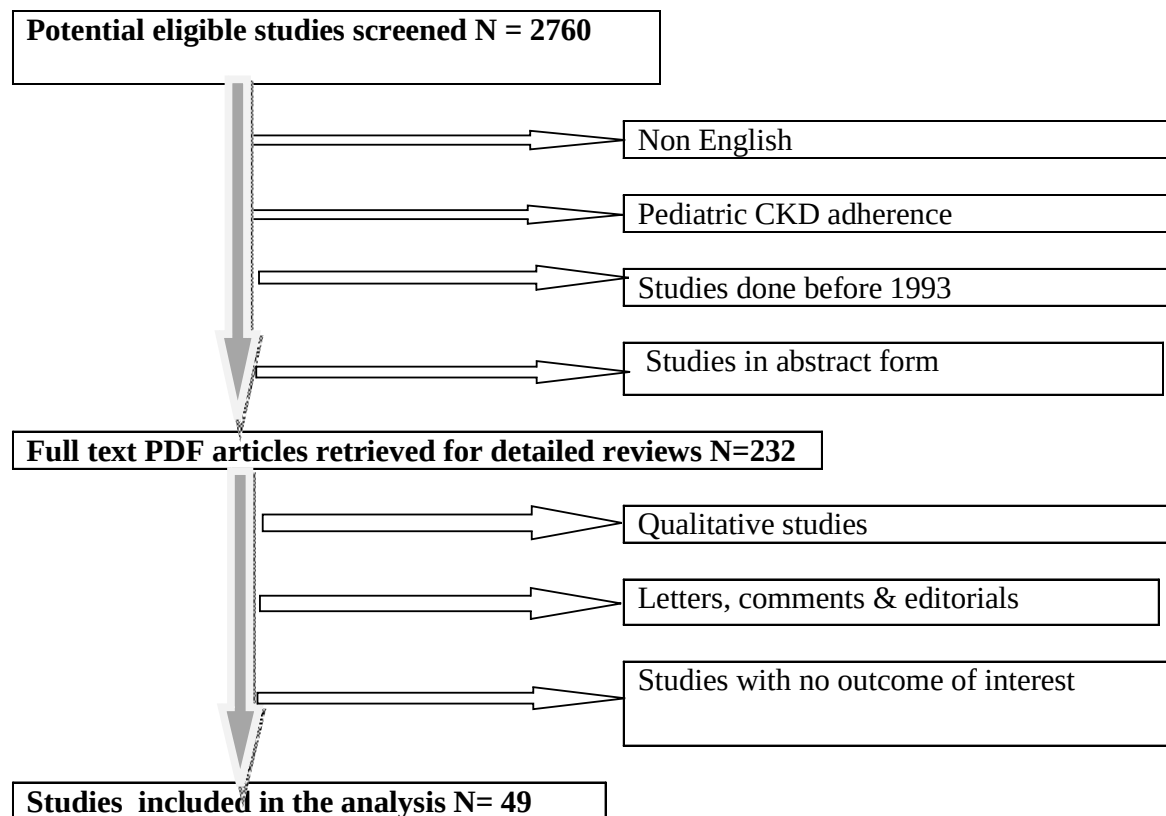
IDWG – Intradialytic weight gain, SR – Self report

Table 6: Studies identified for Dietary adherence in Chronic Kidney Disease (CKD) patients

Author, year	Sample	Measurement	Non adherence	Adherence	Country
Bame et al, 1993	1230	Potassium Phosphorus	2% 50%	98% 50%	USA
Leggat et al, 1998	6 251	Phosphorus	22.1%	77.9%	USA
Vlammnick et al, 2001	564	Self-report	81.4%	18.6%	Belgium
Durose et al, 2004	82	Potassium Phosphorus	4% 31%	96% 69%	United kingdom
Hecking et al, 2004	3039	Potassium Phosphorus	11.7% 23.8%	88.3% 76.2%	France, Germany, Italy and Spain
Kugler et al, 2005	916	Self-report	81.4%	18.6%	Germany and Belgium
Unruh, et al, 2005	739	Phosphate Potassium	33.3% 2%	66.7%	USA
Kara et al, 2007	160	Self-report	58.1%	41.9%	Turkey
Russel et al, 2007	107	Phosphate Albumin	68% 77%	32% 23%	USA
Rambod, 2010	Not stated	Phosphate Potassium Protein	25.5% 5.5% 4.5%	74.5% 94.5% 95.5%	Iran
Lee and Mollasiotis, 2002	62	Potassium Phosphate Self-report	38.7% 56.5% 44%	61.3% 43.6% 56%	Hong Kong
Khalil, & Darawad, 2014	90	Self-report potassium, phosphorus blood urea nitrogen	17% - 80%	20% - 83%	Jordan
Chironda & Bhengu, 2016	90	Self-report	84%	16%	South Africa

Table 7- Overall adherence rates to medication, diet, fluid and dialysis for Chronic Kidney Disease (CKD) patients

Management Modality	Non adherence rate	Adherence rate
Medication	3-80% through self-report and biological markers	20 – 97% through self-report and biological markers
Fluid	30-80% - self report 10-60%- interdialytic weight gain (IDWG)	26 - 70% - self report 40 - 90%- interdialytic weight gain (IDWG)
Diet	2-39% - self report 19-57%- biological markers	61 - 98% - self report 19-57%- biological markers
Hemodialysis	0-35%-skipping hemodialysis 2-32%-shortened hemodialysis	65-100%-skipping hemodialysis 68-98%-shortened hemodialysis
Continuous ambulatory peritoneal dialysis (CAPD)	2.5 – 53% - Missed PD exchanges 4 – 15% - Shortening PD exchanges 22- 26 % - Biological markers	47 – 97.5% - Missed PD exchanges 85 - 96% - Shortening PD exchanges 74 - 78 % - Biological markers

Figure 1- Flow Chart of Search Strategy and Results

Histopathological and Biochemical evaluations of the antidotal efficacy of *Nigella sativa* oil on organophosphate induced hepato-toxicity

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Abstract

Objective: The study was designed to investigate the effects of continuous exposure of dichlorvos (DDVP) on hepatic function and hepatic histomorphology, with the possible antidotal efficacy of *Nigella sativa* oil (NSO).

Methods: Twenty four Wistar rats were randomly divided into four groups, with each group comprising of six rats. The groups were labelled as Sunflower oil (SFO), DDVP, DDVP+NSO and NSO. After 14 days of treatments, blood samples were collected, centrifuged and levels of ALP (Alkaline phosphatase), ALT (Alanine aminotransferase), AST (Aspartate aminotransferase) and GGT (γ-glutamyl-transferase) concentrations were estimated in the serum. The livers were removed and prepared for histopathological examinations and evaluation.

Results: The findings of the study shows significant increase in the serum concentration of ALT, ALP, AST and GGT with a marked distortion in the hepatic architecture in rats administered with DDVP. However, *Nigella sativa* oil (NSO) was observed to ameliorate the levels of impairment in the assessed hepatic function parameters and relatively restoration in the hepatic architecture in DDVP+NSO treated animals when compared to the control and group administered with DDVP only.

Conclusion: The study concludes that impaired liver functions and histomorphological tissue distortions observed in the experimental rats following DDVP exposure were ameliorated following the administration of NSO.

Keywords: *Nigella sativa*, dichlorvos, antidotal effect, hepatotoxicity, liver function test

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Evaluation histopathologique et biochimique de l'efficacité antidote de l'huile de *Nigella sativa* sur l'hépatotoxicité induite par les organophosphates

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Resume

Objectif: L'étude a été conçue pour étudier les effets de l'exposition continue du dichlorvos (DDVP) sur la fonction hépatique et l'histomorphologie hépatique, avec l'efficacité antidote possible de l'huile de *Nigella sativa* (NSO).

Méthodes: Vingt-quatre rats Wistar ont été répartis au hasard en quatre groupes, chaque groupe comprenant six rats. Les groupes ont été étiquetés comme huile de tournesol (SFO), DDVP, DDVP + NSO et NSO. Après 14 jours de traitement, des échantillons de sang ont été prélevés, centrifugés et des concentrations de ALP (phosphatase alcaline), ALT (Alanine aminotransférase), AST (aspartate aminotransférase) et GGT (γ-glutamyl-transférase) ont été estimées dans le sérum. Les foies ont été retirés et préparés pour des examens histopathologiques et une évaluation.

Résultats: Les résultats de l'étude montrent une augmentation significative de la concentration sérique de ALT, ALP, AST et GGT avec une distorsion marquée dans l'architecture hépatique chez les rats administrés avec DDVP. Cependant, l'huile de *Nigella sativa* (NSO) a été observée pour améliorer les niveaux d'altération des paramètres de la fonction hépatique évaluée et relativement la restauration dans l'architecture hépatique chez les animaux traités par DDVP + NSO comparativement au témoin et au groupe administré uniquement avec le DDVP.

Conclusion: L'étude conclut que les fonctions hépatiques altérées et les distorsions tissulaires histomorphologiques observées chez les rats expérimentaux suite à l'exposition au DDVP ont été améliorées après l'administration de l'ONS.

Mots-clés: *Nigella sativa*, dichlorvos, effet antidote, hépatotoxicité, test de la fonction hépatique

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INTRODUCTION

For centuries, pesticides and or insecticide are vital in agriculture to improve food production, eradicate insects and control disease vectors (1). Organophosphorus (OP) compounds are the most used insecticides, in both agriculture and household (2). Most insecticides, including the OPs have been implicated in severe environmental and health hazards (3-5), and their direct exposure to farm workers through residue in agricultural products and spillage on water sources remain the main source(s) of the accidental poisonings (6, 7), resulting in high motility especially in the developing world, due to inadequate management capacities (8).

Dichlorvos (DDVP) is a highly volatile organophosphate (9) with rapid absorption through the gastrointestinal (oral), respiratory tracts (inhalation) and skin (topical), and high bioavailability in the liver and kidney (10, 11). It's toxicity have been associated with irreversible acetylcholinesterase inhibition leading to acetylcholine accumulation, with clinical signs and symptoms well characterized to include lacrimation, salivation, bronchoconstriction, anoxia, and severe cardiac disturbances (12). Although, treatment of OPs poisoning involved routine use of several antidotes including atropine and pralidoxime chloride, they are without unavoidable limitations (13). Therefore, research into finding alternative regimen in the management of OPs poisoning is crucial.

Medicinal plants have received high patronage, with an estimated 80% of the world population depending on herbal supplements, due to the growing perception of their safety and efficacy in the management of infections and other related diseases including hepatotoxicity (14, 15). *Nigella sativa*, also called black seed or black cumin (16), is a native of South and Southwest Asia and one of the most popular Ayurvedic medicines employed in the treatment of many diseases (17). The evidences of its therapeutic efficacies span decades of scientific literature and includes broncho-dilatation, immune-modulation (18), antibacterial (19), hypotension (20), anti-diabetic (21), hepato-protective (22), gastro protective (23), antihistaminic and anti-oxidative (24, 25), neuro-protective (26, 27) and tumour suppressive (28). Plants extracts are also used as memory enhancement (29, 30), infertility improvement in men (31) and efficacy in neurodegenerative diseases and disorders (32, 33).

The aim of the present study was investigate the effects of continuous exposure of dichlorvos

(DDVP) on hepatic function and hepatic histomorphology, with the possible antidotal effect of *Nigella sativa* oil (NSO).

MATERIALS AND METHODS

Chemicals and Drugs

Dichlorvos (purity 98%) and analytical graded sunflower oil were purchased from an Agrochemical store and local store respectively in Ilorin, Nigeria. The black seed oil (100% pure natural oil) was obtained from Masrawarda, Kingdom of Saudi Arabia.

Animal care

Twenty four adult male Wistar rats weighing between 120 and 180 g were obtained from the University of Ilorin Biological garden, Ilorin. They were housed in plastic cages and fed with standard laboratory diet and water *ad libitum* in the animal holding unit of the Faculty of Basic Medical Sciences, College of Health Sciences, University of Ilorin, Ilorin. The rats were exposed to a 12 hours light/dark cycle at room temperature for 7 days before the commencement of the experiments. All rats were handled in accordance with the standard guide for the care and use of laboratory animals.

Treatments schedule

The rats were randomly distributed into four groups (n = 6) as follows:

Group 1: were given sun flower oil (1 ml/kg orally) daily for 14 days

Group 2: were given sun flower oil (1 ml/kg oral) for 7 days followed by DDVP (8.8 mg/kg/day orally) (34) for another 7 days

Group 3: were given DDVP (8.8 mg/kg/day orally) for 7 days then followed by NSO (1 ml/kg orally) daily for another 7 days

Group 4: were given sun flower oil (1 ml/kg oral) daily for 7 days thereafter NSO (1 ml/kg orally) (35, 36) daily for another 7 days

All procedures were scheduled and carried out during the early phase of the day between 06:30 and 09:00 hours, and treatments were given for fourteen consecutive days.

Biochemical evaluation

At the end of the experiments, blood samples were collected from the heart into sterile tubes, centrifuged at 3500 rpm for 20 min, and the serum were collected into other sterile tubes and

properly marked according to the groups. The livers were removed immediately and washed with sodium phosphate buffer (pH 7.2). ALP (alkaline phosphatase), ALT (alanine aminotransferase), AST (aspartate aminotransferase) and GGT (γ -glutamyl-transferase) were assessed in the serum using commercially available enzymatic-kinetic kit (SpinReact-BECGMAN, Germany) and analyzed through autoanalyzer (Bayer ope-RA).

Histological study

Liver tissues were fixed in 10% neutral-buffered formalin and embedded in paraffin. Sections of 5 μ m thickness were attached to slides, deparaffinized and stained with hematoxylin and eosin (H&E) for light microscopic examination.

Statistical analysis

Data from the serum ALT, ALP, AST and GGT levels were subjected to analysis of variance (ANOVA) and Bonferroni post-hoc test using Graph Pad Prism (Version 16). Confidence interval of 95% (P value ≥ 0.05) was considered to be significant.

RESULTS

Effect of DDVP and NSO on liver function parameters

The administration of DDVP only to the rats caused a significant ($P \leq 0.05$) rise in the concentration levels of AST, ALT, ALP and GGT when compared to the control group with the treatment groups (Table 1). In the groups with post administration of NSO, the findings in the NSO group compares favourably with the control and those with DDVP treated rats (Table 1).

Effect of DDVP and NSO on hepatic histomorphology

DDVP administered animals showed degeneration in the hepatocytes (H), dilatation of sinusoids (S), and inflammatory like cellular infiltration in the distorted hepatocytes when compared to the control. The portal triad (hepatic artery (HA), portal vein (PV) and interlobular bile ducts (IBD)) appeared normal with minimal distortion across the groups. However, there were no significant differences between the control and the post treated groups (Figures 1).

DISCUSSION

Accidental poisoning with organophosphate has been on the rise especially in the developing worlds in recent years, resulting in increasing rate

of morbidity and mortality. The poor and inadequate health facilities complicates the situation and often results in poor quality of life (37). These poisoning incidences that are mostly associated with Ops are mostly due to residues in food substances such maize, wheat, vegetables, apples and orange (38, 39) and contaminated water. The liver is the major site of xenobiotic metabolism and first pass metabolism for most drugs and chemicals, hence, hepatotoxicity would be central to any poisoning especially when ingested into the body. The hepatic function test is vital in any toxicity diagnosis. The activities of ALT, AST and ALP enzymes are often considered sensitive biomarkers which may directly demonstrate the extent to which hepatic damage may have occurred and or level of it toxicity (40,41). Pesticide induced hepatotoxicity especially those arising from OP are of growing concern (42) and the need to find agents that can mitigate the situation becomes expedient at this particular time since the nation is moving toward agriculture and these may increase the rate of accidental poisoning.

The findings of the present study demonstrated that acute DDVP exposure provoked a marked elevation in serum concentrations of AST, ALT, ALP and GGT activities which are used as predictive indices of hepatocellular damage or hepatotoxicity. The present findings were strengthened by the earlier studies involving the use of DDVP and other Ops compounds which shows elevation in the serum concentrations of the liver enzymes as indicated above (43, 44). The elevation observed in the study activities of the enzymes could be attributable to the response of the hepatocytes from their cytoplasm in response to the inflammatory activities that follow through hepatic assault recovery stage. It must be noted that previous studies have reported similar findings where they observed increased hepatic function with massive release of these hepatic function enzymes into circulation (45) with a loss of functional integrity of the hepatic membrane (46). It is pertinent to note that exponential rise in ALP concentration along with GGT are strong indicators of bile duct obstruction and liver damage (47).

Although 1/10 of the oral LD_{50} (80 mg/kg in rats) (48) was administered in the present study; a marked pathological changes were observed in the hepatic function enzymes and hepatic morphology. The histopathological alterations reported in this study are suggestive of degeneration and necrosis in the hepatocytes,

cellular inflammatory responses leading to a sustained leakage of liver enzymes, and a burst in their level in the serum as seen in this study. The burden of OPs induced hepatotoxicity is not limited to its poisoning, but includes the limitations in the use of the available antidote (13). *Nigella sativa* used in the present study was observed to meliorate the hepatotoxicity activities of DDVP, by reducing the busted levels of the hepatic function enzymes (ALT, AST, ALP and GGT) in the rats that are exposed to only NSO and in those with prior exposure to DDVP. These findings were strengthened by similar reports of NSO and its activities. The active agent that was found in NSO was Thymoquinone has been shown to mitigate the activities OPs and other compounds that maybe involved in the inducement of hepatotoxicity and toxicity of other systems (35, 49, 50), and similar toxic substances (51, 52).

The hepato-protective effects of NSO in this study can be greatly attributed to its Thymoquinone constituent (53-55), since it has been reported to exhibit cerebral, renal, liver, and cardiac protective effects against many xenobiotic (56). Though there is a rapid turnover of hepatic cells especially during hepatic injuries, these activities may be further elevated with the presence of NSO which could serve in the positive modulation of the hepatic cells and creation of an enable environment which is a key factor during regeneration. Therefore, since the activities of NSO against DDVP induced hepatotoxicity is apparent in this study, it may be a viable alternative antidote in the management of OPs poisoning, especially, Dichlorvos. Hence, in research for novel therapeutic antidotes to OPs poisoning, NSO, which is highly valued as a traditional regimen, with tested efficacy in many diseases is highly recommended for use.

CONCLUSION

In the present study, experimental group was exposed to two dosage of the chemical substance. Liver enzymes and hematologic constituents were used as important bio-markers for detection of hepatotoxic and hematotoxic nature of this pesticide. Four serum hepatic marker enzymes (ALT, AST, LDH, and ALP) were evaluated for hepatotoxicity. According to the results, DIC caused a significant increase in the AST, ALT, LDH, and ALP activities in rats treated with DIC in comparison to those of controls. The reasons for such effect of DIC are not understood at present certainly. However, it is known that several of soluble enzymes of blood

serum such as these enzymes have been considered as indicators of the hepatic dysfunction and damage.

Conflict of interest: The authors declare no conflicts of interest.

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Table 1: The serum levels of liver function parameters in rats given SFO, DDVP, DDVP+NSO and NSO

Groups	AST (U/L)	ALT (U/L)	ALP (U/L)	GGT (U/L)
SFO	11.7±1.09	5.1±1.3	38.51±3.29	14.55±0.99
DDVP	22.1±1.7**	11.2±1.3**	89.38±2.13**	25.78±4.45**
DDVP+NSO	5.2±1.1*	7.1±0.6	79.45±3.24**	24.92±0.28**
NSO	6.8±2.2*	7.7±0.9	34.02±1.78*	9.52±0.36

Data are presented as mean± SEM. (n = 6). The double (**) asterisk indicate a significant (P=0.05) increase when compared with the control, while the single (*) asterisk indicate a significant (P=0.05) reduction when compared with the DDVP treated animals. ANOVA with Bonferroni multiple comparisons test were employed.

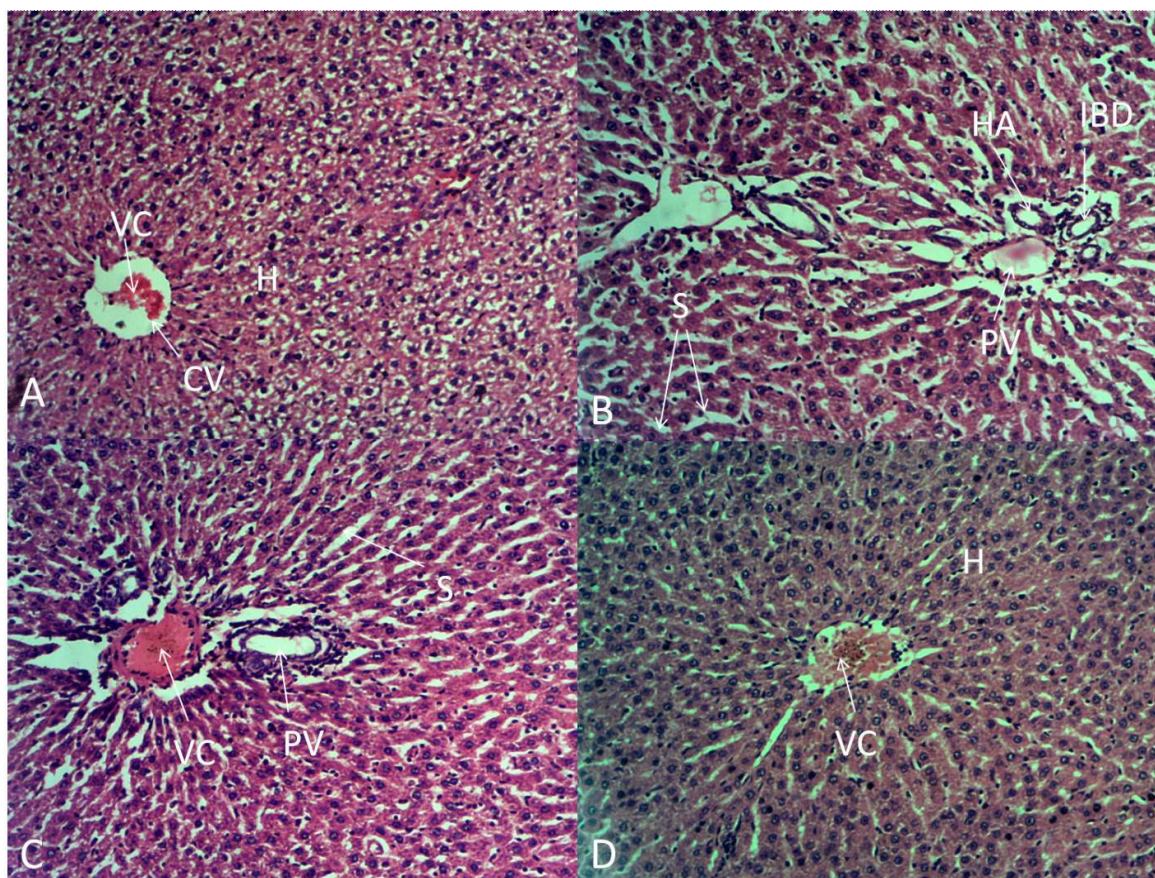


Figure 1: Showing the histoarchitecture of the liver of rats following exposures to SFO (A), DDVP (B), DDVP+NSO (C) and NSO (D) respectively. Revealing the Sinusoids (S); Hepatocytes (H); Portal vein (PV); Central vein (CV); Vascular congestion (VC); Hepatic artery (HA); and Inter biliary duct (IBD). Haematoxylin and Eosin (H&E) X100

Association between blood Pressure, waist circumference, cholesterolaemia and triglyceridaemia in a population of Cameroonian adults

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Abstract

Objective: Blood pressure (BP) is one of the main cardiovascular risk indicators, but studies on its relationship with waist circumference, triglycerides and cholesterol are rare in low and middle income countries and even non-existent in some areas like the north of Cameroon. The aim of our study was to determine the associations between blood pressure parameters and age, waist circumference, triglycerides and total cholesterol in a north Cameroonian adult population.

Method: A cross sectional community-based study was carried out in Ngaoundere (Adamawa region, Cameroon) from June to August 2015. Participants aged 20 years and above were recruited using a multistage sampling technique. Sociodemographic, clinical and biological data were collected and analysed using Microsoft Excel 2013[®] and SPSS version 20.0[®] softwares.

Results: In total 948 participants met our selection criteria. The prevalence of prehypertension (Pre-HTN), Stage 1 hypertension (HTN) and Stage 2 HTN were 37.55%, 26.48% and 18.57% respectively. The prevalence of Stage 2 HTN was found to rise with age, waist circumference, serum triglycerides and cholesterol levels. The mean values of systolic blood pressure (SBP), diastolic blood pressure (DBP), pulse pressure (PP) and mean arterial pressure (MAP) were 131.27 ± 24.07 mmHg, 86.56 ± 14.45 mmHg, 44.71 ± 15.45 mmHg and 101 ± 16.72 mmHg respectively. BP parameters correlated positively and significantly with age, waist circumference, triglycerides and total cholesterol ($P < 0.001$).

Conclusion: This study demonstrates a positive correlation of blood pressure parameters with age, abdominal obesity, hypertriglyceridemia, hypercholesterolemia, thus the need for stakeholders to strengthen measures towards cardiovascular risk awareness and cardiovascular diseases (CVD) prevention in the general population.

Keywords: Blood pressure, pulse pressure, age, waist circumference, triglycerides, total cholesterol.

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Relation entre la pression artérielle, le tour de taille, la cholestérolémie et la triglycéridémie dans une population d'adultes camerounais

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Résumé

Contexte : La pression artérielle est connue comme un des principaux indicateurs de risque d'événements cardiovasculaires ou de décès par maladie cardiovasculaire. Cependant, les études s'intéressant à la relation entre la pression artérielle et des paramètres cliniques et biologiques tels que le tour de taille et la lipidémie sont rares dans les pays à revenus faibles et inexistantes dans certaines régions comme le septentrion du Cameroun. L'objectif de notre étude était de préciser la relation entre les composantes de la pression artérielle et l'âge, le périmètre abdominal, les triglycérides et le cholestérol total sériques dans une population d'adultes nord camerounais.

Méthode : Nous avons réalisé une étude transversale communautaire dans la ville de Ngaoundéré (Région de l'Adamaoua, Cameroun) de Juin à Aout 2015. Des participants âgés de 20 ans et plus ont été sélectionnés selon un plan d'échantillonnage en grappe. Les données sociodémographiques, cliniques et biologiques ont été collectées et analysées à l'aide des logiciels Microsoft Excel 2013[®] et SPSS 20.0[®].

Résultats: Au total, 948 participants ont répondu à nos critères de sélection. Les prévalences de la préhypertension, de l'hypertension de grades 1 et 2 étaient respectivement de 37,55%, 26,48% et 18,57%. La prévalence de l'hypertension artérielle grade 2 augmentait avec l'âge, le tour de taille et les taux sériques de triglycérides et de cholestérol total. Les valeurs moyennes des pressions artérielles systolique, diastolique, pulsée et moyenne étaient respectivement de $131,27 \pm 24,07$ mm Hg, $86,56 \pm 14,45$ mm Hg, $44,71 \pm 15,45$ mm Hg et $101 \pm 16,72$ mm Hg. Ces composantes de la pression artérielle augmentaient de façon significative avec l'âge, le tour de taille, la triglycéridémie et la cholestérolémie totale ($p < 0,001$).

Conclusion: Les résultats de cette étude indiquent une relation linéaire positive suffisamment forte entre les différents paramètres de la pression artérielle, l'âge, l'obésité abdominale, les triglycérides et le cholestérol sériques, pour justifier la nécessité d'un renforcement de la sensibilisation sur les facteurs de risque cardiovasculaire dans notre population.

Mots clés : Pression Artérielle, Pression pulsée, Age, Périmètre abdominal, triglycéridémie, cholestérolémie totale

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INTRODUCTION

Blood pressure is an important indicator of cardiovascular risk assessment. Its relationship with the risk of major cardiovascular events or death from cardiovascular disease (CVD) has been well known for many years (1-3). Previous studies report that not only do individuals with cardiovascular disease present with high blood pressure, but also severally with elevated blood cholesterol, triglycerides, and body fat (4). Although increasing blood pressure (BP) is often cited as the most common CVD risk factor, several authors hold that its various components systolic BP, diastolic BP, pulse pressure (PP) and mean arterial pressure (MAP) also constitute cardiovascular risk indicators even when considered independently (3-10).

Studies examining the relationship between blood pressure and other CVD risk factors such as waist circumference, triglycerides and cholesterol are rare in low and middle income countries. For example, to the best of our search, no data on the associations and interactions between BP, triglyceridaemia and cholesterolaemia in the northern regions of Cameroon exist although high hypertension prevalence have been reported in previous hospital-based studies (10-13).

The aim of our study was to independently examine the relationships between blood pressure parameters and age, waist circumference, serum triglycerides and total cholesterol in an adult population residing in northern Cameroon.

MATERIALS AND METHODS

Target Population and Selection Criteria

This study was carried out within the communities of Ngaoundere town and its environs, and included adults of at least 20 years of age and resident within the region for at least a year. Individuals Received information on the aim, merits and demerits of this study prior to a written consent to participate. Persons on corticosteroid therapy, hormonal contraceptives or previously diagnosed with renal disease, cancer or in any state of confounding infirmity such as anaemia, fever, jaundice haemorrhage, dehydration, malnutrition were not included in this work. A visual assessment of participants including skin elasticity, cornea colouration, and body temperature were used to exclude for possible anaemia, jaundice, dehydration, malnutrition and fever.

Sampling Method

Participants were selected using a multistage sampling technique beginning with the socioeconomic stratification of the different quarters within Ngaoundere into two categories thus: low class and middle-to-upper class. Following stratification, quarters (clusters) were randomly selected within the different socioeconomic strata. In total, we identified and stratified 62 quarters from which 15 were randomly selected with at least one quarter chosen from each of the three subdivisions that make up the Ngaoundere town. Subsequently within every selected quarter one out of every eight living homes was systematically enrolled (beginning with the home of the quarter head) within which one person per home was randomly selected. The total number of homes systematically recruited per quarter varied from 65 to 80. Prior to the commencement of data and sample collection the, quarter(s) of interest were sensitised a week earlier by means of press releases from the health district and health area heads, local radio stations, community relay agents and customary messengers.

Studied Variables

Sociodemographic characteristics included gender and age, while clinical variables of interest comprised of blood pressure and pulse rate and waist circumference. Serum triglycerides and total cholesterol constituted biological variables.

Data and Specimen Collection

Sociodemographic data were collected using a semi-structured questionnaire. Clinical and biological parameters were measured in all participants who met our selection criteria. Selection of participating homes and individuals was done in the evening hours of the day and questionnaires filled by interviewers. Subsequently, instruction for an overnight 8 to 12 hour fast was given in preparation for the collection of fasting whole blood samples and clinical parameters the following morning. Blood samples were collected by venepuncture into dry vacutainer tubes following standard procedures (14), left to clot and transported on ice packs to the laboratory for serum separation (centrifugation) and storage in Eppendorf tubes at -20°C prior to weekly badge analysis.

Measurement of Clinical Parameters

Blood pressure was measured using an

electronic sphygmomanometer (BP Omron® 785) according to the recommendations of The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC7) (2).

The waist circumference was measured with a tape (tape Gulickmeasuring®) graduated to an accuracy of 0.1 cm, flexible but not extensible, following the World Health Organization STEPwise approach to noncommunicable disease risk factor surveillance (WHO STEPS) (15).

Measurement of Biological Parameters

Determination of serum triglycerides and total cholesterol levels were done at the clinical laboratory Service of the Ngaoundere Regional Hospital using commercially acquired kits (Triglyceride PAP, Ref/Lot: TG6300O041, Immesco laboratories, Germany and Cholesterol-Liquizyme CHOD-PAP Ref/Lot: 230006, Spectrum diagnostics, Egypt) adapted for semi-automated spectrophotometric analysis and following standard procedures as detailed in a previous work (16).

Quality Assurance

Standard specimen collection, processing, storage, transport procedures, and the use of appropriate glass and plastic ware were ensured. Calibration of the spectrophotometer was done by the use of the CALIMAT multi-parameter calibrator (Reference: 62321, Lot: 1003001280, Biomérieux, France). Blood pressure measurements for the first 20 participants were measured using both an automated BP monitor and a manual sphygmomanometer. In the same line, the reproducibility of results of fasting serum triglyceride and total cholesterol measurements for these initial 20 samples was assessed using a second semi-automated spectrophotometer (SECOMAM Basic/70V B0358, SN: 1790). Furthermore, analytical quality and validation of results of biochemical measurements was carried out using the LYOTROL™ N control serum (Reference: 62373, Lot: 1003001280, Biomérieux, France).

Ethical Considerations

Information on the aim, merits and demerits of this study was fully disclosed to the participants in the language best understood by them prior to obtaining a written consent and enrolment into the study. Participation was

voluntary and the will to discontinue participation was free and without sanctions. Above all, participants' information was kept strictly confidential, and those with abnormal results were referred to a cardiologist. Ethical and administrative clearances were obtained from the ethical committee of the Ngaoundere regional hospital (Ref: 1121/L/RC/RA/DSP/HR/NGD/CLE) and the regional delegation of public health (Ref: 651/L/RA/DSP/SAGE/BPF/NGD) respectively.

Data Analysis

Data were collected, cleaned, coded and analysed using Microsoft Excel 2013® and SPSS 20.0® softwares. Mean values, standard deviations and proportions were calculated. The Chi-square test was used to compare frequencies of study variables between men and women. The ANOVA and Kruskal-Wallis test were used to compare means of variables between groups and the Pearson correlation test to investigate any existing relationship between blood pressure markers and clinical and biological parameters. Results were considered statistically significant at $p < 0.05$.

Operational Definitions of Variables

Pulse pressure (differential pressure) was defined as the difference between the SBP and DBP (3).

Mean arterial blood pressure was defined as the sum of one third of SBP and two thirds of DBP (3).

Abdominal obesity was defined according to the criteria of the Third Report of the National Cholesterol Education Program Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (NCEP III), by a waist circumference greater than or equal to 102 cm in men and 88 cm in women (17).

Hypercholesterolaemia was defined as serum cholesterol levels greater than 200 mg/dL (18).

Hypertriglyceridaemia was defined as a serum triglyceride levels greater than 150 mg/dL (17)

RESULTS

Blood pressure categories according to JNC7 classification

A total of 948 persons aged 20 to 87 years met our selection criteria. Of these, 464 (48.95%)

were male and 484 (51.05%) were women. 165 (17.41%) of them presented with an optimal BP (SBP < 120 mmHg and DBP < 80 mmHg). The overall prevalence of Pre-HTN, Stage 1 HTN and Stage 2 HTN were 37.55%, 26.48% and 18.57% respectively. In this population, the prevalence of Stage 1 HTN was higher in participants who had a raised serum triglycerides compared to those who had normal serum triglycerides. The prevalence of Stage 2 HTN on the other hand increased with age, waist circumference, and serum triglycerides and cholesterol values (Table 1).

Mean Distribution of Arterial Blood Pressure Parameters

The mean values of SBP, DBP, PP and MAP were respectively 131.27 ± 24.08 mmHg, 86.56 ± 14.46 mmHg, 44.71 ± 15.46 mmHg and 101.46 ± 16.72 mmHg. The means of SBP, DBP, PP and MAP demonstrated significant increasing trends when compared between ascending categories of age, waist circumference, triglyceride and cholesterol ($P < 0.01$), except for mean PP. Likewise, mean PP also portrayed significant increases with increasing age WC and CT levels, but not with TG levels (Table 2).

Relationship between Blood Pressure and Clinical and Biological Parameters

The relationship between blood pressure parameters and age, waist circumference, triglycerides and total cholesterol are shown in Table 3.

DISCUSSION

High blood pressure represents the most frequently encountered CVD risk factors worldwide. In the present study, we set out to examine the association between blood pressure markers and some selected CVD risk factors.

Age

In this study, we observed a significant positive linear relationship between age and all blood pressure parameters both in men and women. The results of our study are consistent with those of several major observational studies on arterial pressure (3,19,20). According to the Framingham heart study, systolic, diastolic and pulse blood pressures increased with age, although not following an identical pattern (19). It reported that changes in blood pressure as a function of age could be summarised in three phases: firstly, a progressive increase in SBP and DBP up to the age of 50 years marking a

predominance of increased vascular resistance; followed by an almost constant DBP contemporary to an asymptotic increase in the MAP coupled with significant elevations in the PP and a continuous increase in SBP. This second phase depicts an increase in both vascular resistance and stiffness of the large vessels. The third phase characterises a drop in the DBP and a steady increase in SBP, with an increase in PP especially among the elderly (19). Likewise, a cohort study that included 11,150 persons aged 40 to 84 years and on follow-up for 11 years in the US showed that before the age of 60 years, SBP and DBP significantly increased with age and after, only SBP continued to increase, while DBP decreased, thus explaining the high prevalence of isolated systolic hypertension in the elderly (3).

Abdominal Obesity

Regarding the waist circumference, and in line with our findings, studies conducted in China (21), Nigeria (22), South Africa (23), Tunisia (24) and the West of Cameroon (25) reported significant positive correlations between SBP, DBP and waist circumference, supporting the notion of abdominal fat accumulation as an indicator of cardiovascular risk (10).

Serum Lipids

Regarding serum lipids, we aimed at screening for raised total cholesterol and triglyceride levels. The prevalence of hypertriglyceridaemia and hypercholesterolaemia were 11.70% and 51.94% respectively. Compared with the results of other authors, our results are similar to those of a Senegalese study (26). However, we recorded a wide disparity in the prevalence rates of hypertriglyceridaemia and hypercholesterolaemia compared with previous literature (4,18,26-28). This disparity in results observed can be attributed to the difference between methodological approaches. For instance, the defining criteria of high cholesterol and the set goals differed between the studies. Furthermore, we found a significant positive correlation between SBP, DBP, MAP and triglycerides one hand, and SBP, DBP, MAP and total cholesterol on the other ($P < 0.01$). The results of our study are consistent with previous literature data on this aspect (18,26,28,29).

Study Limitations

The measurement of blood pressure was

done on a single visit, contrary to international recommendations (2,30), thus a consequent risk of overestimating the average BP level in our study population. Also, laboratory determinations of serum cholesterol and triglycerides were performed once giving the possibility of a white coat effect.

CONCLUSION

This study shows a positive linear relationship between blood pressure parameters and age, waist circumference, serum triglycerides and total cholesterol. Given these observations, we suggest the improvement of awareness on CVD risk and their associated complications at population level by healthcare stakeholders through health promotion sensitisation programs.

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Conflicts of Interests: The authors declare no conflict of interests.

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Table 1: JNC-7 category of blood pressure by age, waist circumference, triglyceridemia and cholesterolemia (N = 948)

Variables	Normal BP n (%)	Pre-HTN n (%)	Stage 1 HTN n (%)	Stage 2 HTN n (%)
Overall	165 (17.41)	356 (37.55)	251 (26.48)	176 (18.57)
Age (years)				
20 – 39	98 (17.13)	218 (38.11)	155 (27.10)	101 (17.66)
40 – 64	53 (17.61)	112 (37.21)	77 (25.58)	59 (19.60)
≥ 65	14 (18.67)	26 (34.67)	19 (25.33)	16 (21.33)
Waist circumference (cm)				
Women Men				
< 80 <94	92 (15.65)	239 (40.65)	162 (27.55)	95 (16.16)
80–88 94–102	28 (17.39)	58 (36.02)	44 (27.33)	31 (19.25)
≥ 88 ≥ 102	45 (22.61)	59 (29.65)	45 (22.61)	50 (25.13)
Triglycerides (mg/dL)				
< 150	148 (17.98)	315 (38.27)	210 (25.52)	150 (18.23)
≥ 150	15 (13.76)	37 (33.94)	35 (32.11)	22 (20.18)
Total Cholesterol (mg/dL)				
< 200	72 (16.07)	174 (38.84)	128 (28.57)	74 (16.52)
≥ 200	91 (18.80)	178 (36.78)	117 (24.17)	98 (20.25)

BP: Blood Pressure. HTN: hypertension. Pre-HTN: prehypertension.

Table 2: Comparison of mean blood pressure parameters between age, waist circumference, triglyceride and total cholesterol categories

Variables	SBP Mean (SD)	DBP Mean (SD)	PP Mean (SD)	MAP Mean (SD)
Total Population	131.27 (24.08)	86.56 (14.46)	44.71 (15.46)	101.46 (16.72)
Age (years)				
20 - 39	123.93(15.85) **	83.58 (11.39) **	40.36 (10.64) **	97.03 (12.05) **
40 - 64	140.14(28.95)	90.87 (17.08)	49.27 (17.77)	107.29 (20.09)
≥ 65	151.59(30.44)	92.04 (17.73)	59.55 (21.20)	111.89 (20.46)
Waist circumference (cm)				
Women Men				
< 80 < 94	128.54 (22.47) **	84.95 (13.75) **	43.59 (14.65) **	99.48 (15.70) **
80–88 94–102	132.03 (24.88)	87.78 (14.90)	44.25 (16.12)	102.53 (17.22)
≥ 88 ≥ 102	138.71 (26.40)	90.33 (15.37)	48.38 (16.69)	106.46 (18.11)
Triglycerides (mg/dL)				
< 150	129.92 (23.50) **	85.46 (14.06) **	44.46 (15.20) ^{NS}	100.28 (16.26) **
≥ 150	142.39 (26.64)	95.25 (15.13)	47.14 (17.25)	110.96 (17.97)
Total Cholesterol (mg/dL)				
< 200	127.19 (21.08) **	83.96 (12.77) **	43.23 (14.33) *	98.37 (14.53) **
≥ 200	135.26 (26.21)	89.06 (15.59)	46.20 (16.34)	104.46 (18.21)

SBP: Systolic Blood Pressure, DBP: Diastolic Blood Pressure, PP: Pulse Pressure, MAP: Mean Arterial Pressure; SD: standard deviation; NS: not significant; *: P<0.05; **: P<0.01.

Table 3: Correlation between blood pressure parameters and age, waist circumference, triglyceride and total cholesterol levels according to gender.

Variables	PAS	PAD	PP	PAM
Males				
Age	0.44**	0.29**	0.40**	0.38**
Waist circumference	0.22**	0.20**	0.15 ^{NS}	0.22**
Triglycerides	0.20**	0.24**	0.09 ^{NS}	0.24**
Total cholesterol	0.20**	0.21**	0.13**	0.22**
Females				
Age	0.43**	0.29**	0.40**	0.38**
Waist circumference	0.22**	0.20**	0.15**	0.22**
Triglycerides	0.20**	0.24**	0.09 ^{NS}	0.24**
Total cholesterol	0.20**	0.21**	0.13**	0.22**
Total				
Age	0.44**	0.29**	0.40**	0.38**
Waist circumference	0.22**	0.20**	0.15**	0.22**
Triglycerides	0.16**	0.24**	0.09**	0.24**
Total cholesterol	0.18**	0.21**	0.13**	0.22**

NS: not significant; *: P<0.05; **: P<0.01; SBP: Systolic Blood Pressure, DBP: Diastolic Blood Pressure, PP: Pulse Pressure, MAP: Mean Arterial Pressure.

Female nurses' knowledge, competence and involvement in cervical cancer screening in health care settings in Osun State, Nigeria

*Fafowora RO.¹, Irinoye OO.²

Abstract

Background: Nurses are involved in reproductive health services and should provide cervical cancer screening. This study investigated nurses' knowledge, competence and extent of documentation of cervical screening at the three levels of care in Osun State.

Methods: Multi-stage sampling technique was used to select 130 female nurses from all levels of care in Osun state. Out of the 130 respondents, 65(50%), 30(23.1%) and 35(26.9%) were from tertiary, secondary and primary health care facilities respectively. A self-administered questionnaire, observational checklist and documentation checklist were used to assess knowledge, competence and documentation of findings. Data was analyzed using SPSS version 20.

Result: The mean age of respondent was 39.34±7.24 years. Cervical inspection during intra-uterine contraceptive device insertion and Visual Inspection of cervix with Lugol's Iodine solution were available procedures at all levels of care. Pap smear screening was available in the tertiary institutions. Findings showed that 50(76.9%), 17(56.7%), and 24(68.6%) of respondents scored over 50% in the knowledge assessment scale from the tertiary, secondary and primary health care facilities respectively. Twenty-six (42.6%) respondents across the three levels of care scored less than 50% in the competence assessment scale. There was no association between level of knowledge and type of facility ($X^2 = 1.619$, $df=1$, $p=0.05$). Seven (58.3%), 2(14.3%) and 1(2.9%) of respondents fully documented findings at the tertiary, secondary and primary care levels respectively.

Conclusion: Majority of female nurses had good knowledge and conduct different types of cervical cancer screening but majority had low competence and inadequately documented their findings.

Key Words: Nurses, knowledge, competence, documentation, cervical cancer screening.

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Connaissances, compétences et implication des infirmières dans le dépistage du cancer du col de l'utérus dans les établissements de soins de santé à Osun, au Nigéria

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Abstrait

Objectif: On s'attend à ce que les infirmières participent activement au dépistage des femmes en âge de procréer pour le cancer du col de l'utérus, ce qui a constitué un fardeau majeur pour la santé publique dans les pays en développement comme le Nigeria. Cette étude a exploré les connaissances, la compétence, l'étendue de la documentation de dépistage par les infirmières aux trois niveaux de soins dans l'Etat d'Osun.

Méthodes: La conception descriptive utilisant la technique d'échantillonnage à plusieurs étapes a été utilisée pour sélectionner 130 infirmières; 65 (50%) établissements tertiaires, 30 (23,1%) secondaires et 35 (26,9%) établissements de soins de santé primaires. Le questionnaire auto-administré, la liste de vérification d'observation et la liste de contrôle de la documentation ont été utilisés pour évaluer les connaissances, les compétences et la documentation des résultats. Les données ont été analysées à l'aide de SPSS version 20.

Résultat: L'âge moyen du répondant était de $39,34 \pm 7,24$ ans. L'inspection cervicale pendant l'insertion de l'IUCD et VILI étaient les deux services de dépistage disponibles à tous les niveaux de soin. Le dépistage du Papanicolaou n'était disponible que dans les soins tertiaires. Les résultats montrent également que 50 (76,9%), 17 (56,7%) et 24 (68,6%) répondent à des établissements de soins primaires secondaires, ont obtenu 50% et plus dans l'évaluation des connaissances. Les niveaux de compétence variaient de 4 (33,3%) tertiaires, 7 (50%) secondaires à 15 (42,9%) pour les établissements de soins de santé primaires. L'étude a montré que 7 (58,3%) des dossiers des clients inspectés avaient toutes les informations au niveau tertiaire, tandis que la majorité au niveau primaire n'avait aucune information documentée 18 (51,4%).

Il n'y avait pas d'association entre niveau de connaissances et de compétence ($X^2 = 1,428$, $p = 0,490$).

Conclusion: La majorité des infirmières dans les établissements de santé étudiés ont une bonne connaissance du cancer du col de l'utérus, mais la plupart sont incompetents et présentent une documentation inadéquate des résultats.

Mots-clés: Infirmières, Connaissance, Compétence, Documentation, Dépistage du cancer du col de l'utérus.

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INTRODUCTION

The burden of cervical cancer globally, regionally and in Nigeria is demonstrated by high number of women at risk and the morbidity and mortality associated with the disease. In 2016, cervical cancer was documented as the 4th cause of female cancer worldwide and the second most common female cancer in women aged 15 to 44 years in the world (1). Worldwide, women aged 15 years and above who were at risk of cervical cancer in millions were 2716.830 worldwide, 2174.580 in less developed region and 542.250 in more developed nations (2). Cervical cancer disproportionately affects developing nations where about 85% of cervical cancer deaths occurred (3). Though readily detectable in its pre-malignant stage, cervical cancer remains one of the most challenging cancer burdens for the country with Nigeria ranking 31st among 53 countries with an incidence by age standardized rate of 29.0 and mortality ranking of 32nd and mortality age standardized rate of 17.5 (4). The challenge is surmountable with services that can reach women to begin screening early to identify clients at risks and those with precancerous condition of the cervix that could span over 10 – 15 years before becoming cancerous (5). When detected early and managed promptly, mortality from cervical cancer will be minimal.

Procedures for screening for cervical cancer either for early detection of the precancerous stage or confirmation of cervical cancer could include Papanicolaou (Pap) smear and cytological screening, Visual Inspection of the cervix with Acetic acid, (VIA) and Visual Inspection with Lugol's Iodine solution (VILI). The aim of using VIA to detect and treat cervical dysplasia in asymptomatic women is to prevent the development of cervical cancer and to complement Pap smear screening (5). Visual Inspection of the cervix with Acetic acid helps in the recognition of clinically normal (acetic acid test negative) from abnormal cervix (acetic acid test positive) and promotes referral of abnormal cases for further evaluation, diagnosis, and appropriate treatment. With inadequate cytological screening programmes in Nigeria the use of VIA and VILI for mass screening and appropriate referral protocol for cytological investigation in the nearest clinical sites where such are available would increase reach and early screening of more women where the facility is available.

In many parts of the world, nurses, majority of who are also women, are pivotal to

cervical cancer prevention and management (6, 7,17,18,19). They are also focus of investigation as service providers and target of service delivery (8, 9, 10) With training and written clinical practice guidelines (8, 9), that also provide basis for documentation, nurses' capacity for active involvement in cervical screening have become best practice to ensure improved access for women in developed and developing countries. Involvement of nurse-midwives who provide maternity services for women and also drive family planning services delivery portend a viable solution to reaching many women in the reproductive age category for cervical screening at all levels of care, primary, secondary and tertiary in Nigeria.

The Nursing and Midwifery Council of Nigeria, by building capacities of teachers in Midwifery schools in Nigeria and incorporating the contents (theory and practice) of VIA, VILI and Pap smear to the midwifery curriculum and examination ensured the average midwife has the competence to conduct the procedure in all facilities where women can be accessed and in community outreach programmes. Despite the preparation of the nurse-midwife in Nigeria to conduct these procedures, little is documented about the extent to which they are currently provide cervical screening services at all levels of care in Osun State. From anecdotal observation, the utilization of hospital-based prevention programme is extremely poor, leading to a small percentage of the population at-risk being reached. Failure to ensure that nurses who have contact with women at all levels of care perform the procedures as desirable limits women's access to preventive efforts towards the prevention of cervical cancers. Little is known about nurses' competence, and documentation of cervical screening procedures at the three levels of care in Osun State.

Documentation is a written or electronically recorded, non-optional expectation in every nursing action that describes the status of a client, the care or services given to the client. It is an accurate, complete, organized, time related recording that should meet set standard (11). Quality documentation of nursing care is an integral part of every nursing procedure and this also applies to cervical cancer screening procedure by nurses. Appropriate documentation of findings in a screening procedure will not only help prompt intervention, but will also improve data base for decision making for quality improvement.

This study was conducted to achieve three objectives of exploring nurses' knowledge of cervical screening procedure at the three levels of care in Osun State, assessing their competence in performing whichever of the procedures they engage in and the extent of documentation of the findings for every client screened.

MATERIALS AND METHODS

Adopting the descriptive design, data was generated in a cross sectional survey of nurses drawn from primary, secondary and tertiary health care facilities in Osun State. There were 693 Primary Health Care Centres (PHCC) located in all the 30 local government areas and one area office of Osun State and 311 nurses and midwives were working in the PHCC at the time of conducting the study. There were also nine state-owned hospitals according to the Federal constituencies with 591 nurses and midwives. There were two tertiary institutions in the state, the Ladoke Akintola University of Technology Teaching Hospital, Oshogbo (LAUTECH) with 298 nurses and the Obafemi Awolowo University Teaching Hospital, Ile-Ife (OAUTHC) with 690 nurses. Nurses and midwives working in the ante natal, labor, post natal, gynecological wards and infant welfare, special treatment, family planning clinics and oncology clinic of these primary, secondary and tertiary institutions were the target of this study and they were 191 from all the settings used.

Multi stage sampling method was used to select 130 nurses across the three levels of care. In the first stage, the facilities to serve as sources of respondents were selected. The two teaching hospitals in Osun State were both selected. Two out of the nine (9) state hospitals were randomly selected. Three (3) local government areas (LGA) were randomly selected out of the thirty three (33) in the state and all the PHCC in the three LGAs served as sources of respondents for the study. The total number of nurses working in the ante natal, labor, post natal, gynecological wards and infant welfare, special treatment, family planning clinics and oncology clinics as were available at the three levels of care were compiled.

In the second stage, the sample size was calculated and 130 respondents were drawn from the selected health care settings among nurses using Yamane formula (8) in determining the sample size. To calculate the required sample size from the total number of nurses using Yamane formula (1968);

$$n = \frac{N}{1 + N(e)^2}$$

where,

n- Sample size

N- Total number of participants

e- Precision level or sampling error (0.05)

$$n = \frac{191}{1 + 191(0.05)^2} = 129$$

To determine the number of participants from each of the health facility, sample was selected proportionately thus:

$$\text{From OAUTHC} - \frac{51(129)}{191} = 34.5 = 35$$

$$\text{From LAUTECH} - \frac{44(129)}{191} = 29.7 = 30$$

$$\text{From the PHCC} - \frac{51(129)}{191} = 34.5 = 35$$

$$\text{From the State Hospitals} - \frac{45(129)}{191} = 30.4 = 30$$

Total number of nurses from all study sites = 130

In the last stage, sample units were randomly selected from nurses working in the relevant clinical sites from the two tertiary institutions (OAUTHC and LAUTECH), the two secondary care facilities (State hospitals in Ede and Osogbo) and all primary health care facilities in Ede North, Irepodun and Orolu local government areas. To make for the 130 respondents required for the survey and adopting simple random sampling using balloting, 65 were selected from the 95 nurses from the teaching hospitals, 30 from the 51 nurses in the two secondary facilities, and 35 from the 45 nurses from the primary health care centres.

Sixty one (61) nurses out of the 130 that participated in the quantitative study (12, 14, and 35 respondents from tertiary, secondary and primary health care facilities respectively) were observed conducting cervical cancer screening procedures and documentation of the report of the procedures.

The tool used to collect data was in five parts. The questionnaire administered to all respondents had three components. The first section collected data on socio-demographic characteristics including previous screening behaviour for cervical cancer of respondents using 12 test items. The second section collected data on which of the four practices of Cervical Inspection, Pap smear, Visual Inspection with

Ascetic acid, Visual Inspection with Lugol's Iodine Solution and Intrauterine contraceptive device insertion were done in the clinical sites. The third section contains a total number of 14 test items adapted from Engender Health COPE Toolbook (12) to assess the knowledge of the respondents on the anatomy of site of cervical cancer, organism associated, risk factors, prevention, time and methods of screening, as well as signs and symptoms of cervical cancer. The respondents were expected to agree to correct answers. For each correct option of the answers chosen, '2' points was awarded. The total score obtainable was 28 points. Score in the range of 0-13 points was considered 'low knowledge', while 14-28 points were considered as good knowledge on the basis of a 50% pass mark as it is conventional in professional examinations in Nigeria. The checklist to document nurses' competence in cervical cancer screening through observation of 61 out of the 130 respondents/the nurses while carrying out the procedures was also adapted from Engender Health COPE Toolbook (12) and Royal College of Nursing guidance for good practice in cervical cancer screening (9). Nurses' competence in this study focused on how well nurses are able to identify any abnormality in the cervix through pap smear or visualization of the cervix using iodine solution. The checklist used had two parts depending on the type of screening being done in such facility (Pap smear or VIA/VIL). In the checklist, a score of 2 denoted satisfactory, 1 denoted unsatisfactory and zero score indicated procedure not performed. The total test items in the first part used to assess for Pap Smear was 16 and the total score obtainable was 32. Any respondent that score between 16 and 32 points was said to be competent in cervical cancer screening procedure, the score of 0-15 denoted not competent. The test items in the second part for VIA/VIL were 15 and the total obtainable score was 30. A score between 0 and 14 denoted being incompetent, 15 to 30 was taken to be competent. To check the documentation of cervical cancer screening procedures conducted in clients' records the 9-item-checklist used was a scale measured at three levels of zero (0) for no record, one (1) for scanty or inadequate/incomplete information recorded, and two (2) for complete information recorded. The maximum score obtainable in this segment is 18. A score less than 18 was deemed incomplete and inadequate documentation of information while zero score indicated no documentation at all.

The face, content and construct validity of the instrument were established through reproductive health experts' review of the test items and the reliability of the final instrument was determined using the test-re-test reliability method with the instrument pilot tested twice over a fortnight among 10 nurses drawn from three clinical sites similar to the ones used for the study. The correlation coefficient for the instrument when the data generated were compared using the Spearman rho's correlation coefficient was 0.85 for the nurses' questionnaire on knowledge and practice of cervical screening, 0.78 for the observation check-list to assess competence in the screening for cervical cancer, and 1.0 for the documentation check-list. Approval to conduct study was taken from the ethical committees of the tertiary health care and permission to collect data was obtained from the overseeing boards of the secondary and primary health care settings before the study was conducted. Informed consent was also gotten from each of the respondent without any force.

RESULTS

One hundred and thirty (130) respondents participated in the study. The mean age of the respondents was 39.34 ± 7.24 years with the age range of 26-55 years. Cervical inspection during intra-uterine contraceptive device insertion and Visual Inspection with Lugol's Iodine solution were the two screening services available at all levels of care. Pap smear screening was only available in the tertiary institutions. Table 1 shows the summary of the socio-demographic characteristics of the respondents. Majority of the respondents by training and qualification (98,75.4%) were expected to be able to perform cervical cancer screening. These were registered nurse-midwives and the Bachelor of Nursing Science degree graduates. However, 22 (62%) of the respondents at the primary health care level were only registered nurses.

Table 2 shows that overall, 70% of respondents scored above 50% in the knowledge assessment scale though the number that scored above 50% at the secondary level was just over half. Table 3 shows that 57.4% of the respondents did not measure up to 50% score on the competency assessment scale and there was no significant association between competence performance level of respondents and clinical sites implying that inadequate performances were similar across board. Table 3 also showed

poor competence in cervical cancer screening among respondents at the tertiary and primary level but with average of 50% of respondents shown to be competent at the secondary care level though it must be noted that respondents in tertiary institutions were observed doing pap smear while those in the secondary and primary care settings were observed doing VILI. Table 4 shows that respondents with good knowledge and good competence were generally low and were just above 30% at the three levels of care. Table 5 shows poor level of documentation of reports at all levels of care by respondents though this seem to be fair at the tertiary level and hence the statistical significant association between level of care and pattern of documentation (Kruskal Wallis Test $X^2=21.642$, $df=2$, $p=0.000$).

Table 6 showed that only 23.1% of the 130 respondents have had pap smear screening before the study.

DISCUSSION

Nurses are strategically placed to drive massive screening, education, early referral and support for cervical cancer prevention and care by the dominance of female in the profession and practice settings that give them access to women of all ages. Nurses, in many countries of the world have been utilized to guarantee access to cervical cancer screening with appropriate guidelines (6, 7, 8, 9, 13). Performing cervical cancer screening to meet desirable standard by nurses would be informed by the knowledge and competence to conduct the different procedures. Findings from this study showed moderate to good knowledge about cervical cancer screening though this level of knowledge assessment was taken at the 50% level. Though nurses with basic nursing training without midwifery training are found in all the service settings, the predominance of nurses without midwifery training (62.9%) at the primary health care facilities poses as challenge to quality service delivery at the level that is supposed to serve large population at the community, grassroots level. Previous study of knowledge of cervical cancer among nurses has shown low translation of such to positive attitude and engagement in cervical screening (10). Findings from this study also support this observation. Despite the knowledge and conduct of the procedure by the nurses, they did not engage in screening behaviour as would be expected.

This study also showed below 50% competence performance level among nurses at

the tertiary and primary levels of care and 50% competence performance level at the secondary level. The observed levels of low to moderate competence may be related to little emphasis placed on performance monitoring of care at all levels of care especially in the clinical sites of reference in this study. This observation has implications for development and dissemination of guidelines, additional training and performance appraisal at service level as means of quality control all the time.

Without appropriate clinical guidelines for nurses in cervical cancer screening as it is the usual practice in other countries (9), nurses in Nigeria may continue to perform at low level quite. This will continue to be at variance with evidence from nurses' demonstrated competence in cervical screening in other countries shown by comparative quality of screening among nurses when compared with quality of service by advanced nurse practitioners and physicians (16,17,18, 19). Demonstrated quality of cervical cancer screening by nurses in other parts of the world suggests the possibility of also promoting higher competence in cervical cancer screening to increase access to the services by more women.

In Nigeria, beyond incorporating knowledge and skills acquisition in basic midwifery training of nurses, guidelines and performance monitoring protocol are desirable to maximize enhanced quality and access to cervical cancer screening by women at all levels of care. Findings from this study also seemingly portend inefficient service deployment for cervical screening at the three levels of care in Nigeria considering the number of nurses that ought to get screened and the women that could be reached with education and full screening at all levels of care by high population of nurses in the health care delivery system.

Documentation of procedure for cervical screening by nurses observed was just fair at the tertiary level and far below expectation at other levels by the number of nurses observed to have fully documented the procedure. Documentation in nursing serves six purposes. These are for communication and continuity of care, quality improvement/assurance and risk management, establishment of professional accountability, legal reasons, funding and resource management and expansion of the science of nursing (11). All these apply in the context of appropriate documentation of cervical screening procedures by nurses in all clinical settings.

This study focused on nurses as service

providers primarily and as clients who should also engage in cervical screening secondarily thus their knowledge assessment was beyond what they know and do as women at risk of developing cervical cancer as it was the case in many previous studies. However, this study also showed low screening behaviour among the nurses, similar to findings among nurses in previous studies (14,15). This is a big challenge as nurses would be expected to serve as role models to other women. One way out of this observation is to ensure organizational commitment to making screening for non-communicable diseases by all workers mandatory and routine as to drive health promoting behaviour. This will not only be focusing on nurses and women but would become a culture for all workers. This is very desirable of health institutions who should lay examples for other organizations too. The extent to which our health institutions are also health promoting leaves more to be desired. From anecdotal observation many health care workers do not engage in health promoting behaviours such as screening as much as health institutions are less systematic about adopting the health promoting initiative as a policy drive for increased productivity of workers.

CONCLUSION

Nurses have professional obligations and high potential to increase access to cervical screening services for women at all levels of care in Nigeria. Findings from this study affirm that nurses currently perform cervical screening procedures subject to the resources provided by the clinical setting of practice at the three levels of care in Osun State but not optimally. Nurses' competence in performing the different procedures available in their settings and documentation of procedures were not optimal and need to be improved upon subject to performance appraisal through monitoring and feedback by whatever measures to be put in place by the management of various facilities.

Conflict of interest: The authors declare no conflict of interest.

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Table 1: Distribution of nurses by clinical sites and the samples units selected

Category of health facility	Total number of nurses in the health facilities	Total number of nurses in the ante natal, labor, post natal, gynecological wards and infant welfare, special treatment, family planning clinics and oncology clinics	Sample size selected by levels of care
Tertiary (OAUTHC& LAUTECH)	988	95	65
Secondary State Hospitals (Ede & Osogbo)	511	51	30
Primary (All PHCC in Ede North, Irepodun and Orolu LGAs)	311	45	35
Total	1890	191	130

Table 2: Socio Demographical Data of Respondents

	Tertiary Frequency (%) (n=65)	Secondary Frequency (%) (n=30)	Primary Frequency (%) (n=35)	Total (N) Frequency (%) (N= 130)
Marital status				
Single	2(3.1)	2(6.7)	8(22.9)	12(9.2)
Married	63(96.9)	28(93.3)	27(77.1)	118 (90.8)
Religion				
Christianity	56(86.2)	24(80.0)	29(82.9)	109(83.8)
Islam	9(13.4)	6(20.0)	6(17.1)	21(16.2)
Age in group(years)				
26-30	14(21.5)	2(6.7)	6(17.1)	22(16.9)
31-35	3(4.6)	11(36.7)	2(5.7)	16(12.3)
36-40	12(18.5)	2(6.7)	18(51.4)	32(24.6)
41-45	15(23.1)	13(43.3)	1(2.9)	29(22.3)
46-50	20(30.8)	2(6.7)	8(22.9)	30(23.1)
51-55	1(1.5)	0(0.0)	0(0.0)	1(0.8)
Ethnic Group				
Yoruba	59(90.8.3)	23(76.7)	33(94.2)	115(88.5)
Igbo	3(4.6)	5(16.6)	2(5.7)	10(7.7)
Others (Urhobo, Oron, Ibibio)	3(4.6)	2(6.7)	0(0.0)	5(3.8)
Number of children				
1	15(23.1)	0(0.0)	0(0.0)	15 (11.5)
2	16(24.6)	14(46.7)	0(0.0)	30(23.1)
3	20(30.8)	5(16.6)	19(54.2)	44(33.8)
4	12(18.5)	9(30.0)	8(22.9)	29(22.3)
Professional Qualification				
RN	4(6.2)	6(20.0)	22(62.9)	32(24.6)
RN/RM	43(66.2)	24(80.0)	10(28.6)	77(59.2)
BNSC	18(27.7)	0(0.0)	3(8.6)	21(16.2)
Years of service				
=5	14(21.5)	1(3.3)	2(5.7)	17(13.1)
6-10	2(31.1)	6(20.0)	8(22.9)	16(12.3)
11-15	9(13.8)	10(33.3)	17(48.6)	36(27.7)
15 and above	40(61.5)	13(43.3)	8(22.9)	61(46.9)

Table 3: Distribution of respondents by their knowledge on cervical cancer screening across the three levels of care

Knowledge of respondents about cervical screening	Tertiary Frequency (%) (n=65)	Secondary Frequency (%) (n=30)	Primary Frequency (%) (n=35)	Total (N) Frequency (%) (N= 130)
Poor knowledge (less than 50%)	15 (23.1)	13 (43.3)	11(31.4)	39 (30.0)
Good knowledge (50% and above)	50 (76.9)	17 (56.7)	24 (68.6)	91 (70.0)
Kruskal Wallis Test = 1.619, df=2, p=0.206				

Table 4: Distribution of the 61 respondents observed by levels of competence in cancer screening procedures across the three levels of care

Competence of respondents in cervical cancer screening procedures about cervical cancer	Tertiary Frequency (%) (n=12)	Secondary Frequency (%) (n=14)	Primary Frequency (%) (n=35)	Total (N) Frequency (%) (N= 61)
Competent (50% and higher in competence assessment scale)	4 (33.3)	7 (50)	15 (42.9)	26 (42.6)
Incompetent (Less than 50% in competence assessment scale)	8 (66.7)	7 (50)	20 (57.1)	35 (57.4)
Kruskal Wallis test = 0.0736, df=2, p=0.692				

Table 5: Cross tabulation of knowledge and competence of the sixty-one (61) respondents observed conducting cervical cancer screening at the three levels of care

Observed Knowledge and Competence in cervical cancer screening test conducted	Respondents' Frequency (%) (n=12)	Tertiary Frequency (%) (n=14)	Secondary Frequency (%) (n=14)	Primary Frequency (%) (n=35)	Total (N) Frequency (%) (N= 61)	Kruskal Wallis test
Good knowledge (50% and above score on knowledge scale) and competent (50% and above on competency score scale)	4 (33.3)	5 (35.7)	11 (31.4)	20 (32.8)	X ² = 1.428 P= 0.490	
Poor Knowledge (less than 50% score on knowledge scale and competent	0 (0)	2 (14.3)	4 (11.4)	6 (9.8)		
Good knowledge (50% and above score on knowledge scale) and incompetent	0 (0)	0 (0)	0 (0)	0 (0)	NA	
Poor Knowledge (less than 50% score on knowledge scale and incompetent	8 (66.7)	7 (50)	20 (57.2)	35 (57.4)		
X ² = 1.428, df=6, p=0.490 NA= Not Applicable						

Table 6: Respondents' documentation of clients' information in records with regards to cervical cancer screening procedures conducted

Rating of adequacy of documentation of screening	Tertiary Frequency (%) (n=12)	Secondary Frequency (%) (n=14)	Primary Frequency (%) (n=35)	Total (N) Frequency (%) (N= 61)
No documentation	0 (0)	5 (35.7)	18 (51.4)	23 (37.7)
Scanty incomplete information	5 (41.7)	7 (50)	16 (45.7)	28 (45.9)
All required information documented	7 (58.3)	2 (14.3)	1 (2.9)	10 (16.4)
Kruskal Wallis Test $X^2=21.642$, df=2, p=0.000				

Table 7: Previous pap smear cervical screening practice by respondents

Have one pap smear before?	Tertiary Frequency (%) (n=65)	Secondary=30(%)	Primary=35(%)	Total %	Kruskal Wallis Test
Yes	25(38.5)	3(10.0)	2(5.7)	30(23.1)	X ² =5.754 p= 0.160
No	40(61.5)	27(90.0)	33(94.3)	100(76.9)	
Done by whom?					
Nurse/Midwife	15(60)	0(0)	0(0)	15(50)	X ² =5.800 P=0.055
Doctor	10(40)	3(100)	2(100)	15(50)	

Psychosocial impairments among adults with epilepsy in a neurology clinic in Nigeria

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Abstract

Objective: Psychosocial problems unattended to may compromise adequate control of seizures and elevate the risk of psychopathology. We assessed for psychosocial impairments and associated psychopathology in patients with epilepsy, with the hope that findings will help initiate formal psychosocial care for patients attending the neurology clinic.

Methods: Consecutive patients with epilepsy seen at the neurology clinic that met the inclusion criteria and gave consent were interviewed in a 2 stage procedure. In the first stage patients were assessed with a semi-structured questionnaire containing psychosocial variables while probable psychiatric morbidity was assessed with General Health Questionnaire (GHQ-12). In the second stage psychiatric diagnoses were assessed with Schedule for Clinical Assessment in Neuropsychiatry (SCAN).

Results: Many of the patients reported difficulties in at least one or more of the psychosocial domains assessed; areas of difficulty included: physical activity (52.4%), occupational activity (46.8%); finances (41.3%); stigma (33.3%); inadequate social support by relatives (31.7%), and perceived inadequate general adjustment (34.9%). Psychosocial factors significantly associated with increased rate of psychopathology included: being a woman, having low education; financial difficulties and limitations in physical activities while significant clinical factors included: having frequent fits and partial epilepsy. Multiple logistic regression analyses indicated that being a woman and having partial seizures were the most important predictors of psychopathology among the patients.

Conclusion: This study has provided evidence of the need to introduce routine psychosocial care in our neurology clinic which hitherto did not carry out structured routine assessment of psychosocial problems in order to reduce risk of psychopathology.

Keywords: Psychosocial impairments, adults, epilepsy, neurology clinic, Nigeria

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Troubles psychosociaux chez les adultes atteints d'épilepsie dans une clinique de neurologie au Nigeria

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Resume

Objectif: Les problèmes psychosociaux sans surveillance peuvent compromettre le contrôle adéquat des crises et élever le risque de psychopathologie. Nous avons évalué les déficiences psychosociales et la psychopathologie associée chez les patients atteints d'épilepsie, avec l'espoir que les résultats aideront à initier des soins psychosociaux formels pour les patients qui fréquentent la clinique de neurologie.

Méthodes: Les patientes consécutives atteintes d'épilepsie à la clinique de neurologie qui satisfaisaient aux critères d'inclusion et ont donné leur consentement ont été interrogées dans le cadre d'une procédure en 2 étapes. Dans la première étape, les patients ont été évalués à l'aide d'un questionnaire semi-structuré contenant des variables psychosociales, tandis que la morbidité psychiatrique probable a été évaluée à l'aide du questionnaire GHQ-12. Dans la deuxième étape, les diagnostics psychiatriques ont été évalués à l'aide du Tableau d'évaluation clinique en neuropsychiatrie (SCAN).

Résultats: Beaucoup de patients ont signalé des difficultés dans au moins un ou plusieurs des domaines psychosociaux évalués; Les domaines de difficulté étaient les suivants: activité physique (52,4%), activité professionnelle (46,8%); Finances publiques (41,3%); Stigmatisation (33,3%); Un soutien social inadéquat de la part des parents (31,7%) et un ajustement général inadéquat (34,9%). Les facteurs psychosociaux associés de façon significative à un taux accru de psychopathologie étaient: être une femme, avoir un faible niveau d'éducation; Les difficultés financières et les limitations des activités physiques, alors que les facteurs cliniques importants incluaient: des crises fréquentes et une épilepsie partielle. Des analyses de régression logistique multiples ont montré que le fait d'être une femme et d'avoir des crises partielles étaient les prédicteurs les plus importants de la psychopathologie chez les patients.

Conclusion: Cette étude a démontré la nécessité d'introduire des soins psychosociaux systématiques dans notre clinique de neurologie qui n'a pas effectué jusqu'à présent d'évaluation routinière structurée des problèmes psychosociaux afin de réduire le risque de psychopathologie.

Mots clés: Troubles psychosociaux, adultes, épilepsie, clinique de neurologie, Nigeria

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INTRODUCTION

It has been observed that people with epilepsy have more psychosocial problems than the normal population. This suggests that psychosocial maladjustment to the disorder may be a frequent phenomenon. The complex biopsychosocial dimensions of epilepsy, its unpredictable nature and course, and issues related to its treatment are factors that influence the psychosocial handicaps it engenders (1-5). Psychosocial adjustment is how well the affected patient responds to the various challenges posed by epilepsy. Few examples of the common psychosocial adjustment problems reported in epilepsy include: stigmatization, educational deprivations and underachievement, vocational difficulties like unemployment and under-employment, difficulty getting married, financial problems, inconveniences of treatment and follow-ups; driving restrictions; intrusiveness in valued activities and psychological distress of various kinds like fears, anxieties, anger or sadness and loss of previous future plans (1-7).

Persistence of psychosocial problems may become too distressing for the patient sometimes more than the seizures themselves and when adjustment is unsuccessful other complications may emerge such as mental ill health, difficulties with seizures control and reduction in quality of life (4, 8). It is therefore important to study and understand psychosocial dimensions associated with epilepsy (2, 3, 5).

What evokes psychosocial problems in patients with seizure disorder vary. Some of these factors include the degree of visibility of the emerging symptoms and signs, frequency of occurrence, complications that occur and the degree of unpredictability of the seizures (1-3). Seizure related consequences of psychosocial morbidity include poor compliance with medications, poor self-management attitudes and behaviors which result in more frequent fits and poorer outcome (2-4, 9).

Characteristics of the patients that help to minimize or abolish the consequences of these psychosocial problems consist of the coping resources available to the patients and these include: economic factors (e.g. gainful employment), family factors (e.g. stable marriage, being a parent, extended family support) and social factors such as network of friends among others (4, 9-12).

Stigma, vocational and educational problems are three psychosocial issues that require special emphasis because they are

common and are known to elevate the risk of psychopathology as well as that of the occurrence of the other complications of psychosocial dysfunctions described above (3, 13-21). Stigma is a psychosocial problem that occurs in patients with epilepsy globally and prevalence rates may be more than 50%. Vocational problems vary from outright unemployment to underemployment, underperformance, absenteeism or negative employer attitude and exclusion from leadership roles (17). Examples of complications that may occur from these vocational problems are financial difficulties and increased risk of psychopathology. Financial difficulties in patients with epilepsy can also occur from the cost of buying medications and carrying out investigations. Educational problems may start in childhood from school absenteeism and effects of antiepileptic drugs which could lead to the experience of underachievement or failure in school or even drop out. Education is an important coping resource (19). Its poor status could thus contribute to inadequate control, reduced quality of life and maladjustment (19, 20).

It has been observed that there is substantial unmet psychosocial assessment and management needs in epilepsy in both developing and advanced countries (22). A number of studies in Nigeria have confirmed this view (14-16) but studies required to guide intervention programs are scarce in the country. Effective, well functioning and successful intervention programs require knowledge of psychosocial adjustment of patients in individual localities and practice settings (22).

In this study we assessed the psychosocial problems of patients with epilepsy and their association with psychopathology, with the hope that the findings will help in the development of psychosocial care for patients with epilepsy.

MATERIALS AND METHODS

This paper is derived from a larger study conducted in the Neurology clinic of university of Ilorin teaching hospital, Ilorin, Nigeria. Ilorin, the capital of Kwara state is a cosmopolitan city in which the Yoruba language and culture along with Islamic tradition are prominent. Kwara state is located in the North-central geopolitical region of the country and has a population of about 2.3 million (23). University of Ilorin teaching hospital is the main referral centre for the host state and parts of 5 other adjoining states. The

neurology clinic is run by 2 consultant neurologists and a complement of resident (trainee) physicians at various levels of training. The clinic receives patients from the family medicine department (the primary care unit of the hospital), the pediatric, behavioral sciences and internal medicine departments and from other centers outside the hospital. The clinic runs outpatient services once a week.

Sampling method:

The main study was a two-stage investigation in which all consecutive attendees to the clinic (both new and follow-up cases) that had been diagnosed as having epilepsy by the consultant neurologists supervising the clinic were approached to participate in the study. The diagnoses were on the basis of symptomatology and EEG. Those who gave informed consent were recruited over the one year period that the study in the neurology clinic lasted.

Instruments and Data collection:

Data collection was done by the consultant psychiatrists assisted by research assistants. At the start of the clinic, the case notes of each patient with epilepsy was identified and separated. The research assistants sought the patients out and asked for their consent to participate after appropriate information about the study had been given. When consent was obtained the case note was marked to indicate recruitment and also avoid double sampling. The questionnaires were then administered to the patients.

In the present study, participants were interviewed with a pro-forma questionnaire designed by the authors, which included socio-demographic variables like age, gender, etc and psychosocial factors that are known from literature to impact on epilepsy like: birth and childhood characteristics, family and interpersonal adjustment including stigma, vocational adjustment, physical or domestic work adjustment, financial adjustment and overall adjustment. Clinical data such as the nature of epilepsy and other relevant information were extracted from the case notes. Also in the first stage, the participants were screened for current psychiatric morbidity using the 12-item general health questionnaire (GHQ-12) (24). The general health questionnaire (GHQ) is a well known screening instrument for psychological or psychiatric disorders that has been used in many countries of the world including Nigeria (24). It

enquires about recent changes in mental wellbeing. In Nigeria, GHQ-12 has been validated in non-psychiatric populations of a general hospital and in a community sample (25). The optimum cut-off point (i.e. score which gives optimum sensitivity and specificity and minimum misclassification rate) was a score of three (25).

The patients who scored 3 and above on GHQ-12 and 1 out of every 5 (20%) of those scoring less than 3 (GHQ negative or non-cases) were interviewed in the second stage. The percentage of GHQ negative patients included in the second stage was predetermined based on the misclassification rate of the instrument in the study setting (25). In recruiting this group, the first GHQ-12 negative patient was chosen by balloting (simple random technique) and then every 5th patient afterward. The research assistants in the first stage had a list of all patients seen. The GHQ negative patients were recruited to minimize type II error, (i.e. to reduce the number of false negative individuals).

In the second stage, the patients were assessed for psychiatric disorders with the Schedule for Clinical Assessment in Neuropsychiatry (SCAN) (26). SCAN is a WHO diagnostic instrument for clinicians trained in its use for the assessment and classification of psychopathology and behaviors associated with the major psychiatric disorders of adult life.

The SCAN was applied by three trained consultant psychiatrists. These consultants were unaware of the participants' scores on GHQ-12. There was good inter-rater reliability among the three consultant psychiatrists; Kappa was 89%. Diagnoses of psychiatric disorders were based on ICD-10 criteria. Ethical approval for the study was obtained from the hospital ethical committee.

Data analysis

Data analysis was done using Statistical Package for Social Sciences (SPSS) version 16.0 for Windows. Simple frequency tables and cross tabulations were generated to detect variable distribution trends and associations while Chi-Square and Fishers exact tests were used to test for significant differences. P value less than 0.05 was set as the level for statistically significant difference.

Risk factors that were significantly associated with the presence of psychiatric diagnosis were then entered as predictor

variables into stepwise multiple regression analysis with backward elimination in SPSS. All the variables that were significant at the beginning of the process were entered into the full model equation. *Multicollinearity check was carried out.* Variables were eliminated on the basis of Score statistics, Walds statistics and maximum likelihood ratio until no more could be removed. This method calculated log odds from regression coefficients for each independent variable in the equation and generated the best fitting model after adjusting for the others.

RESULTS

Socio-demographic characteristics:

Sixty-nine patients were approached to participate in the study but only 63 adult patients gave informed consent and participated fully in the study over a one year period. The mean age was 34.43 (SD=13.79). There were 36 males (57.1%) and 27 females (42.9%). Patients who were less than 40 years were in the majority (71.4%). Those with primary school or less in educational status were 28 (44.4%). Twenty-nine (46.1%) patients were married while 34 (54%) were not married. Almost 6 out of every 10 (57.1%) of the participants were unemployed (Table 1).

Clinical characteristics:

The majority 39 (61.9%) had generalized tonic-clonic epileptic seizures. Others included complex partial seizures 7 (11.1%), partial seizure with secondary generalization 6 (9.5%), absence seizure 1 (1.6%), simple partial 1 (1.6%) and in 9 (14.3%) patients seizures were not classified. In 30 (47.6%) participants seizure disorders were less than 5 years in duration while it had lasted for 5 or more years in 33 (52.4%) patients. Majority of the patients had seizure frequency of less than one per month (32 or 50.8%) while 22 (34.9%) patients had more than one seizure per month.

Analysis of psychosocial characteristics:

The overall prevalence of current diagnosable psychiatric disorders by SCAN was 28.6%. There were 21 patients (33.3%) who reported experiencing illness related stigma. Epilepsy-related psychosocial problems were reported in the following areas: physical activities (52.4%), occupational activities (46.8%), finance (41.3%), perceived inadequate social support (31.7%) and inadequate overall adjustment to the disorder (34.9%), Table 2. An assessment of the relationship between

various variables revealed the following: Patients who reported perceived illness related stigma had significant difficulties in the areas of finance ($\chi^2=15.85$; $P=0.000$), physical activity ($\chi^2=8.23$; $P=0.016$) and occupational activities ($\chi^2=7.60$; $P=0.006$). Those with financial difficulties were significantly more likely to report problems in the domains of occupation ($\chi^2=12.08$; $P=0.002$), and physical activities ($\chi^2=7.60$; $P=0.006$). The patients with partial seizure were more likely than those with generalized seizures to report problems in the area of finance ($\chi^2=12.02$; $P=0.002$). Furthermore, subjects limited in the area of physical activities were also likely to be limited in the area of occupation ($\chi^2=42.12$; $P=0.000$) while those who reported experiencing adequate social support were more likely to be reporting adequate levels of overall adjustment to epilepsy ($\chi^2=11.66$; $P=0.001$).

Univariate analysis of associated factors of psychiatric morbidity:

In the univariate analysis many clinical and psychosocial variables were assessed for their relationships with the presence or absence of psychiatric morbidity. The odds of having a psychiatric diagnosis was 4 times larger for those older than 40 years than those below 40 years ($OR=0.25$, $CI=0.06-0.94$, $p=0.038$); 5.9 times larger for women than men ($OR=0.17$, $CI=0.04-0.67$, $p=0.007$); 7.7 times more in those with abnormal EEG results than those with normal results. ($OR=0.13$, $CI=0.01-1.06$, $p=0.042$); 6.1 times more in partial than in generalized epilepsy ($OR=6.10$, $CI=1.34-29.36$, $p=0.012$); 4.8 times more in physical activity limited patients than those not so limited ($OR=4.79$, $CI=1.2-20.68$, $p=0.023$); 6.8 times more in occupational activity limited patients than those without limitation ($OR=6.77$, $CI=1.66-29.00$, $p=0.004$) and 4.4 times more in those with illness related financial problems than those without such problems ($OR=4.43$, $CI=1.21-16.87$, $p=0.021$) (Table 3).

Multivariate analysis of associated factors of psychiatric morbidity:

Every variable identified in the univariate analysis as significantly associated factor was entered into the full model equation in logistic regression analysis.

At the end of all possible steps and iterations two variables, gender, (being a woman) (with $Exp\ B=0.07$, $CI=0.01-0.52$, $p=0.01$) and type of seizure (having partial epilepsy) (with $Exp\ B=7.56$, $CI=1.24-46.56$, $p=0.03$) remained

significantly associated with the presence of psychiatric diagnoses (the others having been eliminated). The result suggests that the odd of women having psychopathology was 2.7 times larger than for men while that of patients with partial seizure was 2 times larger than those with generalized epilepsy. These independent variables (being a woman and having partial seizure) provided the best fitting equation for the maximum likelihood ratio and therefore had the strongest influence on the outcome (psychopathology). Thus, they are the best predictors of psychopathology in the study population (Table 4).

Analysis of relationship between psychosocial problems and average GHQ score

The GHQ score ranged from 0 - 11, mean GHQ score was 1.49 (SD=2.31). Spearman rho correlation coefficient between GHQ and SCAN diagnosis was (-0.712; P=0.000).

Table 5: Shows a trend in which the average GHQ score increases with increasing number of psychosocial problems in the patients (figure 1). There was statistically significant increase in total GHQ scores with increasing number of psychosocial problems ($\chi^2 = 22.5$; df = 6; P=0.000). The psychosocial problems included in the analysis were: Stigma, limitations in physical activities, limitation in occupational activities, financial difficulties, and problems with family support, problems with overall adjustment, problems with education, problems with employment and problems with marriage.

DISCUSSION

Psychosocial problems of epilepsy patients

Psychosocial difficulties that many patients with epilepsy bring to the clinic may not be identified because they do not mention them and doctors do not inquire about them. This type of situation is likely to occur in the busy outpatient clinics that characterize many developing countries including Nigeria.

One of the most common social problems a patient with epilepsy may experience is stigmatization and this was observed to be prevalent (one-third) in our study population, as was observed in previous studies (13, 27). Stigma in epilepsy has been extensively studied (13, 21, 27) and is known to have several complications (13-16). In the present study, stigma was associated with impairment in other psychosocial domains like finance and physical and occupational activities, thus supporting previous studies that have found stigma to be a risk factor

for additional psychosocial problems (7, 21). Intervention programs at the clinic would need to include preventing and minimizing the experience of stigma and its effects.

About a fifth of our patients with epilepsy had no formal education. Epilepsy is known to disadvantage sufferers in education attainment (5). In addition, lack of education reduces their chances of successful counseling, health education and self-management; and ability to cope with problems of stigma and drug compliance.

Close to two-thirds of our patients were not gainfully employed suggesting existing problems with vocation as previous studies have reported (5, 17, 28). Also related, about half of our patient had disease linked financial difficulties which was associated with psychosocial impairments in other domain like physical activity, occupation and social interactions. Patients with epilepsy are known to report lots of disease related financial difficulties (5, 7, 20). These intertwined factors may make epilepsy more difficult to control and need to be tackled at the clinic level through adequate psychosocial assessment and psychosocial care.

The positive role of perceived social support in coping with chronic physical disorders like epilepsy has been well documented (2, 3). Our patients who reported adequate social support had better overall adjustment to epilepsy. This suggests that information about social support should be sought at the clinic level and adequate social support as a coping resource should be promoted. Social support like other factors such as gainful employment and stable marriage are known coping resources that may help minimize stress (4, 9, 10).

Psychosocial difficulties negatively affect the adequate management of patients with epilepsy and this need to be recognized by their caregivers. It has been observed that patients with psychosocial problems are more likely to have difficulties controlling their seizures (2-4). In this study, evidence was provided that supports this view as there was a significant association between increasing frequency of seizures (suggesting suboptimal seizure control) and presence of financial, physical and occupational problems. This suggests that attention to solving patients' psychosocial problems could be one of the non-drug strategies to help reduce the frequency of seizures in the study population

Psychosocial problems and psychopathology

Psychosocial problems are not only distressing to

the patients but are also known to increase their vulnerability to psychopathology, thereby causing more distress (5, 29).

The present study was able to identify some clinical and social factors considered as psychopathology risk factors because they were associated with increased rates of psychiatric disorders. Female gender, lower educational status, having partial seizures, impairments in physical and occupational activities and finance were identified as risk factors for psychopathology. In addition, being a woman and having partial epilepsy predicted higher prevalence of psychopathology. These findings have support from some previous studies (30-33).

The higher rate of psychopathology among women as seen in our cohort is in agreement with a previous study (34) in which being a female was identified as a risk factor for depression and anxiety in patients with epilepsy. Women have also been reported to be more prone to psychosocial problems than men and there are certain gender-specific issues in epilepsy that appear to put women at greater risk of psychopathology (34). Some of these factors include higher rates in women than men of low education, unemployment, divorce, difficulty getting married, stigmatization and other socio-economic difficulties especially in developing countries (19, 30-32). In addition, there are menstrual cycle related seizure vulnerability risks and treatment related reproductive risks that women have to face.

It is however important to state that there are studies which contradict the fact that women with epilepsy may have an increased risk of psychopathology compared to men. Some studies have reported male gender as being a risk factor for psychopathology while others have not found any gender difference in psychopathology, suggesting that gender may not be a risk factor (35).

The fact that increased rate of psychopathology is associated with partial epilepsy compared with generalized epilepsy was also supported by our study. These rates differ among the various subgroups of partial epilepsy (e.g. temporal lobe, extra temporal lobes, lesional, non-lesional). The neurobiological bases of these variations remain largely speculative. It has been suggested that the diffuseness of the pathology, the degree of interruption of neuronal connections at the site of the lesion, disruption of frontolimbic pathways and functional impairment may determine frequency of occurrence of psychopathology in

the different types of epilepsy (36).

In our study, we found that increasing number of psychosocial problems resulted in increase in the average GHQ scores of the patients. This finding suggests that the more the number of psychosocial problems a patient with epilepsy has, the more likely the probability of occurrence of psychopathology. Patients with epilepsy with multiple psychosocial problems may thus represent a sub-population in need of special care.

Collaboration between neurologists and psychiatrists

In this study we have provided evidence that our patients with epilepsy not only have psychosocial problems but these were associated with psychopathology. More important is the fact that these problems were undetected and therefore unmanaged, with probable consequences on disease control and quality of life. There is therefore a need for formal collaboration between the Neurologists and Psychiatrists to improve care. The Neurologists need to address known psychosocial-management knowledge and attitude gap (37, 38) while the Psychiatrists should establish formal consultation-liaison coverage of the neurology clinic.

Limitations of Study

Although the present study was conducted over a period of one year, the relatively small sample size is a limitation of study. Further studies will need to address why relatively small number of adult patients with epilepsy attend the neurology clinic, with a view to improving attendance.

Some of the patients might also have responded in a socially desirable manner to some of the items on the psychosocial aspect of epilepsy (a common problem with questionnaires).

CONCLUSION

On the whole, this study provided evidence that not only did our patients with epilepsy experience psychosocial difficulties but that they had associated psychiatric complications.

These findings suggest the need for a comprehensive psychosocial care program in our neurology clinic. In view of the problems related to inadequate social support and finances, the involvement of the family should be an essential

aspect of such a program. As a result of the problems of stigma, poor education and employment such a program must also involve public enlightenment through the mass media and the sensitization of policy makers.

Conflict of interest: The authors declare no conflict of interest.

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Table 1: Socio-demographic characteristics of the patients with epilepsy

Variables	N	(%)
Age (years)		
≤25	21	(33.3)
>25 - 40	24	(38.1)
>40	18	(28.6)
Religion		
Christianity	19	(30.2)
Islam	44	(69.8)
Educational level		
No formal education	12	(19.1)
Primary education	16	(25.4)
Secondary education	16	(25.4)
Tertiary education	19	(30.1)
Occupational status		
Employed	27	(42.9)
Unemployed	36	(57.1)
Marital status		
Currently in a marriage	29	(46.0)
Never married	30	(47.6)
Divorced	2	(3.2)
Widowed	2	(3.2)

Total number of patients (N = 63) except where otherwise indicated

Table 2: Some Psychosocial characteristics of the patients with epilepsy

Variables	N	(%)
Stigma because of illness		
Yes	21	(33.3)
No	42	(66.7)
Limitation in physical activity		
Present	33	(52.4)
Absent	30	(47.6)
Limitation in occupational activity (N=62)		
Present	29	(46.8)
Absent	33	(53.2)
Financial difficulties		
Present	26	(41.3)
Absent	37	(58.7)
Perceived social support		
Adequate	43	(68.3)
Inadequate	20	(31.7)
Perceived level of adjustment		
Well adjusted	41	(65.1)
Not well adjusted	22	(34.9)
History of birth difficulties (N=28)		
Present	13	(46.4)
Absent	25	(53.6)
Childhood medical problems (N=41)		
Present	14	(34.2)
Absent	27	(65.8)

Total number of patients (N = 63) except where otherwise indicated

Table 3: Factors associated with psychiatric diagnoses in Patients with epilepsy

Variables	Cases n=18	Non-Cases n=45	Odds ratio	95% Confidence interval	P value
Age in years (N=63)			0.25	0.06-0.94	0.038
≤ 40	9	36			
>40	9	9			
Gender (N=63)			0.17	0.04-0.67	0.007
Male	5	31			
Female	13	14			
EEG (N=28)			0.13	0.01-1.06	0.042
Normal	2	13			
Abnormal	7	6			
Type of seizure (N=54)			6.29	1.39-30.22	0.012
Partial	8	6			
Generalized	7	33			
Presence of stigma (N=63)			0.74	0.18-2.95	0.857
Yes	8	13			
No	10	32			
Physical activity limitation (N=62)			4.79	1.2 - 20.68	0.023
Present	14	19			
Absent	4	26			
Occupational activity limitation (N=62)			6.77	1.66- 29.00	0.004
Present	14	15			
Absent	4	29			
Financial difficulties (N=63)			4.43	1.21-16.87	0.021
Present	12	14			
Absent	6	31			

Table 4: Terminal log odds and Exp (B) in the multiple logistic regression equation of risk factors for psychiatric morbidity in patients with epilepsy

Variables	B (Log odds)	Exp (B) (Odd ratio)	95% Confidence interval	Level of significance
Gender Male Female	2.653	0.070	0.009-0.523	0.010
Epilepsy type Partial Generalized	2.028	7.595	1.239-46.576	0.028
Occupational limitation Present Absent	2.309	10.069	1.468-69.047	0.065
Financial difficulties Present Absent	1.754	5.775	0.900-37.071	0.093

B = Regression coefficient in log-odds units

Exp (B) = Exponentiation of the B coefficient (odds ratio)

Table 5: Number of psychosocial problems and the average GHQ scores of patients with epilepsy

Number of psychosocial problems	Number of patients with psychosocial problems (N=63)	Total GHQ scores	Average GHQ Scores of patients
1	6	2	0.33
2	11	7	0.64
3	15	11	0.73
4	10	8	0.80
5	9	18	2.00
6	10	39	3.90
7	2	8	4.00

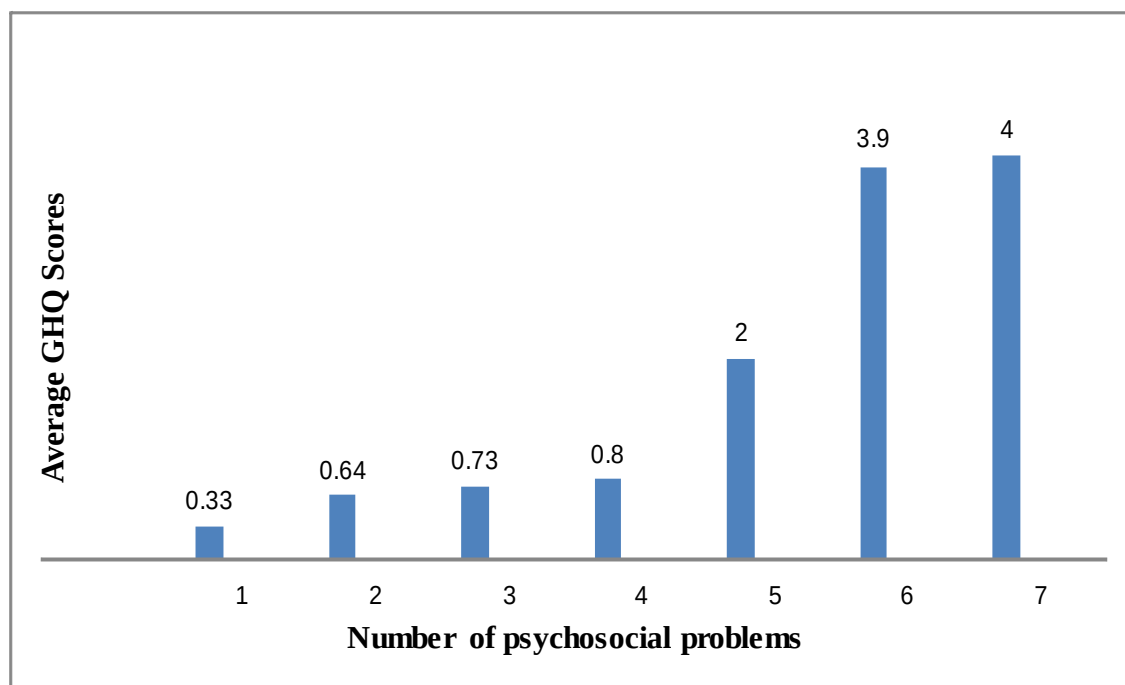


Figure 1. Number of psychosocial problems and average GHQ scores of patients with epilepsy

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