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Editorial Office: All correspondence concerning manuscripts and editorial matters should be addressed to: Dr. Oliver C Ezechi, The Editor in Chief, Nigerian Jornal of Clinical and Biomedical Research, Nigerian Institute of Medical Research, Lagos Nigeria .
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Editorial Commentary

Ethics of Publication

Fame, recognition and "publish or perish" mentality are some of the factors that push scientist/investigators to engage in scientific fraud. For some others it may be out of shear opportunism, laziness, greed and or pressure from significant others.

The definition of scientific fraud is wide and there is no accepted standard definition of it. However there is consensus on what is not a scientific fraud. For example an innocent mistake should not be regarded as fraud. Fabrication, manipulation of data, plagiarism (the use of part or whole of another person's work without acknowledgment), falsely accepting credit for intellectual content and non-disclosure of conflicts of interest are the commonly reported scientific fraud.

The trend towards multi-authored publications in scientific peer review journal has increased in the last few years. While it is commendable when it is properly done, it has precipitated various unethical authorship practices within biomedical research.

There are several other ways publication ethics have been violated in the past, including "redundant or duplicate publications" which indicates publication of a paper that substantially overlaps with one already published. Other violations includes "ghost authorship" whereby a name of an author appears on the manuscript but he/ she did not actually write the manuscript or contribute to it - typically this is from a drug company; and then there is "photograph manipulation". Another form of violation is "data forging" that is inventing data, for example by reporting results of experiments that were never conducted. "Data cooking" entails discarding data that do not support a study's hypothesis so that the study produces 'better' results. "Data trimming" consists of changing data values so that they better fit the predictions made by the research hypothesis. Most disheartening is the phenomenon known as "data torturing" which is the improper exploitation of statistical tests, repeatedly analyzing the same data in different ways until something - anything - emerges as statistically significant[1,2].

One challenge for most scientists is avoiding and resolving issues that center around authorship and the publishing of scientific manuscripts. While trying to place the research in proper context, impart new knowledge, follow proper guidelines, and publish in the most appropriate journal, the scientist often must deal with multi-collaborator issues like authorship allocation, trust and dependence, and resolution of publication conflicts[3,4].

In order to help to resolving conflict as a result of authorship, the International Committee of Medical Journal Editors (ICMJE) issued clear guidelines on who qualify as an author. According the Committee, for one to qualify as an author, the person should have made substantial contribution to;

1. Conception and design, or analysis and interpretation of data and
2. Drafting the article or revising critically for important content and
3. Final approval of the version to be published[4]

The guideline emphasized that it is only an intellectual contribution to a research work that qualifies a person for authorship. It is equally instructive to note the absence of data collection and entry, sample/specimen collection and sample processing from the list.

Another major area of conflict is the position of individual team members in the list of authors of a publication. While the first two positions and the last position are often not subject of debate as the requirements for those positions are often clear, the other position are usually the subject of controversy. In some rare situation, the first position is contested by the two researchers that contributed most to the publication. A smart way of resolving it, if both have equal contribution is for one to be the lead author and the other a corresponding author [5]. A better way of resolving authorship dispute is for the position in the list of authorship be determined before the commencement of work so that roles and responsibilities are defined from the beginning.

There is danger insisting on one's name being added as an author in every paper that is published from your department. It portrays the individual as one that lacks research focus as looking at the publication will show no pattern rather evidence of being jack of all trade and master of none.

One may ask what happens in a multicenter study? In a multicenter study, it is evident that several centres participated and thus large number of authors are expected. A smart way of handling the authorship in a multicenter study is to list the study group as author after few authors and then list the names of the all the researchers on the last page of the article. In this way everybody gets credited. Fortunately though is that some Journals like New England Journal of Medicine accepts up to 50 names of original research works especially in a multicountry clinical trial.

It is therefore only wise to accept authorship credit for works you have intellectual contribution to and can vouch for as not doing so may cost you your carrier.

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Oliver Ezechi
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Review Article

Polycystic Ovarian Syndrome: A Review

Loto OM[1], Akintayo AA[2]

[1]Department of Obstetrics, Gynaecology & Perinatology, Obafemi Awolowo University, Ile-Ife. Nigeria, [2]Department of Obstetrics and Gynaecology, Ekiti State University, Ado-Ekiti. Nigeria

Correspondence: Dr. Loto OM. E mail- bisiloto@yahoo.co.uk

Summary

Polycystic ovarian syndrome is a relatively common condition encountered in the outpatient gynaecology clinic. It is responsible for most cases of infertility due to anovulation and is associated with significant metabolic derangements with significant short and long term health implications. Until recently the contribution of polycystic ovarian syndrome to infertily in our environment was under-reported. Due mainly to the poor knowledge of the diagnostic criteria, high resolution ultrasound and radioimmunoassay capacity need to confirm the diagnosis. Evidence has shown that apart from availability of the infrastructural capacity for the diagnosis, a proper understanding of the pathology and its treatment will go a long way in providing optimum care for such women. This paper reviews the current information on the burden, pathophysiology, clinical features, diagnostic criteria and management of polycystic ovarian syndrome.

Key words: Polycystic ovarian syndrome, Infertility, amenorrhea

Introduction

Polycystic Ovarian Syndrome (PCOS) is a collection of signs and symptoms that form a spectrum of disorders with varying levels of severity in the disturbance of reproductive, endocrine and metabolic functions. PCOS is the most common endocrinopathy in women of reproductive age, with a prevalence of approximately 4-8%.[1-3] Its cardinal features are clinical or biochemical hyperandrogenism and polycystic ovaries and menstrual irregularities resulting from oligo- or anovulation.

Pathophysiology

Stein and Leventhal in 1935 were first to recognize an association between the presence of polycystic ovaries and signs of hirsutism and amenorrhea (eg, oligomenorrhea, obesity) in 1935. After women diagnosed with Stein-Leventhal syndrome underwent successful wedge resection of the ovaries, their menstrual cycles became regular, and they were able to conceive. As a consequence, a primary ovarian defect was thought to be the main culprit, and the disorder came to be known as polycystic ovarian disease. Adams[4], in 1985, described to ultrasound features of a polycystic ovary, 10 or more cysts, 2-8mm in diameter, arranged around an echo-dense stroma. Further biochemical, clinical, and endocrinologic studies revealed an array of underlying abnormalities; hence, the condition is now referred to as polycystic ovary syndrome (PCOS), though it may occur in women without ovarian cysts.

Two associations with this disease entity are theorized to be at least somewhat responsible for its development. The first is the persistent elevation of LH levels in these patients; the second is the apparent arrest of antral follicle development at the 5- to 10-mm stage and consequent failure to enter the preovulatory phase of the cycle. This evidence indicates that the disturbance is mainly a central defect that initiates the cascade of events leading to its onset. Polycystic ovarian syndrome has a familial basis with a dominant mode of inheritance[5]; therefore it affects about 50% of 1st degree relatives.

Recent knowledge suggests that insulin resistance and subsequent hyperinsulinaemia is central to the clinical features of polycystic ovarian syndrome[6] and obesity amplifies the degree of both abnormalities. Insulin resistance in PCOS can be secondary to a post binding defect in insulin receptor signaling pathways, and elevated insulin levels may have gonadotropin-augmenting effects on ovarian function.[7,8] Hyperinsulinemia and insulin resistance independent of obesity has also been described as being pathognomonic of PCOS. Mechanisms have been proposed to account for the excess insulin production by the pancreas: reduction in secretion, reduced hepatic extraction [9], impaired suppression of hepatic gluconeogenesis [10]and abnormalities in insulin receptor signalling[11] with decreased insulin binding decreased insulin receptor numbers (down-regulation), and post receptor failures due to serine phosphorylation and eventual increase in pancreatic beta-cell stimulation. Regardless of the cause, insulin resistance is predominantly seen peripherally, at the level of skeletal muscle, where 85-90% of circulating insulin is used. The compensatory hyperinsulinemia that occurs contributes to androgen excess by directly stimulating androgen production in the adrenal cortex and ovarian theca cells[12] and through a direct effect on granulosa cells limiting ovulation and a simultaneous decrease in hepatic production of sex hormone–binding globulin (SHBG) in the ovaries[13]. Hyperinsulinemia is also responsible for dyslipidemia[14] and for elevated levels of plasminogen activator inhibitor-1 (PAI-1) in patients with PCOS. An elevated PAI-1 level is a risk factor for intravascular thrombosis[15]. The fact that insulin resistance is however demonstrated in only 65-80%[13] of women with PCOS and not in all patients with PCOS is a query that calls for further research.

A proposed mechanism for anovulation and elevated androgen levels suggests that, under the increased stimulatory effect of luteinizing hormone (LH) secreted by the anterior pituitary, stimulation of the ovarian theca cells is increased. In turn, these cells increase the production of androgens (eg, testosterone, androstenedione). Because of a decreased level of follicle-stimulating hormone (FSH) relative to LH, the ovarian granulosa cells cannot aromatize the androgens to estrogens, and this inability leads to decreased estrogen levels and consequent anovulation. Growth hormone (GH) and insulin-like growth factor-1 (IGF-1) may also augmenting effect on ovarian function.

Because of the disparity between follicular growth and steroidogenesis, Franks [16]proposed that a premature activation of LH-induced mitotic arrest, which occurs normally at the onset of the midcycle LH surge, is responsible for the ovulatory dysfunction noted in patients with PCOS. Therefore, a combination of elevated LH levels with enhanced LH action may be responsible not only for the arrested growth of the follicles but also the increased production of estradiol. Franks[16] further hypothesized that these mechanisms may be intimately related to overproduction of cAMP at the level of the granulosa cell, whereby follicular arrest occurs simultaneously with excess androgen production.

Diagnosis

The criteria for diagnosis have been one with varying opinions over a period of time. Despite the implication of hyperinsulinaemia in the clinical presentation of polycystic ovarian syndrome, it would be interesting to note that no criterion considered it in its diagnosis.

The European school of thought held that PCOS encompassed the presence of polycystic ovaries on ultrasound and one or more of the signs and symptoms of raised concentrations of serum androgen and chronic anovulation in the absence of pituitary and adrenal disease[17]. On the other hand, the North American School of thought diagnosed PCOS where a combination of hyperandrogenism and menstrual/ovulatory dysfunction, in the absence of non-classic adrenal hyperplasia were present. There was no need to identify the presence of polycystic ovaries by ultrasonography[6].

During the Rotterdam Conference of 2003, in a joint statement made by the European society of human reproduction and embryology (ESHRE) and the American society of reproductive medicine (ASRM) revised the diagnostic criteria the US National Institutes of Health conference initially proposed in 1990. The criteria now described as the Rotterdam was made to include: Oligo-ovulation or anovulation, Clinical and/or biochemical signs of hyperandrogenism and

exclusion of other etiologies (eg, congenital adrenal hyperplasia [CAH], androgen-secreting tumors, Cushing syndrome) and polycystic ovaries defined by presence of 12 or more follicles in at least one ovary measuring 2-9 mm in diameter and/or increased ovarian volume greater than 10 mls. The presence of at least 2 of the above criteria in at least one ovary is necessary for the diagnosis of PCOS.[18]

Androgen Excess and PCOS Society (AE-PCOS) in 2006, established its own diagnostic requirements: hyperandrogenism (hirsutism and/or hyperandrogenemia), ovarian dysfunction (oligo-/anovulation and/or polycystic ovaries), while ruling out other causes of androgen excess[19,20].

Clinical presentation

The clinical presentation of patients with polycystic ovarian syndrome varies with the particular primary concern of the patient taken into consideration. The principal features of PCOS include menstrual irregularities, anovulatory infertility, androgen excess (hirsutism, acne and temporal balding) and obesity. Some patients with PCOS are asymptomatic and for some individuals signs and symptoms may change over time. The heterogeneity of the features of women with PCOS which varies from a mild disorder affecting the reproductive, endocrine and metabolic systems to a severe disturbance suggests that insulin resistance is not the single unifying hypothesis. Endocrine abnormalities may include increased free testosterone levels, low sex hormone binding globulin, and high luteinizing hormone/follicle-stimulating hormone ratio[21].

The most attention drawn by its presentation to a clinician is due to oligo- or anovulation usually presenting as menstrual irregularities or anovulatory infertility[22]. Menstrual irregularity (oligo- or amenorrhoea) is the most common reason for gynaecological presentation. PCOS women with amenorrhoea are not oestrogen deficient. The endometrium of oligoamenorrhoeic women with PCOS is however continuously exposed to oestrogen until the endometrial growth outstrips its blood supply. This results in heavy and sometimes erratic bleeding as the endometrium breaks down, managed as anovulatory dysfunctional uterine bleeding.

Anovulation accounts for about 30 percent of cases of infertility. Anovulation has been classified by the WHO into type 1; the hypogonadotrophic hypogonadism, type 2; normogonadotrophic anovulation, type 3; hpergonadotrophic hypogonadism and Hyperprolactinaemia. The most common is the type 2 class, commonly caused by polycystic ovarian syndrome.PCOS is the most common cause of anovulatory infertility. It accounts for 90% to 95% of women attending infertility clinics with anovulation. However 60% of women with PCOS are fertile (defined as the ability to conceive within 12 months), although time to conceive is often increased [22]. How polycystic ovary syndrome (PCOS) is associated with infertility has not been completely elucidated. Apart from anovulation, endometrial receptivity has also been questioned. It was suggested that high LH level in the follicular phase of the menstrual cycle caused a premature resumption of meiosis with the consequent release of a 'premature oocyte'[23]. However, it would appear that several factors interact to form part of the vicious cycle of abnormal steriodogenesis, folliculogenesis, abnormal oocyte maturation, decrease endometrial receptivity and early pregnancy loss[24].

Androgen excess presents as hirsutism, acne and male pattern alopecia. Hirsuitism, which is terminal hair of male pattern distribution (facial hair: upper lip, chin, side burn, chest, upper and upper abdomen, upper and lower back, upper arm, thigh and buttock) occurs in about 60% of patients with PCOS[25]. Rapid onset of hirsutism and signs of virilism should be investigated to rule out adult onset congenital adrenal hyperplasia and malignancy. The degree of hirsutism can be evaluated by using the modified Ferriman and Galway score before commencing therapy and for monitoring response. Women with PCOS have abnormalities in the metabolism of androgens and estrogen and in the control of androgen production. High serum concentrations of androgenic hormones, such as testosterone, androstenedione, and dehydroepiandrosterone sulfate (DHEA-S) may be encountered in these patients.

Obesity is a feature seen in many women with PCOS. It cannot be described as pathognomonic or to have aetiologic implications as there are women with features of PCOS who are not obese. Obesity increases hyperandrogenism, hirsutism, infertility and pregnancy complications both independently and by exacerbating PCOS[26.27]. In general populations, obesity and insulin resistance further increase type 2 diabetes (DM2) and cardiovascular disease (CVD). Likewise, in PCOS obesity worsens insulin resistance and exacerbates reproductive and metabolic features [26,27].

Dyslipidaemia is common in PCOS compared to weight matched controls [14,28], with higher triglycerides and lower high density lipoprotein

cholesterol [14]. The dyslipidaemia occurs independent of body mass index (BMI)[14] , however there is a synergistic deleterious effect of obesity and insulin resistance in PCOS. The causes of dyslipidaemia in PCOS are multifactorial. Insulin resistance appears to have a pivotal role mediated in part by stimulation of lipolysis and altered expression of lipoprotein lipase and hepatic lipase[14].

Treatment

The options of management could be non-medical, medical or surgical. The goals of management include restoration of menstruation and improve fertility, treat the effect of hyperandrogenism, hirsuitism and acne, and prevent endometrial hyperplasia and carcinoma.

Weight reduction usually leads to resolution of some of the symptoms resulting from anovulation. It therefore is the usual first line treatment in an evidence based approach in the management of PCOS in women who are overweight[29]. As little as 5% to 10% weight loss has significant clinical benefits improving psychological outcomes, reproductive features (menstrual cyclicity, ovulation and fertility) [30,31] and metabolic features (insulin resistance and risk factors for CVD and DM2). Evidence shows that lifestyle change with small achievable goals results in clinical benefits even when women remain in the overweight or obese range[30,32,33].

Medical therapy depends on the immediate desire of the patient.

For patients with menstrual irregularity, combined oral contraceptive pills (COCP) are considered as first line, this leads to cyclical menstrual bleeds and thinning of the endometrium. This is particularly useful in patients with also seeking contraception at the same time. Progestins can also be considered in patients with contraindications to the use of COCP. This is administered as cyclical depo-medroxyprogesterone acetate or dydrogesterone 12days every 1-3 months. The risk of prolonged oestrogen stimulation of the endometrium in PCOS, which may lead to erratic heavy bleeding, and the risk of developing endometrial hyperplasia and carcinoma is the rational for inducing regular withdrawal bleeds in these women[34].

For patients with features of hyperandrogenism, hirsutism in particular. Management could be medical or non-medical. Options of medical treatment include, COCP, especially in those seeking contraception, antiandrogens like cyproterone acetate, gestrinoine, Diannete, a combination of ethinyl estradiol(EE) with cyproterone acetate,potassium sparing diuretics with antiandrogenic effects like Spironolactone, Yasmin, EE + Drospirenone and other antiandrogens like Ketoconazole, finasteride & Flutamide. Eflorthinine (vaniqua) can be applied topically to achieve debilitation. Treatment should be withdrawn once hirsutism has completely resolved. It is important that an effective contraception is used because anti-androgens can cross the placenta and affect the sexual development of the male fetus. Anti-androgens are not appropriate if pregnancy is desired.

Non- medical options of treatment of hirsutism include shaving, waxing and bleaching, electrolysis, and laser and photothermolysis. Electrolysis is expensive and can bepainful; it should be performed by a trained expert. Shaving can be time-consuming and all physical methods do not guarantee permanent cure, so patients should be counseled appropriately because re-growth of hair is not uncommon and indeed scarring may occur. Repeated laser and photothermolysis tend to produce a near permanent result because hair follicles in the early growing phase are destroyed during treatment electrolysis, waxing & bleaching, Laser removal of hair follicles, photothermolysis.[35]

For patients presenting with infertility, it is important to establish ovulatory cycles with the process of ovulation Induction. Clinical studies have shown that lowering circulating insulin levels resulted in reduction of serum testosterone levels and increased frequency of ovulation and fertility in PCOS women. Those trials include the inhibition of insulin release with diazoxide[36] and improvement of insulin sensitivity with diet-induced weight loss [37], by administration of metformin, which resulted in decreases in ovarian 17, 20-lyase activity and ovarian secretion of androgens[38,39] , and of other insulin sensitizers like rosiglitazone[40].

Weight reduction is still the first line of management, as this has been shown to induce ovulation in some patients.

Next is the use of Metformin, a biguanide, one of the most commonly used hypoglycaemic agents.Its primary action is to inhibit hepatic glucose production, but it also increases the sensitivity of peripheral tissues to insulin.[41] *Cochrane* review has confirmed beneficial effects over placebo .Ovulation was noticed in 46% of patients compared to placebo, this increases to about 76 % when combined with clomiphene citrate[42]. The use of metformin results in

increased ovulation, improved menstrual cyclicity, and reduced serum androgen levels[38,39]. It also reduces the effect of hyperandrogenism, and improves insulin take up.

Clomiphene Citrate is a triphenyethylene derivative distantly related to diethylstilbestrol. It acts as a selective oestrogen receptor modulator, by competitively inhibiting the binding of oestrogen to its receptors at the hypothalamus and pituitary gland. It contains 2 stereo-isomers zu-clomiphene and en-clomiphene. It stimulates ovulatory cycles in about 80% of patients at a dose of 50-100mg daily for 5 days from day 2 of the menstrual cycle. Pregnancy however occurs in about half of those that ovulate.[35] Multifetal pregnancy, usually twins could be a complication of its use.

Medical treatment with parenteral gonadotrophins (pure FSH or human menopausal gonadotrophins) can be employed in patients resistant to anti-oestrogens. However, gonadotrophins have been shown to be associated with an increased incidence of multiple pregnancy and ovarian hyperstimulation syndrome (OHSS) because of the recruitment of multiple follicles[43]. Follicular development should be closely monitored with ultrasound to minimize these risks. Successful treatment with gonadotrophins has been shown in PCOS women with obesity and insulin resistance[44].

Surgery can be resorted to in patients who fail to respond to medical treatment. Wedge resection of the ovary was previously carried out, but the risk of crippling peri-ovarian adhesions have seen the procedure replaced by the more refined laparoscopic ovarian drilling. Laparoscopic ovarian drilling using electrodiathermy or LASER is currently an alternative second-line option in the treatment of women with PCOS who have failed to respond to medical treatment [35]. It is associated with considerably lower multiple pregnancy rates compared to gonadotrophins and no case of ovarian hyperstimulation was reported in a trial by Farquhar et al. [45]. Gjonnaess[46]showed that there was persistence in ovulation and normalisation of serum androgens and SHBG following laparoscopic ovarian electrocautery in over 60% of patients. The mechanism of action of ovarian drilling is that the destruction of the androgen producing stroma of the ovaries with electrocautery leads to a reduction in serum androgen levels, thereby decreasing the amount of substrate available for peripheral aromatisation to oestrogens. It has been postulated that this will restore the feedback mechanism to the hypothalamus–pituitary axis, allowing appropriate gonadotrophin stimulation for follicular development and ovulation [47]. Laparoscopic ovarian drilling using diathermy is potentially associated with periovarian adhesions and theoretically could lead to premature ovarian failure, [43]but less so when LASER is employed.

Long term health implications

The long term health consequences of PCOS include increased risk of hypertensive heart disease, ischaemic heart disease, endometrial hyperplasia and subsequent endometrial carcinoma, ovarian cancer, and type II diabetes mellitus.

The prevalence of the metabolic syndrome is two to threefold higher among women with PCOS compared to normal women matched for age and body mass index, while 20% of women with PCOS under 20 years old have the metabolic syndrome[48]. Furthermore, the metabolic syndrome is present in 80% of PCOS women who are also obese. Hence, the prevalence of the metabolic syndrome is two to threefold higher in women with PCOS compared to age- and BMI-matched non-PCOS controls, regardless of BMI.[49]

The prevalence of type 2 diabetes is tenfold higher among young women with PCOS than among normal women, and impaired glucose tolerance or overt type 2 diabetes develops by the age of 30 years in 30–50% of obese women with PCOS.[49]

Alongside insulin resistance, metabolic syndrome, IGT and DM2, women with PCOS also have increased novel cardiovascular risk factors (inflammation, oxidative stress and impaired fibrinolysis) [50]. Also, increased early clinical and subclinical markers of atherosclerosis seen in PCOS (endothelial dysfunction, impaired pulse wave velocity, increased carotid intima media wall thickness, presence of carotid plaque and increased coronary artery calcification) [51,52] are further exacerbated by obesity[53,54].

Prolonged periods of amenorrhea lead to excessive proliferation of the endometrium from the persistent exposure of the endometrium to premenopausal levels of oestrogen. This leads to endometrial hyperplasia and increasing the risk of development of endometrial carcinoma.[55,56] This is the reason it is advised that patients with oligomenorrhea due to PCOS should have cyclically stimulated menstrual flow.

Conclusion

Polycystic ovarian syndrome is a relatively common condition encountered in the outpatient gynaecology clinic. It is responsible for most cases of infertility due to anovulation and is associated

with significant metabolic derangements with significant short and long term health implications. A proper understanding of the pathology and its treatment will go a long way in providing optimum care for such women.

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Review Article

Recent advances in the Diagnosis of Mycobacterium Tuberculosis

Anochie PI[1], Onyeneke EC[2], Ogu AC[3], Onyeozirila AC[4], Srikanth A[5], Onyejepu N[1], [6]Zhang J[6], Efere, L.O[1], Adetunji MA[1], Bueno J[7], Afocha EE[1] .

[1]Nigerian Institute of Medical Research, Yaba, Lagos, Nigeria, [2]Federal Medical Center, Owerri, Imo state, Nigeria, [3]Department of Medicine, University of Sheffield, UK., [4]Madonna University, Elele, Rivers state, Nigeria, [5]School of Biosciences Technology, VIT University, India, [6]Ada Technologies Inc. USA, [7]Grupo de Mycobacterias, Instituto Nacional de Salud, Bogota, D.C, Colombia.

Correspondence: E-Mail: ip.anochie @nimr.gov.ng, philipanochie@yahoo.co.uk

Summary

Molecular technologies offer the greatest potential for laboratories in resource-rich countries because they have the highest sensitivity and specificity. Continued use of new technologies will be crucial in elucidating the true epidemiology and pathogenesis of a disease, including the less well studied diseases. Continued development of affordable, sensitive, and specific diagnostic tools will be required for use in resource-poor settings, where the incidence of disease is highest.

Keywords: Recent. Advances. Diagnosis. *Mycobacteriumtuberculosis*.

Introduction

Given the limited advances in TB diagnosis for more than a century, the development of new diagnostics has become a central part of the TB research agenda in recent years. Many organization's have acknowledged the urgent need for improved TB diagnostics, and have advocated for additional research [1,2,3,4,5]. Recommendation's stemming from these groups have been incorporated into TDR's strategic plan for TB diagnostics research, and a targeted diagnostics research agenda is reflected in the stop TB.

Several promising TB diagnostic tests that vary according to the level of health system where they could be introduced are currently in development and some under use in many countries[6].

Unfortunately, tests that would have the greatest impact on TB control – point – of – care tests – are only in early development and many are put to little use in some countries.

New diagnostics that increase the sensitivity or simplicity of diagnosing active disease are in later development and put to little use in few countries. These diagnoses would only be implemented at district or central referral laboratories; nonetheless, they are expected to have a measurable impact on TB control. Rapid implementation of proven new technologies will also be critical to meet the urgent public health need and TB control targets.

Over the past years the quality of information on TB micro and macro epidemiology has increased substantially. There is, however, consensus on the need for more and better TB prevalence surveys. Tuberculin skin testing is still the method in use, despite its shortcomings. Novel diagnostic methods for use in TB epidemiological, studies are highly desirable.

This review examines the recent advances in the diagnosis of mycobacterium tuberculosis in humans.

Septi-Check AFB Method

The septi-check AFB System consists of a capped bottle containing 30.0ml of middle – brook 7H9 broth under enhanced (5-8%) Co2, a paddle with agar media enclosed in a plastic tube, and enrichment broth containing glucose, glycenn, oleic acid, pyridoxal, catalase, albumin, polyoxyethylene 40 stearale, azlocillin, nalidixic acid, trimethoprim, polymyxin B and amphotericin B. One side of the paddle is covered with non-selective middle brook 7H11 agar, the reverse side is divided into two sections: one contains7H11 agar with para-nitro – a-acetylamino-b-hydroxypropiophenone (NAP) for differentiation of M. Tuberculosis from other mycobacteria, the other section contains chocolate agar for detection of contaminants. This non-radiometric approach has the potential to expedite processing, obviate Co2 incubation requirements and facilitates early detection of positive cultures.

This method requires about 3 weeks of incubation. The unique advantage of this technique is the simultaneous detection of M. Tuberculosis, non-tuberculosis mycobacteria (NTM), other respiratory pathogens and even contaminants. A multicentric study conducted in the USA has shown that the system gives a better culture result when compared to other methods including BACTEC 460 TB System.

Micro Colony Detection On Solid Media

In this method, plates poured with thin layer of middle brook 7H11 agar medium are incubated and examined microscopically on alternate days for the first 2 days and less frequently thereafter, in less than 7 days, micro colonies of slow growing mycobacteria such as M, tuberculosis can be detected. Though this method is less expensive and requires about half the tie needed for conventional culture, the recovery of mycobacteria is less efficient and it is labour intensive. Since M. tuberculosis grows more rapidly in liquid medium forming strings and tangles, which can be observed under the inverted light microscope with 40x magnification, this method is a better alternative for culturing tubercle bacilli.

Microscopic Observation Of Broth Cultures

This is a rapid and relatively inexpensive method which compares very well with other well established systems in terms of both sensitivity as well as specificity, and also to some extent with speed when compared to solid media. Although this technique may be appropriate for disease endemic high – burden countries, it requires P2 bio-safety cabinets, relatively inexpensive middle brook 7H9 broth oleic acid dextrose catalase (OADC) and antimicrobial supplements and a relatively high technical skill.

Radiometric Bactec 460 TB Method

This technique is specific for mycobacterial growth, wherein 14C labeled palmitic acid in 7H12 medium is used.

This system detects the presence of mycobacteria based on their metabolism rather than visible growth, when the 14C labeled substrate present in the medium is metabolized, 14Co2 is produced and measured by the BACTEC system instrument and reported in terms of growth index (91) value. The BACTEC system is also useful in the identification of M. tuberculosis using specific inhibitor, Para – nitro – a – acetylamino – b- hydro xypro – piophenone.

Using the same system, drug susceptibility tests can also be performed for all the anti-tuberculosis drugs when sufficient 91 is observed. Mycobacteria in clinical samples can be detected in half the time compared to conventional culture methods. A comparison of the BACTEC radio metric method with the conventional culture and drug susceptibility testing methods showed that the rate of isolation of positive cultures was significantly faster with the BACTEC method, with 87% of the positives being obtained by 7 days and 96% by 14 days. There was a good correlation in drug susceptibility tests and most of these results cold be obtained within 8 days and 96% by 14 days. There was a good correlation in drug susceptibility tests and most of these results could be obtained within 8 days by the BACTEC method. By facilitating early diagnosis, the BACTEC method may prove to be cost effective in a population with high prevalence of tuberculosis.

ESP Culture System 11

This is a fully automated continuous monitoring system based on the detection of pressure changes within the headspace above the broth culture medium in a sealed bottle, i.e either gas consumption due to microbial growth.

A special detection algorithm is present in this system for the detection of very slowly growing mycobacteria. The system was evaluated in clinical specimens for the detection of mycobacteria against BACTEC 460 and 7H11 agar solid medium. The mean time for recovery of all mycobacteria, M. tuberculosis complex and mycobacterium avium complex was found to be 13.1, 15.5 and 10.9 days respectively. Hence, the ESP 11 culture system seems to a reliable non-radiometric less labour – intensive alternative to BACTEC 460 system for the growth and detection

of mycobacteria, however, as with other liquid culture systems ESP 11 should be used in combination with a solid medium, not as a stand – alone system.

MB/Bact System

Theis is a non-radiometric continuous monitoring system with a computerized database management. The system is based on colorimetric detection of Co2 comparison of the performance of MB/Bac T with that of BACTEC 460 showed that the mean time for detection of M. tuberculosis by the BACTEC system was 11.6 days Vs 13.1 days by the MB/BacT system. It was concluded that the MB/BacT with the computerized data management system is an acceptable alternative for BACTEC 460 method despite some minor disadvantages such as increased contamination and slightly longer time for detection of growth.

Chromatography

This technique is based on the difference in length of my colic acid residue on the cell wall of different species. It is used for speciation following isolation by cultural techniques. This technique is used in reference laboratories for epidemiologic studies. Chromatographic techniques have changed as technology has evolved. Earlier methods such as column chromatography and most recently by high pressure liquid chromatography (HPLC).

Chromatography is rapid, a total time of 2 hours is required. It is highly reproducible and as little as a loopful of organism is required [7]. The disadvantage of this technique is that the initial cost of equipment is high. The use of negative – ion mass spectrometry to detect tuberculostearic acid in clinical specimens is also gaining ground and hold promise for the rapid detection of mycobacteria [8].

Nucleic Acid Amplification Nucleic acid amplification constitutes a rapidly evolving improvement in the detection and identification of M. tuberculosis. Bacterial DNA (r ribosomal RNA transcribed into DNA) is enzymetically amplified and detected with an appropriate reading system via a signal generating probe. Several enzymatic amplification processes have been developed and introduced into commercial products; the most widely used are PCR (polymerase chain reaction), TMA (transcription mediated amplification) and SDA (strand displacement amplification). Tests based on nucleic acid M. tuberculosis (close to 100%), although some commercial products require a 2-step diagnostic procedure (initial test for mycobacteria genus, followed by tests which differentiate M. tuberculosis from non-tuberculous mycobacteria). Positive results can be obtained with less than 10 bacteria/ml; therefore sensitivity is much better than smear microscopy but slightly less than culture.

Identification of Mycobacterial Species

Mycobacterial speciation is carried out by various methods ranging from conventional biochemical tests to modern high-tech molecular biological methods.

These can be broadly classified as phenotype characterization, Biochemical typing, analysis of lipid by gas chromatography, mass spectrum and high pressure liquid chromatography (HPLC). Probe based identification includes peptide nucleic acid (PNA) fluorescence in situ hybridization assay for the identification of mycobacterial species.

PNA is a novel DNA mimic in which sugar phosphate backbone of DNA has been replaced by a polyamide backbone. The uncharged nature and high conformational flexibility of PNA allows PNA probes to hybridize DNA or RNA with excellent affinity and specificity.

The sensitivity of the M. tuberculosis (MTB) probe targeting MTB complex was reported to be 98%. The sensitivity of currently, nucleic acid tests are used primarily for confirmation of smear – positive results or for primary case finding in combination with other methods. The most outstanding feature of nucleic acid amplification methods is the short time – to – result (between a half and one working day, including sample preparation) paired with a high level diagnostic accuracy. Because of their price and complexity, the use of these methods is still limited to developed countries, but its introduction to developing countries is improving gradually.

The PCR allows sequences of DNA present in only a few copies of mycobacteria to be amplified in vitro such that the amount of amplified NDA can be visualized and identified if appropriate sequences specific for M. tuberculosis are selected, 10-1000 organisms can be readily identified.

The PCR methodology is rapid, results are available within a day of DNA extraction from the sample. A number of target genes of mycobacterial DNA have been evaluated for diagnosis by PCR and various other genotypic methods. The most common target used in the PCR is 156110. This sequence is specific for M. tuberculosis complex and is present up to 20 times in the genome, thus, offering multiple targets for amplification. PCR detection of 156110 in sputum (in pulmonary TB) and peripheral

blood (in extra – pulmonary TB), when compared to culture has a sensitivity, specificity, and positive predictability of 83.5, 99 and 94.2% respectively. A variety of PCR methods have been described in the search for a sensitive and reliable screening test for tuberculosis in clinical specimens.

Species – specific and genus – specific PCR methods are being used with various targets and modifications of PCR.

Transcription mediated amplification (TMA), nucleic acid amplification (NAA), and ligase chain reaction are some of the methods used for identification of M. tuberculosis and NTM.

Transcription Mediated Amplification (TMA) & Nucleic Acid Amplification (NAA)

These methods identify the presence of genetic information unique to M. tuberculosis complex directly from pre-processed clinical specimens. The NAA technique uses chemical, rather than biological amplification to produce nucleic acid, so that within a few hours these tests distinguish between M. tuberculosis complex and NTM in an AFB – positive specimen. It is currently used only for respiratory specimens; use for non-respiratory specimens is likely in the future.

A positive direct amplified test in conjunction with an AFB – positive smear is highly predictive of TB disease. However, the results of NAA are preliminary. The mycobacteral culture is still needed for species identification/confirmation and for drug-susceptibility testing. A negative NAA with an AFB – positive smear indicates that the AFB is probably NTM. The M. tuberculosis direct test (MTD) and amplified mycbacterial direct test (AMDT) are highly sensitive (96%) and specific (100%) for M. tuberculosis on specimens that are smear positive for AFB; however, there are occasional false – negative or false-positive results being reported, which are either due to the presence of fewer bacilli or due to contamination. Another disadvantage of the technique is that both viable and dead bacilli can give positive results as the DNA of both can be amplified.

The Ligase Chain Reaction

This is a vanant of PCR, in which a pair of oligonucleotides is made to bind to one of the DNA target strands, so that they are adjacent to each other. A second pair of oligonucleotides is designed to hybridize to the same regions on the complementary DNA. The action of DNA polymerase and ligase in the presence of nucleotides results in the gap between adjacent primers being filled with the appropriate nucleotides and ligation of the primers.

The nucleic acid amplification test steps for Gen – Probe's MTD Test involves test kit, lysis of cells and release of the nucleic acid target. Subsequently, a specific sequence of the mycobacterial nucleic acid is amplified resulting in million – fold increased target NDA concentration.

Labelled DNA probe is added, resulting in a concentration – dependent complex of labeled DNA probe and DNA, detection of signal originating from the labeled probe bound in complex, using an automated reader. Total time is 2 to 5 hours and patient visits once.

The advantages of nucleic acid amplification includes that results are available in several hours, specificity is 98 – 100% (9), sensitivity is greater than 95% in sputum that is acid-fast bacilli (AFB) smear – positive and 60-70% in smear-negative, culture- positive specimens[10-12].

Recently, developed amplification tests may have better sensitivity in smear – negative specimens while retaining the same high degree of specificity[13, 14, 15]. It shows promise for materials other than sputum (blood, lymph, bone marrow, gastric aspirate, cerebrospinal fluid, urine, bronchial aspirate and lavage), although results have considerable variability (16, 17). The disadvantages includes that of cost, complexity, lower specificity (higher proportion of false-positives) under field conditions, and in-house tests may be less expensive but are more time – consuming.

Genotyping

This is an essential tool in the laboratory for TB epidemiology. Genotyping relies on molecular techniques based on PCR.

New PCR – based genotyping methods include spacer oligonucleotide typing (spoligotyping) and Mycobacterial Interspersed Repetitive Unit (MIRU) typing.

Spoligotyping is based on differences between strains in the spacer sequences n the direct repeat locus of the M. tuberculosis genome. MIRU is based on variable numbers of tandem repeat at 12 loci in the genome of M. tuberculosis (20). These genotyping techniques can provide typing information from culture within a month from the time the specimen is collected from the patient. Genotyping is useful in answering specific questions related to suspected outbreak of TB in institutions such as hospitals, schools and prisons. PCR based strain – typing requires only a small cell mass and yield numerical results that can be compared easily either within a laboratory or between laboratories to determine whether two

strains are the same. When used together for strain typing, spoligotyping and MIRU provide a powerful combination of tools that can discriminate strains which are not part of the chain of transmission (21). Rarely, however, unrelated strain could have the same spoligotyping and MIRU number (21). This disadvantage has given rise to DNA fingerprinting.

DNA fingerprinting based on restriction fragment length polymorphism (RFLP) is the gold standard for strain – typing in mycobacteriology. The insertion sequence 156110 was specifically identified as the target of DNA probe to be used in fingerprint analysis (22, 23). It requires a week for the assay to be performed and results evaluated. The disadvantages of genotyping by RFLP is that a large cell mass is required and the results are band – pattern, thereby difficult to convert into digital format making comparison difficult. It is however available only in regional laboratories and not yet a routine technique.

Serology

In contrast to many infectious diseases for which serodiagnosis (detection of antibodies or anti-geris in blood) are used, technology has so far largely failed to provide an adequately sensitive, specific and practical method as a first – line (25, 26). Screening tool for clinical use in TB specificity is hampered by (18, 19) antibodies in the sample that cross – react with environmental mycobacteria, leading to false – positive results. Also, the lack of reproducible methods for purifying anti-geris means that results are variable.

Capture Elisa

A quantitative test to detect lipo arabino mannan (LAM) has been developed for the detection of TB in urine specimens. Another test being used in a field trial is the dipstick method (semi-quantitative) for the detection of LAM in both pulmonary and extra-pulmonary specimens. Preliminary reports have shown a sensitivity and specificity of 93 and 95% respectively.

Detection of Lam

This test is based on the capture antibody derived from murine source (Murine monoclonal antibody against LAM). The rabbit antisenim against M. tuberculosis is used as a source of detector of the antibody. This specific and sensitive assay for the detection of LAM in sputum is potentials useful for the diagnosis of TB.

Antigen Detection in Body Fluids

The advent of nucleic acid amplification technology (especially PCR) has overshadowed recent developments in antigen detection. However, free mycobacterial antigen at a concentration of 3 – 20ng/ml can be detected in biological fluids such as cerebrospinal fluid (CSF) or pleural fluid. The most commonly used antigens include mycoacterial sonicates, extracted glycolipids, PPD, Ag 5 (38 kDa, Ag A60, P32 Ag, Cord Factor (trehalose dimycolate) and lipoarabinomannan. Most of the tests use polyclonal antibodies raised against crude mycobacterial antigens except for antigen 5 and LAM.

The sensitivity of tests ranges from 40-50% and specificity 80-95%. The methods used for antigen detection are: the sandwich ELISA, inhibition ELISA, latex agglutination and reverse passive haemagglutination tests.

Antibodies to mycobacterial antigens in sera of patients are detected either by using monoclonal or polyclonal antibodies. Cross – reactions by environmental mycobacteria is likely to produce false-positive results.

Reproducible methods for purification of mycobacterial antigeris have yet to be evolved; hence the results of most assays available at present are variable in different settings. It is also important to note that the immune response in mycobacterial disease appears to be associated with HLA Class 11 allotypes and different patients appear to recognize different antigens. It is thus unlikely that all tuberculosis patients will recognize a single antigens, and hence, prove to be a handicap for the development of antibody – based detection systems for mycobacteria.

Some of the newer approaches are as follows:

TB Stat-Pak

This immunochromatographic test based on the detection of antibodies has been evolved with a capability to differentiate between active or dormant TB infection in whole blood, plasma or serum. Its value in disease endemic countries such as India is yet to be ascertained.

Insta Test TB

It is a rapid in vitro assay for the detection of antibody in active TB disease using whole blood or serum. The test employs an antibody binding protein conjugated to a colloidal gold particle and a unique combination of TB antigris immobilized on the membrane.

Enzyme immunoassay for the detection of anti-mycobacterial super oxide dismutase antibody.

Super oxide dismutase as an important secretary protein of M. tuberculosis and has been evaluated for the diagnosis of tuberculosis. It is found to be useful only in low prevalence countries (93-94% positive predictive value), compared to high prevalence countries liked India and Egypt, where the positive predictive value drops to 77-88%.

To over come the poor specificity of the existing skin test based on tuberculin, newer tests with defined antigens are needed to discriminate between the infected individuals from those with active disease. The latest of these is the MPB 64 patch test.

TB MPB 64 Patch Test

MPB 64 is a specific mycobacterial antigen for M. tuberculosis complex. This patch test becomes positive in 3-4 days after patch application and lasts for a week. The test has a specificity of 100% and a sensitivity of 98.1%.

This promising test has been reported so for only in one setting in Philippines and need to be carried out in other settings.

Another approach is the use of defined antigens for an accurate and rapid test for tuberculosis infection based on the detection of T cells sensitized to M. tuberculosis either by blood tests in vitro or skin tests in vivo. Mononuclear cells from the peripheral blood are stimulated in vitro and production of IFN gamma from the sensitized T cells is measured by ELISA. The antigeris used are ESAT 6 (early secretary antigen TB) and CFP 10 (coloring forming protein), which are being used as an alternative for PPD, for use in skin test (tuberculin testing) in vivo.

The ESAT 6 (6kDa) is a specific antigen and a strong inducer of IFN gamma production by T cells of TB patients. The M. tuberculosis genome encompasses regions of differences (RD). These RD may encode potential antigens relevant for protection or diagnosis.

The RDI region is responsible for the secretion of ESAT – 6 in response to TB. His antigen is recognized by T cells of TB patients and is not recognized by BCG vaccinated or healthy unvaccinated individuals. The level of IFN gamma increases in treated compared to untreated patients, and is associated with improved immunity against TB. Hence, this may be useful in monitoring TB patients.

Most of the serological tests have low turnaround time, high negative predictive value and are useful as screening tests. The limitation of these tests is low sensitivity in smear negative patients, HIV positive cases, and in disease endemic countries with a high infection rate. The tests are also expensive, required trained personnel and often have difficulty in distinguishing between M. tuberculosis and Non-tuberculosis mycobacteria (NTM).

Micro Array Technology

Currently available serological tests, therefore, offer little compared to standard smear microscopy, but their superior operational characteristics hold some promise.

Since none of the assays is yet approved by regulators in North America or Europe, or recommended by the international TB Community. Their use is restricted to the private sectors of countries lacking diagnostic regulating bodies.

Serological detection of TB involves preparation of supplies, sample collection, application of blood sample to immunochromatographic (IC) strip, reading the IC strip and visible control and patient bars shows positive results.

The total time involved is 15 minutes and patient visits once. The advantages of serological tests includes that it is more convenient when obtaining specimens from extra pulmonary cases and children suspected of having pulmonary disease. It is simpler to use than smear microscopy, has high negative predictive value, results are available within 1 hour, involves simple technology and relatively inexpensive. Its disadvantages includes that sensitivity is highest in patients with smear positive disease, but much lower in children, patients with extra pulmonary disease, immunodeficiency virus (HIV) infected individuals and smear – negative cases.

It cannot reliably distinguish active tuberculosis disease from latent infection with M. tuberculosis it cannot distinguish M. tuberculosis from other species of mycobacteria.

Mycobacteriophage Assay

FAST Plaque TB is an original phage based test, which uses the mycobacteriophage to detect the presence of M. tuberculosis directly from sputum specimens. It is a rapid, manual test, easy to perform and has an overall higher sensitivity when compared with sputum smear microscopy in newly diagnosed smear positive TB patients.

The test has a specificity of 98.7-99.0% and a sensitivity of 70.3 – 75.2%, when compared with smear microscopy, which has a specificity of 97.3 – 97.4% and a sensitivity of 61.3 – 63.4%.

FAST Plaque TB is the only commercial phage assay and is a method based on a technology that utilizes mycobacterio phages (viruses that infect mycobacteria) as indicators of the presence of viable M. tuberculosis in a clinical specimen. Test steps for fast plaque TB™ involves sputum sample, mycobacterio phage added to sputum sample. Phages recognize and attack M. tuberculosis cell and release DNA. New phage particles produced and virucide added to inactivate phages outside the cell. Virucide is neutralized and specimen mixed with mycobacteria smegmatis and agar, which are pour into Petri dish. Phages replicate and lyse MTB and then repeatedly infect mycobacterium smegmatis cells. This appears as clear zones on the agar plate. The total time for this test is 48 hours and patient visit once. Some groups have developed home-based methods. The advantages of phage assay includes rapid results obtained from sputum (48 – 72 hours) no dedicated equipment required, high sensitivity in smear – positive specimens (24). Semi quantitative results and may be most useful in high burden countries; in a study conducted in South Africa, sensitivity was 70.3% and specificity 99% in previously untreated TB patients (25). Its disadvantages includes that there is low sensitivity in smear – negative culture – positive specimens requires technical expertise and is evaluated only on sputum specimens.

Cytokine Detection Assay

Molecular biological advances in the past decade have allowed the development of tests to estimate cell – mediated immune response against M. tuberculosis.

Circulating lymphocytes are extracted from samples of venous blood, exposed to purified mycobacterial antigens, and incubated for 6 to 24 hours. If the patient is infected with M. tuberculosis, the blood cells will recognize the tuberculin and produce cytokines (most commonly interferon – gamma), which are measured.

The test steps for Quantiferon – Gold ™ assay cytokine detection involves blood sample collection, addition of stimulating antigens, followed by incubation for 16-24 hours at 37^0 C, harvesting of plasma, addition of conjugate solution, followed by incubation for 2 hours at room temperature, washing plates more than 6 times, adding substrate, incubating for 30 minutes, adding stop solution, reading absorbance at 450nm and calculating results using special software. The total time involved is 48 hours and patient visits once.

In 2001, the FDA approved a commercial assay of this nature described above called "Quanti-FERON (R) TB" (Cellestis Ltd), to detect latent tuberculosis infection. This assay has evolved which incorporates TB – specific antigens.

ESAT – 6 and CFP – 10 and is approved for diagnostic use in Europe, Japan and the USA.

Use of specific MTB antigens reduces cross – reactivity to the BCC, Vaccine and many environmental mycobacteria. T SPOT – TB (Oxford Immunotec Ltd) is a similar assay that has been approved for use in Europe. The test captures IFN – gamma released from peripheral blood mononuclear cells in response to stimulation with MTB – Specific antigens.

Conclusion

In conclusion, the advantages and disadvantages of each available TB diagnostic method are evident and no test is yet available those meet target specification in terms of performance and ease to use. Performance is a compilation of sensitivity, specificity and speed while ease to use is a compilation of safety, number of steps, cost, robustness and training simplicity. Serology and micros copy are easier to use X-ray, culture, and nucleic acid amplification test (NAAT) while culture and nucleic acid amplification test performs better than X-ray, microscopy and serological techniques. Apart from these characteristics of current TB diagnostics, furthermore, the quality of the test results with existing methods are dependent on the availability of sufficient human and financial resources, training of laboratory personnel and monitoring of performance.

New method that overcome limitations and respond to challenges posed by special population swill be well received.

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Original Article

The effect of *Citrus Aurantifolia* (Acid Lime) on Isolated Rabbit Ileum Smooth Muscle Contractility

Odeh SO[1], Enyikwola O[1], Adelaiye AB[2],Ibu JO[3].

Department of Human Physiology, Faculty of Medical Sciences, [1]University of Jos, Jos; [2]University of Abuja, Abuja, and [3] University of Uyo, Uyo.

Correspondence:oyioche01@yahoo.com

Summary

Citrus aurantifolia (acid lime) is one plant being used in traditional medical practice for several disorders. Considering the reported roles plant products play in management of disease states, we undertook to assess the effect of the *Citrus aurantifolia* on isolated rabbit ileum smooth muscle contractility. Acid lime obtained from the open market and identified by a plant Taxonomist, was extracted by simple squeezing. The extract was tested on the tissue mounted in an organ bath, balanced by a 1g weight, and using a microdynamometer (7050) recorder set at speed of 24mm/min. The effect of the extract was compared with those of standard drugs, acetylcholine (10µg) and adrenaline (10µg). Results show that *Citrus aurantifolia* significantly inhibits isolated rabbit ileal contractility, the effect being superior to that of adrenaline, and not reversed by the administration of acetylcholine.

Keywords: *Citrus aurantifolia*, rabbit, ileum, smooth muscle, contractility.

Introduction

Citrus aurantifolia (acid lime) is of the Rutaceae family. Much of the works on citrus plants, especially acid lime has been chemical analysis of its contents. Reports are that *C. aurantifolia* contains 37mg ascorbic acid per 100g fresh weight[1]. Its citric acid content is 5.9% in 100ml of juice. Oguntona and Akinyele[2] reported that it contains 0.6g/100g of edible portion of protein and 0.8g/100g edible portion of monosaccharide. The electrolyte content per 100g edible portion is; calcium 19g, iron 0.7g phosphorus 21g, potassium 15g, sodium 5g.[2] . Wong[3] and Oh *et al*[4], described the benefits of lime in the management of fever, flu, sore throat, cystitis, rheumatism and dysmenorrhoea, among others. Morton[5] reported that the citrus peel oil is useful in the treatment of stomach disorders. Recent studies indicate that some citrus plants increased the oral bioavailability of several drugs metabolised by Cytochrome P450 3A4[6] . Corroborating this, the report of Edwards *et al*[7]showed that grapefruit and servile orange juices contain 6'7'-dihydroxybergamottin, a furanocoumarin, which inhibits CYP3A4.

Benefits of citrus fruits according to Crowell[8] also are derived from the presence of monoterpenes with some antitumour activity. Hashimoto *et al*[9] investigated the interaction of citrus juices with a new 1,4, dihydropyridin (pranidipine), a calcium antagonist in healthy subjects. They reported a significant increase in heart rate with the juice treatment.

Liija *et al*[10]demonstrated that citrus fruits juices could cause a considerable delay in gastric emptying and the inhibition of the cytochrome P450 3A4 – mediated first pass metabolism. In the same vein, Rubin *et al*[11] advised caution in citrus

fruits intake in patients with a previous history of gastric surgery.

The motor functions of the gastrointestinal tract are performed by smooth muscles except at the pharyngeal and anal ends. The smooth muscles contain poorly developed system of T-tubules which releases calcium during the cycle of contraction and relaxation[12,13]. Calcium controls cell membrane permeability to sodium, and if completely removed from smooth muscle cells would lead to depolarization, and the electrical and mechanical events would be abolished[14-16]. Several factors affect intestinal smooth muscle motility including vagal influences, reflex mechanisms, and hormones, among others[17-24] gave reports on the effects of some plants on intestinal motility. This study was undertaken to investigate the effects of *Citrus aurantifolia* on rabbit ileal smooth muscle contractility.

Materials And Methods

The fresh limesused for the study were purchased from the open market and identified by a certified plant Taxonomist. The acid lime fruits were cut into two halves and squeezed to obtain juice. The juice was stored in a bottle for use.

Rabbits (n=5) were used after being adapted for five days before the experiment. The rabbits were killed by a blow to the head. The abdomen was quickly dissected and the small intestine removed into a beaker containing Tyrode solution (NaCl 140; KCl 2.7; $NaHCO_3$ 12.0; $MgCl_2$ 0.5; $NaHPO_4$ 0.3; CaCl 0.9; and glucose 5.5, in millimolar concentrations).Short pieces, 2cm, of the ileum were excised and placed in a petri dish containing the Tyrode solution and properly aerated. The piece was carefully set up in the organ bath and washed with Tyrode solution. The tissue in the organ bath was aerated by means of an electric air pump and left to rest for a while in the organ bath so as to stabilize. A microdynamometer (7050) recorder was set up, balanced with a 1g weight, and ran at a speed of 24mm/min.Controlled responses were obtained and the effect of acetylcholine (10µg) and adrenaline (10µg) on the tissue determined. Various concentrations of the extracts were then tested on the tissue. After each test, the tissue was washed repeatedly with Tyrode solution and allowed to rest for up to 20 mins to allow the tissue recover fully.

The results were analysed, and significance level determined by the Student's t- test. A probability level of less than 5% was considered significant.

Results

Table 1 shows the effect of standard drugs (acetylcholine and adrenaline) on isolated rabbit ileum. At a dose of 4 $x10^{-3}$ ug/ml, the tension generated and duration of contraction were greater and longer respectively when acetylcholine (tension: 12.6g; duration of contraction: 30sec) was applied compared to when adrenaline was applied (tension: 0.32g; duration of contraction: 10sec).

Table 1. The effects Acetylcholine and Adrenaline on isolated rabbit ileum.

	Acetylcholine	**Adrenaline**
Dose (µg/ml)	4 $x10^{-3}$	4 $x10^{-3}$
Log Dose	- 2.40	- 2.40
Tension (g)	12.60	0.32
Duration of contraction (sec)	30	10

The tracing of the effect of acetylcholine and adrenaline is shown in figure 1 below. is shown in figure 1 below.

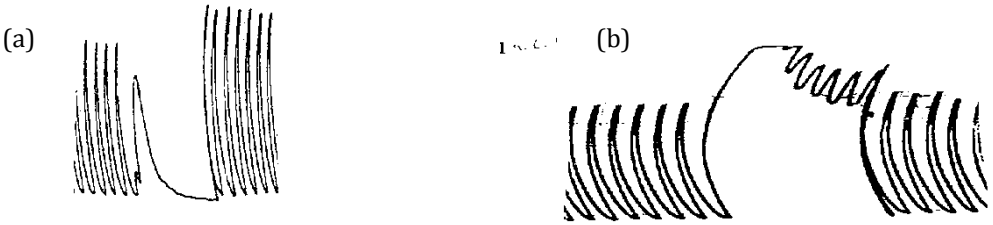


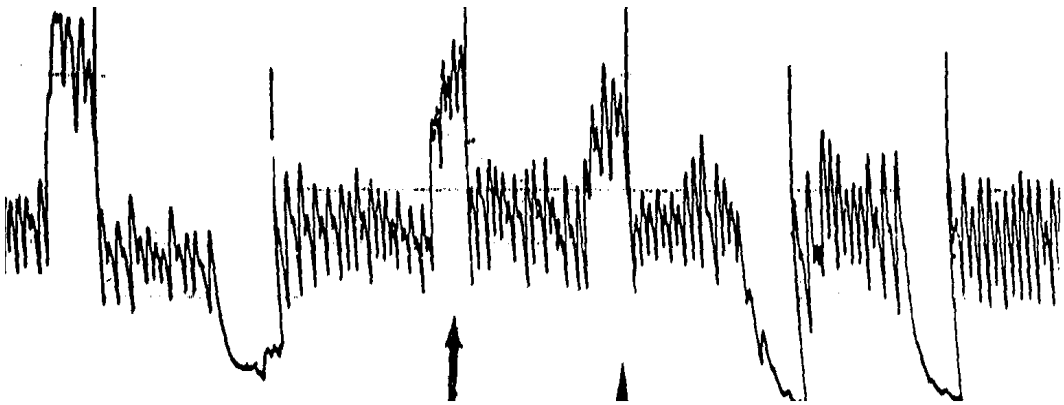
Figure 1: The effects of standard drugs (a) adrenaline [10µg], and (b)acetylcholine [10µg] on rabbit ileum smooth muscle.

The effect of the acid lime on isolated rabbit ileum in the absence of the standard drugs is shown in table 2 below. At equivalent dose of $4x10^{-3}$, the tension generated (8.4g) and duration of contraction (10sec) was less than that of acetylcholine but though the tension generated was greater than that of adrenaline (0.32g), the duration was similar (10sec). The results of other doses tested are detailed in table 2, with dose of $8x10^{-2}$ and $8x10^{-1}$ generating the greatest tension (10.4g) and duration of contraction (20sec) respectively. The effect of acid lime extract in the presence of the standard drugs is shown in table 3. At a dose of $32x10^{-4}$, tension of 6.0g and 0.40(sec) were generated respectively in the presence of acetylinecholine and adrenaline. However while contraction lasting for 35sec was generated in the presence of acetylcholine, non was generated in the presence of adrenaline.

Table 2. Effects of *Citrus aurantifolia* extract on isolated rabbit ileum.

Dose (µg/ml)	Log Dose	Tension (g)	Duration of contraction
$4 x10^{-3}$	-2.40	8.40	10
$8 x10^{-3}$	-2.10	9.80	10
$16 x10^{-3}$	-1.80	7.20	10
$32 x10^{-3}$	-1.50	10.00	10
$4 x10^{-2}$	-1.40	10.20	10
$8x10^{-2}$	-1.10	10.40	10
$16 x10^{-2}$	-0.80	10.00	10
$32 x10^{-2}$	-0.50	5.00	10
$4 x10^{-1}$	-0.40	9.00	20
$8 x10^{-1}$	-0.10	8.80	20
$16 x10^{-1}$	0.20	_	_
$32 *10^{-1}$	0.50	_	_
$32 x10^{-1}$ 0.50			

The tracing of the effect of acid lime extract on isolated rabbit ileum is shown below.



0.8ml

Fig 2. The effects of *Citrus aurantifolia* (100mg/ml) on rabbit ileum smooth muscle.

Table 3. The effects of *Citrus aurantifolia* extract on isolated rabbit ileum in the presence of standard drugs [acetylcholine (10µg) and adrenaline (10µg)].

	***C.aurantifolia* + acetylcholine**	***C.aurantifolia* + Adrenaline**
Dose (mg/ml)	32 $x10^{-1}$	32 $x10^{-1}$
Log Dose	0.51	0.51
Tension (g)	6.00	0.40
Duration of Contraction (sec)	35	_

Discussion

Crowell[8] had reported that the presence of monoterpenes in citrus plants is responsible for some of the actions of acid lime. This study demonstrates a considerable inhibition of isolated rabbit ileal smooth muscle contractility. This corroborates the findings of Liija *et al*[10] and Rubin *et al*[11] that citrus fruits juice could cause a significant delay in gastric emptying.

The effects of *Citrus aurantifolia,*a significant inhibition of isolated rabbit ileal contractility, seems to be anti-cholinergic in nature as acetylcholine was unable to immediately reverse the lytic effect of the extract on the tissue contractility. Also shown is the superiority of the anti-motility effect of the acid lime extract over that of adrenaline on the rabbit ileum.

It is concluded that *Citrus aurantifolia* juice extract considerably reduces motility in the isolated rabbit ileum.

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Conflict Of Interest

The authors declare no conflict of interest. .

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Original Article

Contraceptive needs and use of contraceptive services by pre-menopausal women age 50 years and over in Botswana

Ama NO

Department of Statistics, University of Botswana, Gaborone, Botswana

Correspondence: Dr Njoku OA E-mail: amano@mopipi.ub.bw; njoku52@gmail.com

Summary

The paper examines the contraceptive needs and use of contraceptive services by a stratified sample of older women (50 years and above) who have not attained menopause, from four selected sites in Botswana. The paper analyzeshow some of the determinants of family planning impact on the uptake of contraceptive services/methods among the older women. The paper shows that 8.5% of the older women still want to have children whilecontraceptive prevalence among this group of older women is 59.3% and unmet need for family planning is 37.3%. The contraceptives mainly used by the older women are condom, breastfeeding, abstinence and barrier methods. A binary logistic regression analysis of the data reveals that having information, knowledge, availability and accessibility of specific methods do not always lead to the use of the method. For instance, although information and availability significantly predicts contraceptive use, knowledge and accessibility of the methods do not significantly predict contraceptive use . Thus, while availability and accessibility of condom is negatively correlated with contraceptive use, information and knowledge of condom is positively correlated with use. Older women who are employed, are in marriage and have some education are more likely to use contraceptives. The study recommends increased effort by public healthcare programme planners, policy makers and NGOs to increase information, education and communications (IEC) interventions to boost uptake of family planning services among the older women. Such interventions should be service specific, specifically provide information and knowledge on the available methods and how best to access the methods; establish an environment of trust and respect; and explain how to use the chosen methods, benefits, and possible side effects.

Keywords: Information, knowledge, accessibility, availability, family planning, older women

Introduction

The government of Botswana in collaboration with other stakeholders involved in the provision of family planning services e.g UNFPA have put in place various strategies and policies to increase uptake of family planning services in Botswana. These are aimed at increasing contraceptive prevalence rate (CPR), reduction in both total fertility rate (TFR) and unmet need for family planning services. However, these services are known only to target men and women of the reproductive age group (15-49 years) with little or no emphasis on older women 50 years and above, especially those who may not have attained menopause. Yet the women in this age group have their specific needs which because most of them are still sexually active and are therefore vulnerable to unwanted pregnancy, HIV and STIs, .need special attention. Those older women who live in violent relationships are often unable to make family planning choices and are at greater risk of unwanted pregnancy, HIV/AIDS infection and STIs. The purpose of the study is to examine the utilization of family planning services by pre-menopausal womenaged 50 and over and to analyze how these determinants impact on the uptake of family planning services/methods.

The paper accomplished these objectives using information provided by 61 older women from a a stratified sample of 444 older women drawn from four selected sites in Botswana. The paper made use of the binary logistic regression methods to examine the odds of family planning use and its determinants. The resultsenhance knowledge of the family planning needs of this significant but overlooked group and highlight the problems of older womenin meeting their family planning needs.Recommendations that can enhance policy formulation by family planning programme managers and policy makers to address the needs of the older women are also made.

Background

Family planning is critical in preventing unwanted pregnancies and unsafe abortion and in reducing maternal mortality as well as reducing poverty, maternal and child mortality. The service also empowers women to choose when and with whom to have children. Family planning means deliberately choosing when to have children by spacing the number of pregnancies, as well as avoiding unintentional pregnancy. It involves the use of some form of contraception or natural family planning methods until a couple is ready for a child[1]. According to[1] , having another baby within a year of giving birth physically strains a mother by depleting necessary iron and vitamins in her body. Also attempts at breastfeeding two children who are closely spaced may be less successful. Caring for children can be stressful, and women who choose when and how many children to have may be better able to work or further their educations before committing to the potentially demanding tasks of raising children[1].

Fertility naturally declines with age, so when a woman is heading towards the end of her fertile years, she has a lower chance of becoming pregnant. However, there is still need to think about using contraceptives because the woman can still become pregnant[2]. An unplanned pregnancy at an older age can be devastating for the individual woman and can present difficult choices. It is therefore advisable for the older women to continue contraception until there is no further chance of ovulation and risk of pregnancy. Women in their late reproductive years may also have heavy, irregular or painful periods which must be taken into account when choosing a method of contraception The author[3] estimated that the possibility of pregnancy in women between 45-49 years is two to three per cent, while the risk of pregnancy without contraception after the age of 50 years is minimal - less than one per cent[2]

The family planning methods that can be used in either delaying or stopping pregnancy include oral contraceptives (the "Pill"); hormonal injectables; subdermal implants; intrauterine devices (IUDs); male and female sterilization; and barrier methods such as male and female condoms, diaphragms, and spermicides. Other modern methods include the Lactational Amenorrhea Method (LAM); fertility awareness methods such as methods that involve keeping track of when the fertile time of the menstrual cycle starts and ends (the Standard Days Method); and symptoms-based methods, which depend on observing signs of fertility (cervical secretions, basal body temperature)[4]. The natural family planning methods include breastfeeding, withdrawal and abstinence.Women of all ages need to remember that condoms are the only contraceptive choice to protect against sexually transmissible infections.

Studies have shown that if women had only the number of pregnancies they wanted, at the intervals they wanted, maternal mortality would drop by about one-third [5]. Women with birth-to-pregnancy intervals of less than five months experienced a risk of maternal death that was 2.5 times higher than women with birth-to-pregnancy intervals of 18 to 23 months[6]. In the developing world, an estimated 137 million women who want to avoid a pregnancy are not using a family planning method[7]. These women have an "unmet need" for family planning. Women with unmet need fall into two groups: women who wish to wait at least two years until their next pregnancy, and those who want to stop childbearing altogether. Globally, an estimated 55 percent of those with unmet need for family planning have a need for spacing and 45 percent for limiting[7-9]. Women may have an unmet need for family planning for a variety of reasons: lack of knowledge about the risk of becoming pregnant; fear of side effects of contraceptives; perceptions that their husbands, other family members, or their religion opposes family planning; or lack of access to family planning services[10]. Many of these barriers could be overcome through better information and counseling for both women and men.

The healthcare situation in Botswana

There is substantial unmet need for family planning in sub-Saharan Africa. In other regions of the world, unmet need is generally lower because more women in those regions are using family planning. Nevertheless, unmet need remains an important component of the total potential demand for family planning[11] .

Primary health care is provided in all the 24 health districts of Botswana and the health

services are very accessible in the urban and rural areas with 84% of the general population living within five kilometres of a primary health care health facility[12] . There is little or no difference between urban and rural dwellers as the health care facilities are easily accessible[13] . The hospitals are open 24 hours a day and the clinics are open from 7:30 a.m. to 4:30 p.m. (with someone on call to attend to emergencies)[14] . Health services are virtually free at the public facilities, requiring only a nominal charge of 5 Botswana Pula (US$0.70 at the exchange rate of 1 US$=7.2 Pula)[15]. It is worth noting that the maternal child health and family planning services are exempted from the nominal fee. Paved roads connect most villages, making referrals relatively easy even in the rural areas. Ambulances are available at the lower-level health facilities for transfers to hospitals. The government also has a contract with Netcare 911 to provide air ambulance services in emergencies[15] .

The Primary health care programmes that are in place in Botswana include, amongst others: epidemiology and disease control services; occupational health services; environmental health services; food sciences laboratory services; maternal and child health/family planning services; expanded programme on immunization; food and nutrition; health education services; HIV/AIDS and sexually transmitted diseases; oral health services; and rehabilitation for persons with disabilities, as well as curative services[15].Because of Botswana's strong family planning program, use of modern contraceptives among all women 15–49 years of age increased during the last four decades from 16 percent in 1984 to 29 percent in 1988, 40 percent in 1996, and 51 percent in 2007[16-17] . Use of traditional methods of contraception decreased from 7.5 percent in 1984 to 2.6 percent in 2007[16] . Male condoms are the most commonly used method of contraception (42 percent), followed by injectables (7 percent) and oral contraceptives (6 percent). Use of long-term methods such as intrauterine device and implants is negligible. The use of male condoms increased from one percent in 1984 to 11 percent in 1996 and 42 percent in 2007, and this increase has been attributed to an effective multimedia dual protection HIV campaign[15-16] .

The Government of Botswana is thus highly ensuring that all people enjoy adequate health as enshrined in the Vision 2016 of Botswana. Howbeit, these services target women, men and youths within the primary sexually reproductive years (15-49 years). No specific health care programme has been designed to specifically target the olderwomen (50 years and above), notwithstanding that many of them are still sexually active and very vulnerable to incidence of rape, HIV/AIDS and STIs. Very little, if any, information is available on the older women's family planning attitudes and behaviour, sexual behaviour and how sexual activities change with aging and illnessin Botswana. A study by author(s)[18] reported sexual activity among the older women of varying ages and noted that women were significantly less likely than men at all ages to report sexual activity and but that many older women were sexually active although such activities may have declined;: the prevalence of sexual activity declined with age (73% among respondents who were 57 to 64 years of age, 53% among respondents who were 65 to 74 years of age, and 26% among respondents who were 75 to 85 years of age); Among respondents who were sexually active, about half of both men and women reported at least one bothersome sexual problem. Author(s)[19]have shown that a substantial percentage of the older women still enjoy sex with their partners, are very reluctant to attend the clinics with the younger women and have unmet need for family planning (72%)[20]. These women are very vulnerable to HIV/AIDS and STIs and many of them perceive their sexuality problems as normal and hardly consult the medical experts.Reducing the unmet need for family planning, stigma and discrimination associated with older women seeking family planning services from the public healthcare hospitals and clinics is important for the design of familyplanning programs because it affects the potential demand for family planning services and hasimportant implications for future population growth. The good health of older women, as well as equal access andquality services across the life course, are very critical and should be of practical concerns to healthcare delivers and policy makersin the implementation of healthcare programme, particularly for HIV/AIDS, as most of the care given to orphan children, elderly members of their families and HIV infected persons is provided by the older women.

Correlates of uptake of family planning services: Analysis of DHS surveys data from 13 out of 27 developing countries showed that lack of knowledge, fear of side effects, and husband's disapproval were the principal reasons for nonuse among women who were otherwise motivated to use family planning[21]. A study by[22] using DHS-II data from sub-Saharan African countries indicated that lack of information about family planning, opposition to family planning, and ambivalence about future childbearing were the principal factors responsible for unmet need for

family planning. Health problems and opposition to use are major reasons women not currently using contraceptives do not intend to use them in future. Twenty-three percent not intending to use contraception cited health concerns as the main reason while 5 percent expressed opposition to use, 5 percent expressed that the husband/partner disapproved, and 4 percent cited religion[23]. In the case of Botswana such factors as cost and access are much lesser concerns, indicating further need to strengthen demand for family planning services as they might be other causes for non-use of family planning services. With respect to pre-menopausal women aged 50 and over in Botswana:this paper aims to 1) determine their family planning needs and use of family planning services; 2) assess their main sources of contraceptive information and knowledge of contraceptive services. ; and 3) establish correlates of contraceptive service use, including demographic characteristics , information, knowledge, availability, and accessibilityof contraceptive methods .

Operationalization of variable being studied

Availability, accessibility and knowledge: Availability of family planning services and methods in this study was measured by the older women's assessment of the method-mix (number of methods available) in the various clinics and hospitals; whether a particular method can be found in the clinics and hospitals and how regularly the older women were able to obtain their desired services from the clinics and hospitals. Accessibility, on the other hand, was measured by the closeness of the healthcare facilities to old women's homes, affordability of the services, the healthcare services being sensitive to social and cultural considerations such as gender, language and religion and also the quality of the services[24] .

Knowledge of family planning methods and of places to obtain family planning services is crucial in the decision on whether to use a method and which method to use. It is presumed that more widespread knowledge of family planning method will result in greater use of contraceptives[25-26]. Acquiring knowledge about fertility control is an important step toward gaining access to contraceptive methods and using a suitable method in a timely and effective matter. Knowledge of family planning methods was measured by asking the respondent to name the ways that a couple can use to delay or avoid a pregnancy or birth. If the respondent did not spontaneously mention a particular method, the interviewer described the method and asked the respondent if she knew it. All the modern family planning methods, namely: female sterilization, male sterilization, the pill, intrauterine device (IUD), injectables, condom, combined oral contraceptives, and emergency contraception, diaphragm, vasectomy, spermicides, Norplant as well as the natural methods, periodic abstinence, breastfeeding, observation of safe periods and withdrawal were included in the list.

Information on family planning services: It is internationallyagreed that individuals andcouples should have informed and voluntary choice inusing family planning and choosing the most appropriatemethods[27]. Item 7.12 of United Nations ICPD programme of action reiterates "The aim of family-planning programmes must be to enable couples and individuals to decide freely and responsibly the number and spacing of their children and to have the information and means to do so and to ensure informed choices and make available a full range of safe and effective methods. The success of population education and family-planning programmes in a variety of settings demonstrates that informed individuals everywhere can and will act responsibly in the light of their own needs and those of their families and communities. The principle of informed free choice is essential to the long- term success of family-planning programmes"[28].

For individuals and couples to have informed and voluntary choice of family planning, information on available family planning services and methods, and the risk of using these methods ought to readily available. It requires that the healthcare providers are adequately trained on how to communicate this information to the older women. Furthermore, the use of several media to reach users of the family planning services need to be exploited. Appropriate information on family planning services and methods is therefore very critical in the successful implementation of the family planning programmes at all stages and for all groups of people including the older women.

Methods

Setting and sample: The paper is derived from a study that was conducted between February and October 2011 and funded by the University of Botswana. Four health districts of Botswana namely Gaborone, Selibe Phikwe (predominantly urban areas), Kweneng East, and Barolong (predominantly rural areas) were purposively selected for the study.The 2011 population projection of women 50 years and above is 139,915 women, comprising 15.2% of the total female population and 12.1% of the total country's population [28]. The estimated sample size for the

study was calculated at 454, using the sample size calculator programme[29] that allows for 95% confidence (and an error margin of 5%), and that posits that the response from the sampled population would be the same as that of the entire population. This number was allocated to the four sampled districts using probability proportional to size (PPS), where the size is the number of older women 50 years and above from each district[28] . The snow ball technique, a non-probability sampling method, was used to identify the older women from each of the districts because of the sparse nature of the population and the difficulty in obtaining an updated sampling frame of older women.The snowball technique is advantageous over the house-to-house survey as the latter is associated with a largely quantitative tradition of measuring the rare event that often suffers from a lack of response from the particular rare event, whereas snowball sampling involves locating the household with the rare event through key informant approach. Snowball sampling was found to be economical, efficient and effective for this study[30-31].

Instruments used for the study/Data collection: A questionnaire containing questions on demographic characteristics, sexual activities and family planning needs of older women, limitations, biases and stigma related to accessing family planning services was developed as research instrument. The questionnaire was of mixed structure. Some responses were provided on a five-point likert scale while some open ended questions gave the older women an opportunity to express their own opinions on the issues under investigation.

Trained research assistants administered the questionnaires to the participants at their homes or workplace. In some cases, where the respondent did not have time for a face-to-face interview, the questionnaire was self-administered and collected on a convenient agreed time. Potential respondents were informed that participation was voluntary and confidential in natureand there was no financial incentive. To maintain anonymity no personal identifiers were attached to the survey data.The purpose of the study was explained to the older women. Participants were not obliged to answer all questions and could terminate the interview at any time. A signed informed consent form was completed prior to participation but the questionnaire was completed anonymously. At the end of the data collection, 444 of the older women who were approached for the study completed the questionnaire giving a response rate of 98%.

Ethical consideration: Experts in public health and ageing reviewed the questionnaire prior to submission to the ethical committee of the University of Botswana. The Ethical Committee of the Ministry of Health also provided approval for the study. District Health Management Teams provided permission to conduct the study in each of the health districts. Research assistants, who were all females, were trained during a two-day training workshop on the content and administration of the research instrument as well as principles of attitude and behaviour towards older women participants.

***Exclusion criteria*:** The study excluded older women who had physical or mental disabilities This was due to the difficulty in providing special equipment such as facilities for hearing-impaired - signage, loops,and disability awareness training for interviewers, preparing large print materials for participants with visual impairments, and providing material in easy-to-read format for participants with intellectual disabilities.

Data analysis: The Statistical Package for the Social Sciences (SPSS) computer programme was used to capture andanalyse the data. All variables, including the responses to the open-ended questions, were coded before being captured. Data were first analyzed using descriptive measures, such as percentages, means, and standard deviation. Multivariate binary logistic regression models were then fitted to the data to examine the impact of determinants of family planning on family planning service use by theolder women.

Results

The analysis and results in this paper are derived from the responses of 61 older women, out of a total sample of 444 respondents, who answered 'No' to the question, 'Have you attained menopause?' .

Demographic characteristics

The demographic characteristics of the older women (n=61) who have not attained menopause are shown in Table 1.

Age of women: 98.4% of the older women were between 50 and 59 years of age while 1.6% (n = 1) was between 70 and 79 years of age.

Highest educational qualification of older women: 26.2% of the older women had no schooling, 19.7% had primary certificate, 8.2% attempted secondary school certificate while 11.5% had secondary school certificate; 18% had diploma certificate; 4.9% had attempted degree and 9.8% had university degree while 1.6% had professional certificate.

Employment status: Majority (52.5%) of the older women were employed, 11.5% were unemployed

but not seeking any employment; 18% were unemployed but seeking for some employmentwhile3.3% were retired civil servants.

Marital Status: 32.8% were single (never married); about 50.8% were married while 3.3% were widowed; 9.8% were cohabiting and 3.3% were divorced

Knowledge about menopause: A little over half of the older women (52.5%) had good knowledge of menopause while the rest had poor knowledge of menopause.

Table 1: Demographic characteristics of the older women

Demographic characteristics of older women	Response	Number of older women	Percent
Knowledge of menopause	Good	32	52.5
	Poor	29	47.5
Age of older women	50-59	60	98.4
	70-79	1	1.6
Education qualification	No schooling	16	26.2
	Primary Certificate	12	19.7
	Secondary attempted	5	8.2
	Secondary school certificate	7	11.5
	Diploma certificate	11	18
	Degree attempted	3	4.9
	University Degree	6	9.8
	Professional Certificate	1	1.6
Employment status	Employed	32	52.5
	Retired civil servant	2	3.3
	Unemployed (but not seeking employment)	7	11.5
	Unemployed (but seeking employment)	11	18
	House wife	9	14.8
Marital Status	Never married (Single)	20	32.8
	Cohabiting	6	9.8
	Married	31	50.8
	Divorced	2	3.3
	Widowed	2	3.3

Family planning needs of the older women: The family planning needs of the older women were measured in this study by the methods that the women are currently using either to stop pregnancy or to delay having a baby. The questions required them to state whether they were using any family planning methods to either stop being pregnant or to delay pregnancy and which family planning methods they were using now. The results show that 8.5% of the older women still wanted to have children, 59.3% were using some family planning methods while 37.3% have unmet need for family planning.

Figure 1 shows the top ten family planning methods that the older women (n= 61) are using now. The top four preferred methods currently used now are condom (79%), abstinence (29%), breast feeding (16%) and barrier methods (13%).

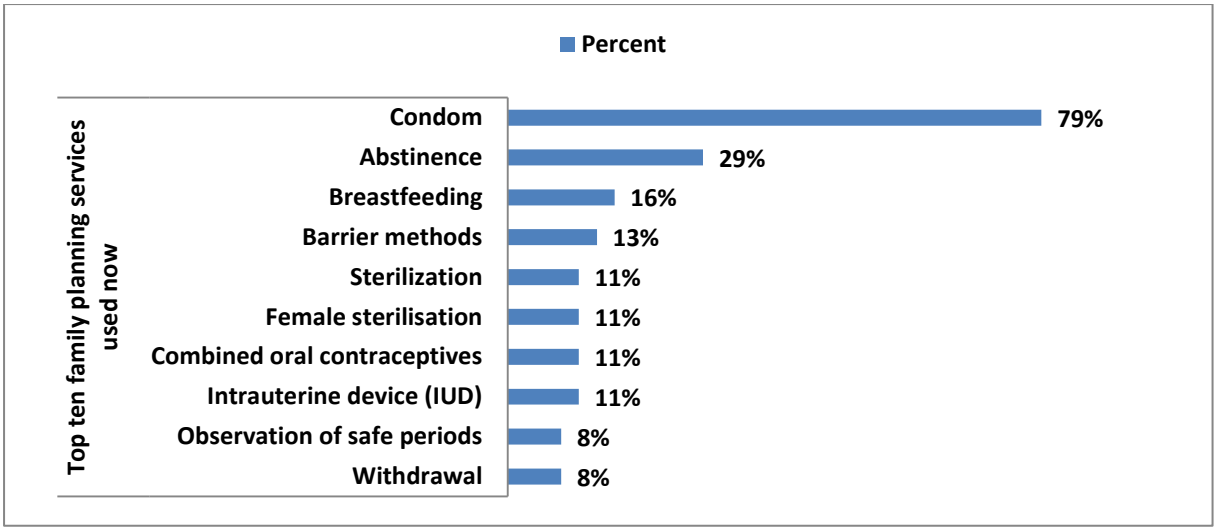

Figure 1: Top ten family planning methods being used now (n = 61)

Source of information about family planning needs: The main sources of information on available family planning were the nurses (55.8%), medical doctors (21.2%), radio and television (17.3%), medical journals (3.8%) and friends/neighbours/relatives (1.9%).

Availability, accessibility and knowledge of family planning services and use: The results of the analysis shows that condom (94%), intrauterine device (IUD) (76%), abstinence (66%), breastfeeding (62%) and combined oral contraceptives (62%) were the most available and accessible family planning services to the older women. Knowledge of condom was very high (95%), followed by the IUD (79%), abstinence (74%) and combined oral contraceptives (70%) (Table 2).

In order to verify how availability, accessibility knowledge and information on these services influenced theuse of the services, four multiple binary logistic regression analyses were carried out with the family planning services as predictors and the log odds of use of these services as the response variable.

Table 2: Older women's assessment of their knowledge, availability, and accessibility of family planning services

Family Planning services	Availability	Accessibility	Knowledge
Condom	94%	93%	95%
Intrauterine device (IUD)	76%	71%	79%
Combined oral contraceptives	62%	53%	70%
Progestogen-only pills	58%	49%	61%
Combined injectable contraceptives	60%	53%	65%
Female sterilization	46%	29%	46%
Breastfeeding	62%	62%	61%
Spermicides	24%	13%	28%
Barrier methods	28%	18%	33%
Sterilization	28%	20%	32%
Emergency contraception	24%	13%	28%
Diaphragm	48%	38%	51%
Vasectomy	42%	33%	51%
Norplant	44%	33%	46%
Abstinence	66%	69%	74%
Withdrawal	36%	24%	46%
Observation of safe periods	36%	27%	47%

The procedure defines the odds of in favour of using a family planning services, as

$$\frac{\pi}{1-\pi} = \exp(\beta_0 + \beta_1 x_1 + \beta_2 x_2 + ... + \beta_p x_p) \quad \text{..... 4.2.1}$$

With $\log(\frac{\pi}{1-\pi}) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + ... + \beta_p x_p$ 4.2.2

Where, π is the probability of using the family planning services or methods and $1-\pi$ is the probability of not using the family planning services. The probability of using the family planning services π is defined as

$$\pi = \frac{\exp(\beta_0 + \beta_1 x_1 + \beta_2 x_2 + ... + \beta_p x_p)}{1+\exp(\beta_0 + \beta_1 x_1 + \beta_2 x_2 + ... + \beta_p x_p)} \quad \text{..... 4.2.3}$$

The vector of covariates $(x_1, x_2, ..., x_p)$ is the predictor variable while $(\beta_0, \beta_1, \beta_2, ..., \beta_p)$ is the vector of regression coefficients which are unknown and need to be estimated and is defined as B in Table 3, 4, and 5. The quantity $Exp(B)$ in the table defines the multiplicative increase in the odds of a positive response for a unit change in anypredictor variable holding the other variables fixed. Positive values of B indicate that the predictor variable increases the odds of using the family planning method or service, while a negative value indicates a decrease in the odds of use of the method. The null hypothesis to be tested is : The model is a good fit to the data versus the alternative hypothesis that the model is not a good fit to the data. The null hypothesis is rejected if the p-value is less than α, the level of significance.

The four top contraceptives in terms of their availability and accessibility to the older women (Table 1) were extracted and further analysed using the multivariate binary logistic regression method and results shown in Table 3,4, 5 and 6.

Table 3 shows that although the availability of condom, IUD, breastfeeding and abstinence significantly predicts use family planning (Chi-square = 3.801; p > 0.05), availability of individual services negatively correlates with use of the service (the beta values are all negative). Thus, the fact that condom, IUD, breastfeeding and abstinence are available in the healthcare system does not translate to the services being used by the older women (Exp(B) are less than one in each case)). On the contrary, accessibility of condom, IUD, breastfeeding and abstinence in the public health facilities do not significantly predict usage of family planning (Chi-square =13.042; p < 0.05) . However, accessibility of the natural family planning methods, abstinence and breastfeeding, although not significant (p > 0.05), correlates positively with the odds in favour of use of family planning. Older women who have access to breastfeeding and abstinence were respectively 1.5 and 1.7 times more likely to use the services (Table 4). The results show that knowledge of these four family planning services do not significantly predict use of family planning (Chi-square = 12.307; p < 0.05). While older women who had knowledge of condom were about 1.5 times more likely to use it, knowledge of IUD, abstinence and breastfeeding did not increase use of the services (they were negatively correlated with the odds in favour of use of the services). Those who had knowledge of abstinence were almost as likely to use it as those who did not have the knowledge (Table 5). Accessibility and knowledge significantly (p < 0.05) predicts use of the service.

Table 3: Logistic regression to measure the impact of availability of top four family planning services on usage

Availability of family planning services	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
Condom	-0.765	0.85	0.81	1	0.368	0.465	0.088	2.462
IUD	-0.413	0.846	0.238	1	0.626	0.662	0.126	3.474
Breastfeeding	-0.200	0.772	0.067	1	0.795	0.818	0.18	3.717
Abstinence	-0.076	0.816	0.009	1	0.925	0.927	0.187	4.584
Constant	0.633	0.641	0.976	1	0.323	1.883		

Model adequacy: Chi-square =3.801, $p > 0.05$

Table 4: Logistic regression to measure the impact of accessibility of top four family planning services on usage

Accessibility of family planning service	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
Condom	-1.377	0.848	2.637	1	0.104	0.252	0.048	1.33
IUD	-1.688	0.862	3.831	1	0.05	0.185	0.034	1.002
Breastfeeding	0.41	0.823	0.248	1	0.618	1.507	0.3	7.564
Abstinence	0.531	0.869	0.373	1	0.541	1.7	0.309	9.344
Constant	1.013	0.599	2.862	1	0.091	2.754		

Model adequacy: Chi-square = 13.042; $p < 0.05$

Table 5: Logistic regression to measure the impact of knowledge of family planning services on usage

Knowledge of family planning services	B	S.E.	Wald	Df	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	**Upper**
Condom	0.413	0.388	1.133	1	0.287	1.511	0.707	3.23
IUD	-0.958	0.287	11.152	1	0.001	0.384	0.219	0.673
Breastfeeding	-0.242	0.292	0.689	1	0.406	0.785	0.443	1.391
Abstinence	-0.068	0.292	0.054	1	0.816	0.934	0.527	1.657
Constant	1.532	0.327	21.896	1	0	4.626		

Model adequacy: Chi square =12.307, $p < 0.05$

Information on family planning services versus use

The older women were asked if they had full information on family planning services from the health care systems in Botswana. Only 75% of them indicated that they had the information while 18.3% said they hadn't any information and 6.7% did not know of any information. The main

sources of the information on the contraceptive needs were nurses (83.3%), medical doctors (70%), radio and television (53.3%) and the information reached the older women mainly in the form of printed materials (68%), audio-visual materials (49%), informative sessions (36%) and sessions for men and women (32%).

The study then explored how the usage of family planning services is affected by the extent of iinformation on the family planning services or methods using the multivariate binary logistic regression method (Table 6). The results of the analysis shows that full information on condom, IUD, breastfeeding and abstinence jointly predicts contraceptive usage (Chi-square = 2.379; $p > 0.05$) . However, older women who had full information on condom, IUD and breastfeeding (although not individually significant, $p > 0.05$) were respectively 2.9 times, 1.9 times and 1.4 times more likely to use those services than those who did not have the full information.

Table 6: Logistic regression to measure the impact of information of family planning services on usage

Full information on family planning services	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
Condom	1.073	1.368	0.615	1	0.433	2.923	0.2	42.699
IUD	0.618	0.813	0.576	1	0.448	1.854	0.377	9.133
Breastfeeding	0.304	0.73	0.173	1	0.678	1.355	0.324	5.668
Abstinence	-0.198	0.805	0.06	1	0.806	0.821	0.169	3.977
Constant	-0.671	0.408	2.702	1	0.1	0.511		

Model adequacy: Chi-square = 2.379; $p > 0.05$

Demographic variables versus family planning use: Table 7 shows the binary logistic regression to explore how demographic characteristics of the older women affect their use of family planning services. The table shows that although education and marital status do not significantly affect use of family planning ($p > 0.05$), but they are positively correlated with use of contraceptives. Older women who have some education and are married are respectively 2.6 times and 1.1 times, respectively, more likely to use family planning services than those are not educated or never married. Poor menopausal knowledge and being unemployed are negatively correlated with use of contraceptive (Beta values are negative). The older women who have poor knowledge of menopause are almost as likely to use contraceptives as those who have good knowledge of menopause (Exp (B) = 0.9) while the unemployed are less likely to use contraceptives than those employed.

Table 7:Logistic regression to measure the impact of demographic characteristics of older women on usage

Demographic characteristics of older women	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
Unemployed	-0.399	0.567	0.494	1	0.482	0.671	0.221	2.04
Married	0.124	0.587	0.045	1	0.832	1.132	0.359	3.576
Poor knowledge of menopause	-0.057	0.583	0.01	1	0.922	0.944	0.301	2.96
Some education	0.946	0.63	2.255	1	0.133	2.577	0.749	8.862
Constant	-0.503	0.637	0.624	1	0.429	0.604		

Discussion

This study set itself to determine the family planning needs of the older women who have not yet attained menopause, their knowledge, availability and accessibility of contraceptives from the healthcare services. Furthermore, the study sought to determine how the demographic characteristics of the older women, knowledge, availability, adequate information and accessibilityof the contraceptive services impact on the usage of available services. The study revealed that the older women's family planning needs are mainly condom (79%), abstinence (29%), breast feeding (16%) and barrier methods (13%). The concentration on the natural family planning can be viewed from the perspective of the women not having appropriate information or knowledge of the modern methods. The author[32] outlined the primary obstacles to contraceptive use as lack of knowledge (arising from the lack of information) about contraception, its use or its availability; concerns about contraception's health effects; or cultural or familial objections. It was shown by[19] showed that the older women were using mainly the traditional methods before menopause.

Information dissemination about family planning services among the older women was low: about 25% of them had no information about the family planning services that were available in the healthcare systems in Botswana. Information about existing family planning services and their utility including associated risks of using them is very critical to the older women opting for the use of these services. Various media have been outlined for disseminating information concerning family planning services. The analysis shows that the older women got information about their family planning needs mainly through the nurses, medical doctors, radio/television in that order (see[19]). In addition, the results of this analysis indicate that generally older women with information about a particular family planning service were more likely to use the service than those who did not have the information. These findings are supported by[33] , who found out that contraceptive prevalence was nearly 50% among women who recalled hearing or seeing messages in three media (radio, print and television) compared to 14% among those who did not recall any family planning messages. The authors[34] also showed that women exposed to radio messages aboutfamily planning were 1.9 times more likely to be current users. It is pertinent from these findings that a lot need to be done to bring information about available family planning services to the older women. Judging from the age of these women and the possibility that many of them may be incapacitated by poor health, special intervention needs to be put in place to inform them about existing family planning services and the risks of using the methods. Use of leaflets containing information on family planning services and the risks associated with them can be dropped at the homes of these older people.

While acquiring knowledge about fertility control is an important step toward gaining access to contraceptive methods and using a suitable method in a timely and effective manner, the relationship is not always positive. The results of the binary logistic regression analyses showed that while knowledge of condom do not significantly ($p > 0.05$) predict use of the method, those who had knowledge of condom were more likely to use it than those who did not have any knowledge of it. This result is supported by[35] , who showed that although contraceptive knowledge is universal in India, with 96 percent awareness of at least one family planning method, yet usage of methods across the studied sample was less than 50%, showing a gap between knowledge and contraception adoption. Lack of knowledge of family planning was found by[8] to be another important reason for nonuse among women with unmet need.

Availability of family planning services in the healthcare systems implies that the services can be easily acquired both in terms of required number and mix. The study has shown that the most highly rated contraceptives in terms of availability to the older women, namely, condom, IUD, breastfeeding and abstinence, are negatively correlated with use of the services. Condom is the most widely used family planning method in Botswana[36], a method that may prevent sexually transmitted infections (STDs) including HIV/AIDS if used correctly all the time. Condom is available free-of-charge in Botswana. The male condoms were made widely available in bars, gas stations, hotels, markets, pharmacies, private clinics, and salons, toilet ends, Government offices, market places, in the malls and any other strategic locations[16] and information about its use is widely spread. It is worrying that the older women are not utilizing the opportunity. This result point to the fact that there might be other hindrances to its use, namely, spousal disagreement and taboo associated with condom use[19] . Analysis of data from 13 DHS surveys by[21] showed that lack of knowledge, fear of side effects, and husband's disapproval were the principal reasons for nonuse among women who were otherwise motivated to use family planning. A study by[21] using DHS-II data indicated that lack of information about family planning, opposition to family planning,

and ambivalence about future childbearing were the principal factors responsible for unmet need for family planning. The study, therefore, calls for interventions to break these bottlenecks, some of which might be culturally related.

.

Although access to four most perceived accessible family planning services/methods by the older women does not significantly predict family planning usage, access to the natural family planning methods, namely, abstinence and breastfeeding, on the other hand, are positively correlated with usage (beta values are positive). Thus, the direction of relationship between the accessibility of services and their usage is not generally conclusive but depends on the particular service. These results are in agreement with the findings from a World Fertility Survey (WFS) by[37-38] who indicated that level of contraceptive use has a strong positive association with availability and accessibility of family planning services. Rodriguez's analysis[36] showed further that inaccessibility of family planning services were important contributing factors to the very low level of contraceptive use in Nepal. The author[38]found out that that theproportion of current users of family planning services decreases as travel time to reach an outlet increases. The same pattern was found among both rural and urban women. The proportion of current users rises from 16 percent to 33 percent among rural women when travel time decreases from a half-hour or more to less than a half-hour (accessibility increases).

The results of this study can further be explained by the fact that although availability, accessibility, knowledge and information are essential in advancing utility of the contraceptive services, there are other sides of the coin. According to the Health Behavioural Model[39]the likelihood that someone will take action to prevent illness depends upon the individual's (i) evaluation of chances of getting a condition; (ii) evaluation of how serious a condition, its treatment, and its conseuqences would be; (iii) evaluation of how well an advised action will reduce risk or moderate the impact of the condition and (iv) evaluation of how difficult an advised action will be or how much it will cost, both psychologically and otherwise. Thus although condom is available everywhere and can be accessed free-of-charge the elderly women are not seen to be availing themselves of it. Changes in behaviour towards contraceptive use need to be adequately pursued and any intervention to enhance increased use of contraceptive methods should be directed towards behavioural change.

Demographic characteristics are other variables that can affect usage of family planning services. The study has shown that although having some education (primary up to university) and having been in marriage (married, divorced, widowed) are not significant predictors ($p > 0.05$) of family planning use, older women who have some education and have ever been married are more likely to use contraceptives than those who do not have any education and have never been married, respectively. This result however is in line with[40]findings from a multivariate analysis that increased education was significantly associated with the greater likelihood of using method of contraception. Married women were more likely to use contraception than married women who had been in more than one union, unmarried women who had been previously married, and never married women.Employment which is a proxy for income status in this analysis is positively correlated with contraceptive use. This result, however,agree with [40] that self-employed women and employees had much higher predicted probabilities of contraceptive use.Mediating variables (e.g., educational level, employment)are believed to indirectly affect behavior byinfluencing an individual's perceptions of susceptibility, severity, benefits, and barriers in the using contraceptive[41] .

The author feels that emphasis should be on education for awareness creation of the utility, creating knowledge of where to get the FP services and risk involved in using the family planning methods so as to increase uptake of family planning services.

In the light of the study findings and discussions, it is clear that increased information and knowledge of the contraceptive services is key to usage of the services. The study, therefore, recommends increased effort by public healthcare programme planners, policy makers and NGOs to increase information, education and communications (IEC) interventions to boost uptake of family planning services among the older women. Such interventions should be service specific and specifically provide information on all available methods; establish an environment of trust and respect; explain how to use the chosen method, the benefits, and possible side effects; and be able to answer any questions that the older women might have.

It is, however, not very clear from the analysis why the older women are not using the condom despite efforts by public health planners and service providers to ensure availability, accessibility of the services, and to provide information leading to knowledge of condom. Further studies are therefore necessary to understand why the older women, particularly those who are still highly sexually active and can still be pregnant are not using condom, judging

from the high prevalence of HIV/AIDS and STIs in Botswana. A further study is recommendedthat will target only older women (50 years and over) who have not yet attained menopause includingthosewith disabilities such as the mentally ill and intellectual disabled as this group may be especially prone to sexual abuse.

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Original Article

Gestational Age at Booking and Associated Factors Among Pregnant Women in North Central Nigerian.

Jogo AA[1], Hwande ST[2], Shaahu VH[3], Agulebe JC[2] , Belabo AD[3].

[1]Department of Obstetrics & Gynaecology, College of Health Sciences, Benue State University, Makurdi, Nigeria; [2]Department of Obstetrics & Gynaecology, Federal Medical Centre, Makurdi, Nigeria; [3]Department of Community Medicine, Federal Medical Centre, Makurdi, Nigeria.

Correspondence: shimajogo@yahoo.com

Summary

Several studies have shown that despite the known benefits of early booking for antenatal care, many women still choose to register late. The reasons for this behaviour are not yet to be clearly elucidated.This study was designed and conducted to determinethe pattern of booking, its associated factors and reason(s) for late booking. The level of knowledge and the source of information on antenatal care among the women were also determined. A total of 512 (95.9%) 0f 534 pregnant women approached to participate in the study gave their consent and were enroll into the study. The 22(4.1%) women who declined to participate in the study gave reasons of time constraints (77.3%), need husbands approval (13.6%) and no reason (9.1%). 396 (77.3% of the women booked after 14 weeks (late booking) of gestation.Distance to the facility (80.2%), inability to raise the user fee required for antenatal care registration (44.8%) and did not know they were pregnant early (26.7%) were the major reason for booking late. After controlling for possible confounding variables, financial constraints (Odd ratio: 16.5; 95% CI: 5.8-47) and distance of the facility from respondents home (odd ratio: 10.5;95% CI:5.1-21.9) retained independent association with late booking.

Keywords: Gestational age, pregnancy, north central

Introduction

Antenatal care (ANC) is a specialized form of care organized for pregnant women[1]. It helps them to attain and maintain a state of good health throughout the pregnancy and thus improves their chances of having safe delivery of healthy infants[1,2]. It has been shown to reduce maternal and perinatal morbidity and mortality.

Ideally, first trimester antenatal registration is associated with many benefits. These include accurate dating of the pregnancy, early detectionof medical disorders and congenital anomalies that could threaten the pregnancy and its outcome. There is objective assessment of maternal baseline parameters such as weight, blood pressure and urinalysis that may provide a picture of her pre-pregnancy condition[2].

Several studies have shown that despite the known benefits of booking early for antenatal care, many women still choose to book beyond the first trimester of pregnancy [3,4,5]. The reasons for this trend are as varied as the countries from where these studies emanate[6,7,8]. In Nigeria the actual reasons why women book late have not been clearly elucidated. This becomes even more relevant as the MDG year 2015 is round the corner. If these reasons are identified then they would avail governments,policy makers and clinicians of evidence that is needed to build interventions that would guide our women to book earlier in pregnancy.

This study aimed to determine the pattern of booking, its associated factors and reason(s) for late booking in a major referral centre in the north central zone of Nigeria. The level of knowledge

and the source of information on antenatal care were also determined.

Materials and methods

Pregnant women who came for antenatal care registration at the Federal Medical Centre, Makurdi, North-Central Nigeria between August 2010 and March 2011 were invited to participate in the study. Those who gave their consent to participate were interviewed by research assistants using pre tested questionnaire. The research assistants were fluent both in English and the local languages. The questionnaire contain questions on the women's sociodemographic characteristics, pregnancy related information, knowledge and source of information on antenatal care. Women who declined to participate were not interviewed, however were allowed to continue with antenatal registration. Ethical approval for the study was obtained from the Ethical Committee, Federal Medical Centre Markurdi.

The data obtained was analyzed using SPSS version 17.0 software. Data were summarized using mean and standard deviation for continuous variables; and relative frequencies for discrete variables. Associations were tested using χ^2 test and statistical significance was put at p-value <0.05.The participants were categorized into those who booked early (≤14 weeks gestational age) and those who booked late (>14 weeks gestational age).

Results

A total of 534 pregnant women were approached to participate in the study; of which 512 (95.9%) gave their consent to enroll into the study. The 22(4.1%) women who declined to participate in the study gave reasons of time constraints (77.3%), need husbands approval (13.6%) and no reason (9.1%).

The sociodemographic and characteristics of the pregnant women studied is shown in table 1 below. Of the 512 pregnant women recruited 308 (60.2%) were aged 25-34 years with a mean age of 27.3±SD 5.3 years. The youngest and oldest were 15 and 45 years of age respectively. Majority, 485 (94.7%) were Christians with Muslims accounting for 27 (5.3%). While the indigenous women of the Tiv (51.0%), Idoma (20.0%) and Igede (3.0%) ethnic groups were in the majority, women of Hausa, Igbo and Yoruba ethic stock were in the minority (26%). Those that wereunemployed were 212 (41.4%), 122 (23.8%) were civil servants while 108 (21.1%) were traders with only 40 (7.8%) being farmers. Majority of the women 505 (98.6%) were married and only 7 (1.4%) were single, divorced or cohabiting. The respondents showed a high level of educational attainment asmajority completed either a tertiary (41%) or secondary (36%) education. The spouses of the women were mainly civil servants 264 (51.6 %), and traders (25.6%) and artisans.

Table 1: The sociodemographic characteristics of the 512 pregnant women studied.

Socio-demographic characteristic	Number of respondents 512 (%)
Age (years)	
• 15-24	• 147(28.7)
• 25-34	• 308(60.2)
• 35-44	• 56(10.9)
• ≥45	• 1(2.0)
Religion	
• Christian	• 485(94.7)
• Moslem	• 27(5.3)
Ethnic group	
• Tiv	• 260(50.8)
• Idoma	• 102(19.9)
• Igede	• 16(3.1)
• Others	• 134(26.2)

Socio-demographic characteristic	Number of respondents 512 (%)
Occupation	
• Civil servant	• 122(23.8)
• Farmer	• 40(7.8)
• Artisan	• 30(5.9)
• Trader	• 108(21.9)
• Unemployed	• 212(41.4)
Education	
• Primary	• 97(18.9)
• Secondary	• 185(36.1)
• Tertiary	• 208(40.6)
• No Formal Education	• 22(4.3)

The obstetric characteristics of the pregnant women are shown in table 2 below. While 77.3% (396) of the women booked after 14 weeks (late booking), only 22.7% (116) registered before 14 weeks (early booking). Majority of the respondents (91.8%) were of parity < 4 with the grand multipara being 42 (8.2%). The majority (62.5%) of the women have confirmed their pregnancy before presenting in the hospital , either using urine pregnancy test (48.4%), obstetric ultrasound (11.3%) or both (2.7%).

Table 2: Obstetrics characteristics of the 512 pregnant women interviewed.

Obstetric characteristics of the women	Number of respondents n=512(%)
GA at booking (weeks)	
• Early (<14)	• 116(22.7)
• Late (≥14)	• 396(77.3)
Parity	
• ≤ 4	• 470(91.8)
• ≥ 5	• 42(8.2)
No of miscarriages	
• 0	• 334(65.2)
• 2	• 156(30.5)
• 3-4	• 17(3.3)
• ≥ 5	• 5(1.0)
No of children alive	
• 0	• 189(36.9)
• 2	• 221(43.2)
• 3-4	• 73(14.3)
• ≥ 5	• 29(5.7)
Pregnancy confirmed	
• Yes	• 320(62.9%)
• No	• 192(37.5)
Method used to confirm pregnancy	
• Urine pregnancy test	• 248(48.4)
• Obstetric Ultrasound	• 58(11.3)
• Both	• 14(2.7)
• Not confirmed yet	• 192(37.5)

Various reasons were given by the 116(22.7%) women that booked after 14 weeks for booking late. While majority cited distance to the facility as the reason for booking late (80.2%), others their inability to raise the money required for antenatal care early (44.8%) and did not know they were pregnant early (26.7%) as the reason for booking late. Twenty one (18.1%) others gave reasons of "did not know the importance of early registration" and "I booked at another clinic from where I was referred here" as their reason. After controlling for possible confounding variables, financial constraints (Odd ratio: 16.5; 95% CI: 5.8-47) and distance of the facility from respondents home (odd ratio: 10.5;95% CI:5.1-21.9) retained independent association with late booking.

Family and friends were the source of information about antenatal care in majority (74.6%) of the women. The respondents who said that a woman who receives ANC is likely to deliver a live baby were 502 (98.0%). These who said that ANC is likely to teach them how to look after their baby were 508 (99.2%) and those who said that a woman who receives ANC is less likely to die in that pregnancy were 490 (95.7%).

Detailed analysis of possible association between select sociodemographic variables and gestational age booking showed no significant association. Though women who had more than secondary education are likely to book early than their less educated colleagues, the association was found not be statistically significant (p=0.93). Similar findings were noted for parity (p=0.68), occupation (p=0.07), religion (p=1.0) and marital status.

Tables 3: Knowledge and source of information on antenatal care among the respondents.

Variables	Number of respondents n=512(%)
Source of antenatal information	
• Family and friends	• 382(74.6)
• Health care workers	• 76(14.8)
• Colleagues	• 14(2.7)
• Print and electronic Media	• 40(7.8)
Knowledge of ANC	
• Woman who receives ANC is likely to deliver live baby	• 502(98.0)
• Woman who receives ANC is likely to learn how to look after baby	• 508(99.2)
• Woman who receives ANC is less likely to die in that pregnancy	• 490(95.7)

However women who are more than 34 years of age were found to book late compared to their young counterparts (p=0.001). After controlling for possible confounders, maternal age did not retain independent association with gestational age at booking.

Discussion.

The majority of women in this study booked late in pregnancy, with only 116 (23%) of them doing so earlier than 14 weeks. This is similar to findings elsewhere in Enugu, Ibadan, and Sokoto[3,4,6]. The commonest reason proffered was the far distance of the facility from their home. The implication of this is that the women may be forced to make fewer visits to the health centre or they may choose not to come to such a distant facility. A way out may be for government to build more Primary Health Care facilities closer to the women. Such facilities would need to be properly equipped and well staffed to deliver the necessary benefits. This may take some long term planning and allocation of funds for such an intervention to succeed. In the short term, government may further strengthen the current Midwives Service Scheme whereby Midwives in Nigeria are required to spend a mandatory one year working in rural communities[9]. In this way the women may not need to go far to access a Midwife who would avail her with the necessary care in pregnancy. Lack of money to pay the user fees at the facility was another reason they gave. In the early 1990s Harrison had warned about the havoc the World Bank's Structural Adjustment Programme (SAP) would wreak on the health and welfare of people in sub-Saharan Africa. Maternal health, he pointed out, had been hard hit by macroeconomic-driven policies designed to restructure the financial outlook of ailing governments[10]. Mainly through devaluation and cuts in resource allocation, health services have deteriorated. Health resources dwindle and user fees drive people to self-medication, quackery and harmful traditional medicine[11]. Almost two decades later, this prediction has come true for much of sub-Saharan Africa as evidenced in this study. User fees was one of the major reasons for these women failing to book early for antenatal care. They, like the unbooked emergencies who receive no antenatal care lose such benefits of antenatal care as malaria prophylaxis, prevention of hypertensive complications in pregnancy, prevention of anaemia in pregnancy[11], immunization against tetanus, as well as screening for haemoglobinopathies, human immunodeficiency virus and syphilis. Yet another reason for booking late in this study may be the women's source of information about antenatal care. Surprisingly, Family and Friends were the main source of information about antenatal care for 386 (75%) of the women. One would have expected that the Health Care Workers, who ought to be better

informed, would have been the ones to perform this role. On the contrary, only 76 (15%) of the women got this information from Health Care Workers.

A look at their ages showed that 308 (60%) of the women were aged 25-34 years with a mean age of 27.3±SD 5.3 years. Majority of the women 485 (95%) were Christians. Half of them 260 (51%) were from the Tiv ethnic group. Very few of the women 5 (1%) had never married before. It seems the antenatal services in this Centre carter for married women and steps might need to be taken to ensure that all women are attended to without discrimination, irrespective of marital status, as is done elsewhere.

The urine pregnancy test was the commonest method for confirming pregnancy by 256 (75%) of the women. Only 70 (21%) used pelvic ultrasound scan as a method of confirming pregnancy.

Further studies might need to be done to find out why the respondents' high knowledge of the benefits of antenatal care did not translate into their embracing the practice in this study. Cultural practices like having to defer to a male member of the family such as a husband or an uncle did not feature in this study. The level of education was high among the women as 393 (77%) had at least secondary school education, and most of them 470 (92%) were of low parity ≤4. There were strong relationships between levels of education, the woman's occupation, her age as well as parity on one hand and gestational age at booking on the other, but none of these were statistically significant.

Early presentation for ANC gives the health team the opportunity to make early diagnosis and plan treatment that would lead to healthy mothers delivering healthy babies. This study confirmed that as in much of sub-Saharan Africa and the Middle East, women in Makurdi also booked beyond 14 weeks gestation. The study also showed that the twin set-backs to achieving the Millennium Development Goals (MDGs) namely poor access to health facilities as well as user fees are still very much with us.

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Original Article

Maternal Morbidity and Mortality in the South Western Nigeria: the Role of Prayer Houses

Ezechi OC[1], Loto OM[2], Okogbo FO[3] , Ndububa VI[4], Fasubaa OB[2].

Clinical Sciences Division, Nigerian Institute of Medical Research, Lagos, Nigeria, Dept. of Obstetrics &Gynaecology, Obafemi Awolowo University, Ile – Ife, Nigeria, Dept. of Obstetrics &Gynaecology, Irrua specialist Teaching Hospital, Irrua Nigeria , Dept. of Obstetrics &Gynaecology,Imo State University, Owerri, Nigeria.

Correspondence: Dr. Oliver C. Ezechi. Email: Oezechi@yahoo.co.uk

Summary

The study examines the adverse effect of the prayer houses to safe motherhood in South Western Nigeria.The record of all women refered to Obafemi Awolowo University Teaching Hospital Ile - Ife, Nigeria over a 66 month period and Havana Specialists hospital Lagos over a period 60 months from prayer houses were studied to identify their contribution to maternal morbidity and mortality .Ten thousand, four hundred and fifty three women were seen at the centre during the study period. One thousand, two hundred and seventy five of these cases were referred from other hospitals, churches, traditional birth attendants and from other sources. Two hundred and twenty five (17.8%) of the refered cases were from the prayer houses. There were forty three maternal deaths among these women, giving maternal mortality rate of 19111 per 100,000. Twelve (27.9%) women were brought in dead, fifteen (34.9%) died at the emergency room within one hour of presentation and the remain sixteen (37.2%) deaths were among patients admitted in very poor state. The maternal mortality rate among the cases refered from prayer houses were 200 times that of the booked patient delivering at the maternity units. The paper highlights the adverse effect of delivery in inappropriate places such as churches, homes and other birthing centres and their contribution to unbooked obstetric emergencies and concludes with policy formulations that may perhaps make motherhood safer in Nigeria.Unbooked obstetric emergencies are major contributor to the high maternal morbidity and mortality in our environment and referrals from prayer houses constitutes 17.8% of these cases.

Key words: prayer houses, maternal morbidity and mortality

Introduction

Women in developing countries continue to face high risks of death or serious morbidity as a consequence of pregnancy[1, 2, 3]. Various biomedical and socio-cultural factors which are in many ways preventable are known to contribute significantly to maternal death in these countries where the highest rates of maternal mortality in the world have been recorded[2,4,5,6,7,8,9,10,11,12]. Intervention studies to reduce maternal mortality have focus on socio-cultural factors such as the place of delivery, delays in seeking treatment early, cultural barriers, good communication networks, transportation, education of women and reduction of cost of delivery; all of which can make motherhood safer[4, 6, 9, 13, 14]. In developing countries, the place of delivery is a major risk factor to maternal death where less than 40% of deliveries take place in well-staffed hospitals[15, 16]. Most deliveries take place in inappropriate places

such as in prayer houses, home and other places where labour is supervised by poorly trained personnels with all the attending complications[7, 17, 18, 19].

Concerned about the number of pregnant or recently delivered women who were dead or moribund on arrival at the maternity units of Obafemi Awolowo University Teaching Hospital Complex Ile –Ife, Nigeria (OAUTHC) following transfer from prayer houses within and around the city the study was conducted to identify the contribution of prayer houses to safe motherhood in our environment and make appropriate recommendation for policy formulation.

Patients and Methods

This retrospective hospital based study was conducted in three tertiary centers inthe south western Nigerian cities of Lagos, Ile Ife and Ilesha over a 66 months year period. Two of the tertiary center, though located in Osunstate provides referral services for Osun, Ondo, Ekiti states and parts of Oyo, Edo, and Kwara states ofNigeria. While the two facilities in Ile Ife and Ilesha were government owned facilities, the facility in Lagos is a private specialist hospital located in Surulere Lagos. The hospitals received emergencies from both public and private hospitals, including clinics, nursing homes, traditional birth attendants, prayer houses and other self-referrals. All emergency obstetric adprayer houses into the units goes through the labour ward emergency room. The referrals from prayer houses were identified from the case record of the patients. Sociodemographic characteristics, place of antenatal care, source of referral, gestational age at delivery, booking status, diagnosis at presentation, condition of mother on arrival were extracted from the case notes into a data capture pro forma designed for the study. For each patients comparison of distance between her home and the referring prayer houses visa- viz the distance between her home and the hospital were made. Data management was with SPSS for windows version 20.0.

Results

During the study period of study, 12203 mothers were admitted into the three facilities. One thousand four hundred and twenty three (11.7%) of mothers were transferred or referred from other hospitals, clinics, prayer houses houses, TBAs and other sources. Two hundred and forty four (17.1%) of the total referred patients were from prayer houses houses/homes. The age of the prayer houses homes referrals ranged between 17 and 36 years, with majority, 163(66.8%) being between 20 and 29 years old. There were 32(13.1%) mothers who aged 19years or less and 49(20.1%) aged 30 years and above. While Eighty eight (36.1%) of the mothers werein their first pregnancy,ninety nine (40.6%) were having/expecting their 2nd -4thbabies. The remaining women ((23.4%) were grand-multiparae. Thirty two (13.1%) mothers were originally registered in the hospitals, but defaulted, only to be transferred from a prayer houses house because of complications. Majority of the women belong to low socioeconomic class (79.1%) and resides within approximately 10km radius of our facilities (75.4%). The remaining sixty women (24.6%%) resides more than 10kilometres from the hospitals. Comparison of distance between the patients' home and the hospital and patients home and the referring prayer houses/ houses showed that in the majority (69.3%) of cases the admitting hospital was nearer to the patient's homes than the prayer houses home/houses. Of the remaining seventy five (30.7) , our facilities were farther away from the women homes than the prayer houses homes/houses (5.7%) or of comparable distance (25.0%).

While one hundred and twelve (45.9%) women were transferred undelivered, 132 (54.1%) women were transferred after delivery. The time elapsed between the onset of complication at the prayer houses home/house ranged from two to ninety six hours with a mean of 29 hours. .

The diagnosismade at our facility on presentation and associated number of maternal deaths is shown in table 1. Postpartum haemorrhage (25.8%), prolong obstructed labour (16.4%), puerperal sepsis (12.3%), and severe pre-eclampsia/eclampsia (11.5%) were the commonest diagnosis at presentation.

Forty four (18.0 %) maternal deaths were recorded among these women. Twenty seven (11.0%) women were either brought in dead or died within one hour of presentation. Nine (20.5%) of the deaths were patients who though booked and received antenatal care in the facilities but presented at prayer houses home/houses first either for delivery or obstetric services. . Detailed analysis of these nine defaulters showed that they were all planned for an elective caesarean section because of previous caesarean section (4), breech presentation (2), suspected fetal macrosomia (1) and placenta praevia (2).

Table 1: Summary of the diagnosis at presentation and associated maternal death in the study.

Diagnosis at presentation	Number of cases n=244 (%)	Number of maternal deaths associated. n=44 (case fatality rate)
Haemorrhage	97(39.8)	12(12.4)
• Antepartum haemorrhage	• 19(7.8)	• 3(15.8)
• Postpartum haemorrhage	• 63(25.8)	• 6(9.5)
• Ruptured uterus	• 15(6.1)	• 3(20.0)
Prolonged obstructed labour	40(16.4)	0(0.0)
Puerperal sepsis	30(12.3)	2(6.7)
Pre-eclampsia/eclampsia	28(11.5)	1(3.6)
Sickle cell crisis in pregnancy	4(1.6)	1(25.0)
Brought in dead/ Died within	27(11.0)	27(-)
one hour of presentation	28(7.4)	0(0.0)
Fetal complications		
• Retained second twin	• 8(3.3)	• 0(0.0)
• Cord prolapse	• 10(4.1)	• 0(0.0)

Seventy six maternal death were recorded in our facilities during this period; forty four (58.7%) from prayer houses houses, twenty three (30.7%) from referrals from other health facilities, TBAs and homes and nine (12.0%) occurred among patients who booked and delivered in our facility.

The maternal mortality rate among the patients referred from the prayer houses (19555 per 100,000) was 195 times that of the patients that booked, received antenatal care and delivered in our maternity units (130 per 100,000). Discussion

The overall goal of maternal health and safe motherhood programme is to reduce the number of maternal morbidity and mortality arising from pregnancy. This is yet to be achieved in many developing countries with very high maternal mortality rates even though in many places[7], fairly adequate services exist to save mothers' lives but many of the women are not availing themselves of these services[4, 11, 12,13,17,18]. This underutilizing or failure to utilise these facilities is demonstrated in this study where 1423 (11.7%) of the patients with significant problems in pregnancy, labour and puerperium were transferred to our center from prayer houses, traditional birth attendants, private clinics and peripheral health centres where inadequate infrastructure exist to provide satisfactory maternity care services. The contribution from the prayer houses of 244 (17.1%) patients to the total referral during the period of study is considerable. This further confirms the unpalatable activities of some evangelistic protestant churches in maternity care and their adverse contribution to unbooked emergencies[7, 9, 10, 17].

The sociodemographic findings of the 244 women are similar to the findings of previous study on maternal morbidity and mortality in our environment [4,7,17,18,20,21]. The socioeconomic status and the place of abode of the women are very important findings in this respect. Majority of the women were of low socioeconomic class with low level of education and hence low monthly earnings. One hundred and eighty four (75.4%) women lived approximately within 10 kilometer radius of our facilities and could easily reach the hospital within a few minutes but still prefer delivery in prayer houses. It is quite surprising that despite nearness of the hospital to their home in comparison to the prayer houses, these women prefer to deliver in this prayer houses. This finding is in agreement with the findings of Onwudiegwu et al [6] that distance is not a determining factor in seeking health care in our environment as reported by previous author[1, 4,9,17]. He reported that distance to the hospital could not be considered a genuine inhibitory factor to service use, since a large percentage of the women lived close to the hospital[6]. He therefore attributed their action to attitudinal

factors of fear of operation, dissuasive advice, opposing religious views and a complex social behaviour based on wrong attitude, wrong perception, ignorance and misconceptions. The finding of only 5.7 % of the women's residence being closer to the prayer houses than the hospital attests to this.

From the observations on the medical conditions that brought these patients to the hospital, the causes of death and state of patients on arrival at the hospital, this study showed convincingly that prayer houses homes/houses contributed significantly to maternal morbidity and mortality data in our hospital. Of the seventy six maternal deaths recorded in the hospitals during the period of study; 44(57.8%) came from prayer houses home/ houses despite the fact that referral from these prayer houses accounted for only 2.1% of total maternity patients during the period. It also accounted for 64.9% of the total maternal death among referred patients. The maternal mortality rate among this category of referred patients was about 200 times that of the patients that booked, received antenatal care and delivered in our unit. Detailed analysis of the maternal deaths among the prayer houses' referrals showed that nineteen were brought in dead , fifteen died within one hour of presentation at the emergency room and the remain nine were among the patients that presented very late and in very poor conditions. This scenario is very pathetic and of great concern as almost all the deaths were preventable if delays had not occurred at the referral praying houses. This study further confirms previous view that prayer houses are inappropriate place for women to deliver as their use delays entry into an appropriate health care delivery system [2, 4, 6, 7, 9,11,12,13,15,17,18]. It is obvious from this study that maternal mortality in our hospital could be reduced by at least 57 % if inappropriate prayer houses' deliveries are avoided. However to achieve such a huge reduction in maternal mortality in our environment, factors like religion, socio-cultural, economic and previous delivery experiences in the prayer houses which plays an important role in women deciding the place of birth[9, 10, 17, 18], must be addressed. In Nigeria today harsh living socio-economic conditions and poverty tend to be a strong determining factor in making women to decide the place of birth[4, 7, 11, 12, 17,19,22,23]. Deterioration in the national economy from the devaluation of currency and its sequalae has made women to avoid hospital delivery because of its perceived high cost; opting to deliver in cheaper but dangerous places [4, 8, 11, 17,19,22,23]. Frequent industrial unrest as a result of poor remuneration of health care workers and the resultant poor service delivery lives these women with no option since majority of them could not avoid the high cost of service in the privately run institution were the exist.

Deaths resulting from these cheap places such as prayer houses could be prevented or drastically reduced with appropriate government policies. It is recommended that government improves the current level of poverty by improving the standard of living of her populace, and provide affordable, accessible and adequate, well staffed and well equipped maternity services both in urban and rural areas. Legislation should be made against delivery in inappropriate places. Prayer houses should face its traditional role of prayer and evangelization. If deliveries have to take place in prayer houses, birth attendants in these places need to be trained; appropriately licensed to perform such functions and supervised by the department of health in the local government where such prayer houses are located. Moreover strong systems of referral from these places to our hospitals need to be developed coupled with information, education and communication program to increase community awareness about the dangers of these prayer houses.

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Original Article

Improvement of Quality of Home Based Care and Wellbeing of Care Givers Using STOC Model in a HIV Treatment Centre in Lagos.

Amusan-Ikpa SK, Idigbe IE, Musa Z

HIV treatment Centre, Nigerian Institute of Medical Research, Lagos, Nigeria.

Correspondence:sueamusan@yahoo.com

Summary

Home Based Care (HBC) services serve as a bridge between the facility and the home in HIV programs. The care givers provide care and support from diagnosis to end of life care to people living with HIV/ AIDS. However providing care for HIV positive clients by HIV positive volunteer HB Caregivers is both stressful and distressing. This study evaluated the challenges faced by HIV positive volunteer HBC caregivers providing home based care at the HIV treatment centre, Nigerian Institute of Medical Research Lagos. The study utilized direct interactions and observation of thirty five consenting HIV positive volunteer home based caregivers over a two year period. The evaluation was guided by the See-Try-Observe-Continue (STOC) model. Stress/Fatigue was the most common challenge (62.9%) faced by caregivers. Sexual harassment (34.3%) and recurrent ill health (49.0%) were the other challenges reported. Using the stock model we implemented strategies of increasing number of volunteers and pairing of female volunteers. Socializing with other PLWHA/care givers and counselling were found to be the major coping strategies among volunteer care givers.

Keywords: Home based care, caregivers, coping, sexual harassment

Introduction

With the advent of antiretroviral therapy, people diagnosed with Human Immunodeficiency virus infection (HIV/AIDs) can and do live healthier lives. This notwithstanding people living with HIV/AIDS experience a range of HIV related symptoms along with other social and psychological issues that often require care and support[1] .This need for care often times stems from the lack of finance to access care in hospitals, over-stretched in-patient facilities, absence of relatives to care for sick client and the fear of stigma and discrimination from both health care workers, other clients and their families .Such patients usually fall back on the experienced hands of volunteer Home Based Care care - givers who nurse them with local remedies and foods. Home Based Care (HBC) fills these gaps in HIV programs and serves as a continuum of care extended from the health facility to the home.

Providing care and tracking can be very demanding and exhausting on volunteers. It also means they are frequently faced with reports of deaths of clients they are caring for or may have cared for in the past. This could result in either physical and/or psychological stress. Volunteers are also known to experience symptoms of burn out which may be physical as well as behavioural and like the patients they care for, may display symptoms of stages of grief. The continuous process of their duties means the volunteers do not have time to walk through their emotions. Over time, these repressed emotions can result in cynicism and decreased ability to invest emotionally in patients. This hardens the volunteers and consequently expresses less sensitivity and sympathy for the needs of the next patient[2].

While several report elsewhere have address the challenges faced by HBC care givers and strategies to effectively manage them, no study in our environment have evaluated these. This study was carried out to determine the challenges faced by HBC caregivers in our programme as well as

devise strategies to effectively manage challenges faced by volunteer HBC givers.

Patients and Methods

The HIV treatment Centre at the Nigerian Institute of Medical Research Lagos operates a HBC unit. The unit uses volunteer from the Positive Live Organisation of Nigeria- a support group of people living with HIV/AIDS. On recruitment they are training on palliative and Home based care. These volunteers are relied upon for their professional knowledge and personal experiences as persons living with HIV/AIDS to provide care in the absence of family members and friends of the sick PLWHA. They also provide part time care to ease the burden of relatives in caring for the client. Apart from providing care and psychosocial support to clients, volunteers also have to track clients who have defaulted on appointments for more than three months, if they are on ARV or six months if they are only on care. The process of tracking requires volunteers to visit the homes or available addresses of the clients/treatment partners to find out why they have defaulted. Usually, initial attempts are made to contact defaulters via phone contacts provided, when this fails then the need for address tracking.

The study conducted over a period of 24 months (January 2010 –December 2011) used a mixed methodology of qualitative and quantitative designs. It involved direct interactions and observation of the thirty five consenting HIV positive volunteer caregivers in the unit while performing their routine HBC tasks. In addition it was guided by the See-Try- Observe-Continue (STOC) model used by AIDS Relief and adopted from the Institute for Health Improvement's Plan-Study-Act Cycle[3].

The study was conducted in two phases. In the first phase (Jan – Dec 2010) . The volunteers report the services rendered to clients and their families on visit forms issued to all volunteer care givers. Their experiences and reports of other challenges were recorded in the visit book. In the second phase (Jan –Dec 2011) the care givers were trained on how to manage the challenges as well as pairing the female caregivers whenever they have to visits male clients. In addition they reported the services rendered and challenges faced. Excluded from the study were counselor's volunteers from other sites and those with CD4 less than 350cells/mm3.

Results

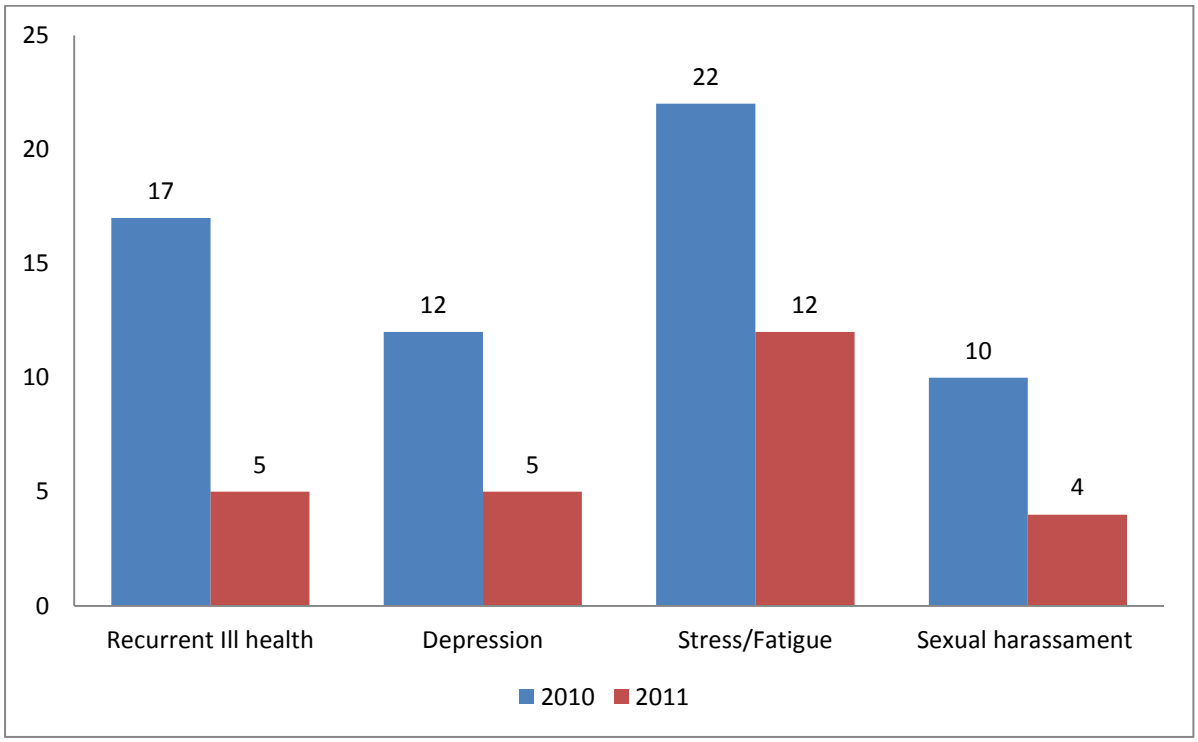
The sociodemographic characteristics of the respondents are shown in table 1 below. The mean age of the volunteers was 41.4 years with a range of 26 – 58 years. Majority (74.3%) of them were within the age group 31 – 49. Major were either married (31.4%), widowed (31.4%) or completed a secondary education (65.7%) .

Table 1: Socio-demographic characteristics of the Volunteer HBC care givers.

Characteristics	No of respondents (%)
Age (Years)	
• <20	• 0(0.0)
• 20-29	• 2(5.7)
• 30-39	• 12(34.3)
• 40-49	• 14(40.0)
• 50 and above	• 1(20.0)
Sex	
• Male	• 5(14.3)
• Female	• 30(85.7)
Marital Status	
• Single	• 8(22.9)
• Married	• 11(31.4)
• Widow	• 11(31.4)
• Separated/Divorced	• 5(14.3)
Educational status	
• Primary	• 2(5.7)
• Secondary	• 23(65.7)
• Tertiary	• 10(28.6)
Religion	
• Christianity	• 32(91.4)
• Islam	• 3(8.6)
Employment status	
• Employed	• 9(26.0)
• Unemployed	• 26(74.0)

Figure 1 showed the challenges experienced by the 35 volunteer care givers before and after the introduction of the stock model. Though the challenges reported by care givers were same before and after the introduction of the stock model, the intensity significantly reduced after the training. Compared to pre training challenges, the number of volunteers reporting stress and recurrent ill health dropped from 22(65.9%) and 17(48.6%) respectively to 12 (34.3%) and 5(14.3%). The difference in the two reported challenges were statistically significant at p = 0.03 and 0.01 respectively. The incidence of sexual harassment and depression also reduced, however the difference were not statistically significant. Sexual harassment reduced from 28.6% in 2010 to 11.4% at the end of 2011 (p= 0.14) and depression from 34.3% to 14.3% at the end of the study.

Figure1: the reported challenges before and after the introduction of the STOCK model)



Discussion

The introduction of STOC model to address the challenges reported by the care givers in the study resulted in in a 58% drop in cases of depression among volunteers. The finding in this study is similar to other studies that used STOC model to address challenges of HBC reported by care givers[4,5,6]. The major cause of depression among volunteers was reflecting over their own death or end of life as a result of HIV. In the Zambian study, Counselors were worried about their HIV status as they encountered partners who may have risky behaviours similar to theirs. This finding indicates a need for continuous counselling volunteer HBC givers. In 2010 there was a recorded 62.8% rate in fatigue reported by volunteer which is similar to the 62% who reported emotional exhaustion a study from Zambia[7]. This figure however dropped by 45.5% when STOC model was introduced. The strategy employed to help burn out as a result of stress was the quarterly get together which provides a relax atmosphere for the volunteers to socialize, express their feelings and discuss the gains of their work and how best to respond to difficult situations[8]. These informed gatherings and discussions are helpful because they can occur directly after a stressful experience. It helps in reducing burnout among the volunteers. The care givers are relaxed and energized to face the months ahead . Primo prescribed a similar strategy by pointing out that through talking, sharing feelings with other caregivers as they have the same work demands, can help them to cope better with feelings such as isolation, anger, sadness or grief[9].

It was observed that none of the male volunteers experienced any form of harassment. Female volunteers felt safer when visiting with male volunteers. This was however not always possible due to the ratio of male to female volunteers on the team (approximately 1:7). Increasing the number of male care givers may go a long way in reducing further sexual harassment among the female care givers when they are paired with their male colleagues.

In conclusion, STOC model was found useful in improving the quality of home based care and challenges faced by care givers in this study. We therefore recommend its adoption by other institution providing HBC not only for quality improvement but also for the welfare of the care givers.

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Original Article

Sexual Violence and HIV/STIs in Girls and Young Women: Trends and Association in South Western, Nigeria

Otuonye NM[1], Onwuatuelo IR[2], Onwuamah CK[3], Okwuzu JO[4], Adeneye AK[4], Oparaugo CT[5], Adesesan AA[4], Akintunde GB[6], Ohiku FO[3], Uwandu M[3] ,Fowora MA[7], and Otuonye EI [8]

[1]Central Laboratory Unit, [2]Clinical Sciences Division, [3]Human Virology Unit, [4]Public Health Division, [5]Clinical Diagnostic Laboratory, [6]Microbiology Division, [7]Molecular Biology and Biotechnology Division,Nigerian Institute of Medical Research, 6 Edmond Crescent Yaba, Lagos Nigeria, [2]AIDS Preventive Initiative Abuja, Nigeria No. 10 Ndagi Mamudu Close, Jabi Street Abuja, [8]Evergreen Chambers S/L.4th Floor, 2, Martins Street, Off Ojuelegba Road, Surulere, Lagos, Lagos State Nigeria

Correspondence: Email-mnotuonye@yahoo.com

Summary

Sexual violence put girls and young women at risk of long- lasting consequences in their reproductive health. The study focused on the trend of sexual violence and its' association with STIs/HIV amongst girls and young women in Western, Nigeria.Data was obtained from in and out school girls and young women aged ≤10 to 28 years, using a cross sectional study design. 400 respondents were randomly selected and individually interviewed using a structured administered questionnaire which examined demographics, types of sexual violence, cases reported to authorities and infections with STIs/HIV. These were collated and analyzed using EPI INFO 2002. Out of 400 respondents, sexually violence cases were reported from 389 (97.4%) respondents out of which rape and Incest accounted for 33.0% and 14.0% (47%) respectively.Out of these 47% respondents, 30.42% of them reported being infected with HIV and other STIs. HIV/STIs among those who had incest and were raped were significantly associated with sexual violence ($p<0.005$). Other sexual practices were significantly associated with sexual violence ($p<0.05$). Fathers and neighbours were the most prevalent perpetrators of sexual violence ($p<0.05$) in girls and young women.The study indicated a significant trend in sexual violence over time. Sexual violence within age bracket ≤10 is on the increase while ages ≥26 are on the decline. The study also suggests that sexual violence is one of the factors that increase the acquisition of HIV/STIs in girls and young women. Regular surveys would help in developing new strategies for control and prevention of sexual violence in girls and young women in Lagos Nigeria.

Key words: Sexual violence,Girls, young women, HIV/STIs, Nigeria.

Introduction

Sexual violence is a cruel and violent sexual act by a person who is perceived to hold power over another[1]. Since it is an exploitation of power, young women, girls and children are especially at risk and the violations can have long-term consequences on their sexual developmentand reproductive health.

Sexual violence which is forced or coercive includes: rape within marriage or dates, incest, sexual assault, sexual molestation, sexual harassment, accomplished prostitution, and forced early marriage. Denial of rights to use contraceptives for protection against HIV/STIs and pregnancy, forced abortion, female genital mutilation, childhood sexual abuse and trafficking are other forms of sexual violence. However, it can

occur at home, school, work place, isolated places, cars, or public places[2].

Sexual violence is wide spread in all societies. Current estimates indicate that between 8% and 70% of women worldwide have been physically or sexually assaulted by a male partner at least once in their lives[3]. In the United States, one third to one fifth of all women has been physically assaulted by a partner or ex-partner during their lifetime[4].

Rape is one of the most under-reported crimes in South Africa. It is estimated that one million cases occur every year and one out of every 35 rapes is reported[5]. In a recent survey that includes questions about experience of rape before the age of 15 found that school teachers were responsible for 32% of the undisclosed adolescent rapes[5]. Another study conducted in junior secondary schools in Zimbabwe, Malawi and Ghana, teachers were generally unwilling to report each other's sexual misconduct, and sexual abuse of girls by teachers, older male pupils, and sugar daddies is largely accepted[6].

The commission on the review of higher education in Nigeria (CRHEN) suggests that the phenomenon of sex abuse is gradually assuming a critical dimension. Students identified sexual harassment as being among the stressors hindering academic work in the universities. Lecturers and teachers in higher Institutions of learning as well as secondary schools give girls low or poor grade, if they resist their advances[7].

There are serious obstacles to reporting and prosecution of rape in Nigeria especially if it has to do with police and security agents or men who are highly connected[8]. Also, in Nigeria and other developing countries, rape is used by the police and security agents as a means of torture to extract confession from suspects in custody. Their victims face humiliation and intimidation while the investigations are hampered by corruption and incompetence[8]. Whether abused by police, security forces, relatives or unknown persons in their homes and community, there are enormous difficulties faced by victims of sex abuse.Women and girls rarely seek prosecution for fear of intimidation by the police and rejection by their families and community. Only estimated 10% of cases are ever being successfully prosecuted in Nigeria[8].

Perpetrators of sex abuse can be family members, boyfriends, lecturers/teachers, community leaders, neighbours, uniformed men, religious leaders and strangers.

Non-consensual sex has been identified to be a major contributing factor to reproductive health problems such as unwanted pregnancy and its complications, HIV/AIDS and other sexually transmitted infections (STIs) that can cause cervical cancer, infertility, physical injury and trauma[9]are also identified. Transmission of these infections and reproductive health problemshave persisted in spite of the use of STI/HIV prevention approaches such as sexual abstinence, faithfulness in relationships, and condom use as long as non consensual sex remains wide spread[9]. What then will be the faith of girls and young women who are faced with coaxed sexual violence? A number of studies have attempted to investigate sexual violence in women. However, the association of sexual violence and HIV/STIs is yet to be reported in Lagos Nigeria. The primary objective of the study is to determine the relationship between sexual violence and HIV/AIDS in young women in southwestern Nigeria.

Methods

Study site and population: A cross sectional survey was conducted among in and out of school girls and young women in South Western part of Nigeria. The age range of respondents was ≤10 – 28 years with a mean age of 18.9.

Data collection procedure: A total of 400 girls and young women who consented to participate in the study were interviewed. Participants were randomlyselected form Universities of Lagos, Ibadan and Ogun State, some secondary schools (private and public), and some selected house-holds. Interviews were conducted in private rooms and offices by women due to the sensitive nature of the research. Information surrounding the under aged was shrouded in a lot of secrecy however, mothers and guardians of these children were able to supply the information needed. Data was collected from structured interviewer administered questionnaires conducted in English. The questionnaire covered socio-demographics, knowledge of STIs/HIV, knowledge and experience of sex abuse, and prostitution. Other information that was sought included: number of cases reported to the authorities, number of cases withdrawn and why the cases were withdrawn. In addition, information on infections with STIs/HIV and pregnancies, who was responsible for the sex abuse, other sexual practices, knowledge and use of condom, and sexual debut were collated and analyzed. The study period was from 2007 to 2009.

Data analysis: This was done using EPI INFO 2002 (CDC, USA). Data was collated, entered and analyzed. Correlation of individual's variables

with sex abuse status was performed. Fisher's exact tests were used to calculate statisticalsignificances at 95% confidence intervals (CIs).Level of statistical significance for all analyses was set at $p< 0.05$.

Results

Social background of respondents: The age of the respondents ranged from ≤10 to 28 years with a mean age of 18.5. The marital status showed that 43 (10.8%) were married, 352 (88.7%) were single, 3 (0.5%) were widowed. Of the four hundred respondents, 310 (78.7%) were Christians, 82 (20.8%) were Moslems, traditional and others were 2 (0.6%) while, 6(1.5%) did not indicate their religious status. The educational backgrounds of the respondents were: Tertiary 193 (48.5%), Secondary (43.5%), Primary 30 (7.5%) and non 4 (1.0%). Sources of knowledge of sex abuse include friends (14%), magazine (31%), mass media, (46.4%) and school (8.5%).

Age Distribution and Sexual Violence Analysis of the age of the respondent by frequency of reported violence showed sexual violence was commoner in age groups 16-20 years (32%) and 21-25 years(33%) compared to age groups less than 11(13%), 11-15(15%) and greater 7%.

Prevalence and types of Sexual Violence: Of 400 respondents, (97.4%) respondents had a history of sexual violence. Rape (33.0%;132) and assault (2.3%; 89) were the most common form of sexual violence reported. Other forms of violence reported are molestation (13.3%), incest (14.0%), sexual harassment (12.0%) and Forced marriage (2.8%).

Sexual Violence and HIV/STIs infections: For this analysis only rape and incest were considered. While 15(11.4%) of the 132 respondents who reported rape were reported to be HIV infected, others reported past Trachoma vaginalis (9.1%), Candida (7.6%), Gonorrhoea (3.8%) and Syphilitic (3.8%) infections . Among the respondents that reported incest, 5(3.8%) reported infectionCandida, 3(2.3%) Gonorrhoea, 3(2.3%) Trachoma vaginalis, 2(1.5%) HIV and 1(0.8%) syphilis. Thirty eight (9.5%) do not know whether they had any infections while 36 (9.0%) refused to reveal the problems they had after being sexually violated.

Knowledge Sexual Violence, HIV, Education and Sexual Violence: About 47.6% (168/353) of those knowledgeable about sexual violence had been abused as against 83.3% (30/36) of those lacking such knowledge being abused (p=0.0000).

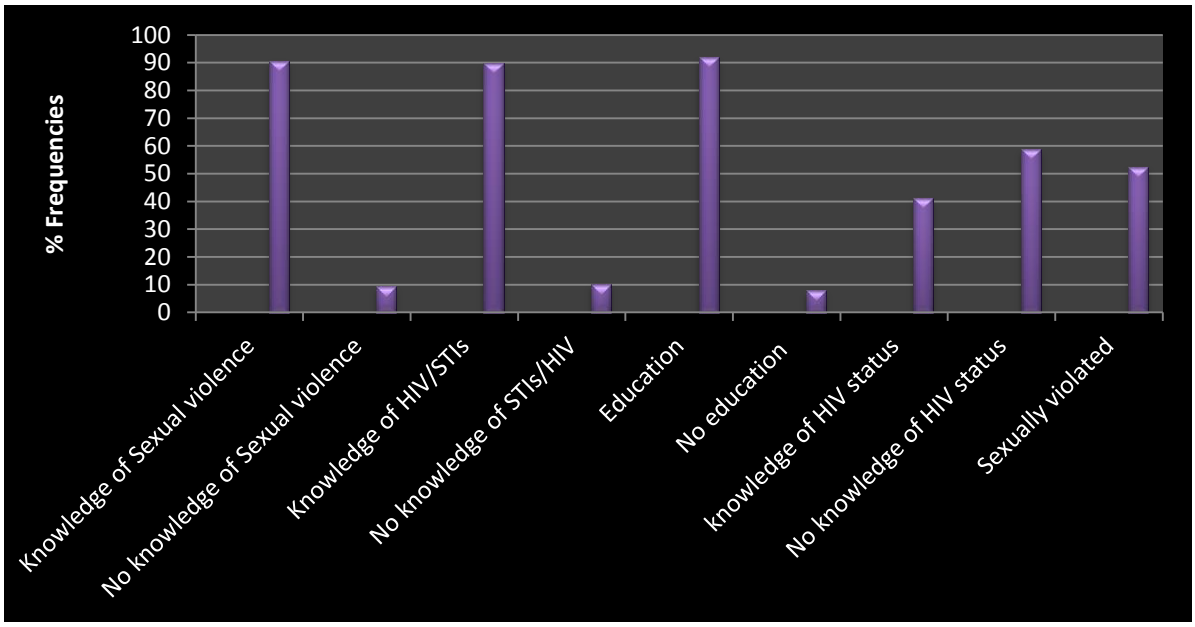

Fig 1. Respondents' knowledge of Sexual Violence, HIV/STIs, HIV status, level of Education and experience of Sexual Violence

Sexual Practices and HIV/STIs: Oral (42.0%;97) and anal (37.7%;87) sex were the most common other sexual practices engaged by the respondents. Others engaged in lesbianism (20.3%;47) and prostitution (14.0%;56).Among the respondents that reported other sexual practices, 10 (2.5%) reported HIV and N Gonorrhoea positive status, while 9(2.3%), 6(1.5%) and 4(1.0%) reported being infected with Trichomonas, Syphilis and Candida infection. These sexual practices were found to be significantly associated with sexual violence amongst the respondents who were sexually violated (p=0.05)

Perpetrators' of Sexual Violence and Report to authorities: Perpetrators of sex violence in this study were the Fathers (31.0%), Neighbours (15.0%), Teachers (21.0%) and male relatives (13.0%), boyfriends (8.0%), Imam/clergymen (4.0) and unknown persons (4.0%). Seventy six respondents (41.1%) got their families to report their rape cases to the police after which the matter were charged to the court, while some have received judgments, others are still on-going. However, due to stigmatization, 109 (58.9%) did not let either their families or the authorities know they were sexually abused. However, 10 (13.0%) out those who reported (41.1%) withdrew their cases due to the attitude of the police and other court officials.

Knowledge and use of condom and sex debut: Of the 400 respondents, 332 (83.0%) have knowledge of condom, 56 (14.0%) do not and 12 (3.0%) did not indicate. One hundred and fifty four (38.5%) use condom regularly, 94 (23.5%) do not. Thirty six (9.5%) use safe period while 87 (21.75%) were virgins. Two hundred and sixty seven (66.75%) have had sex before the age of 15.

Partner/parent characteristics elevate violence risks in respondents

Of the 47% who have been sexually violated, 10.2% of the respondents have been raped more than three times by their partners. About 2% revealed that the sexual violence is still on-going. Of the 22.3 % of the respondents that reported being assaulted,5% reported to have been assaulted more than 3 times, 2.4% is still on-going. 13.3% were molested more than 3 times. About 5% of the respondents are still being forced by their parents into early marriage.A neighbours' nephew on holiday sexually violated 3 girls of same parents in one day. Their ages were 5, 7 and 9 years. Twenty nine, (7.25%) of respondents got pregnant after rape. This study did not cover physical injury inflicted on the respondents by violators. Subsequent study will cover that area. All the respondents reported going into emotional depression and some took as long as six months to recover.

Religion, marital status and Sexual Violence: Comparatively, 46.4% (141/304) of Christians have been abused while 68.4% (54/79) of Muslim also have been abused (p=0.0029).Also, 54.8% (23/42) of married respondents have been abusedwhile 50.9% (175/344) of single people have been abused (p=0.3132)

Discussion

This study gives an overview of sexual violence on girls and young women in South Western Nigeria. Results from this study shows that sexual violence is high (97.4%) ($p < 0.0000$) among the population studied. This result is higher than WHO 2002 estimation. Comparing with WHO estimate in (2002), the overall prevalence was 25% for girls and 8% for boys[10], although these figures differ with population studied, study location and definition used. However, it is consistent with the study done by Okonkwo *et al* (2006) on female sexual assault in Nigeria. Their study showed that out of 1260, 533 admitted to attempted or actual rape giving a rate of 4 out of every 10

Sexual violence was high within the age bracket, 16 to 25 years with incidence rate of 31.3% to 32.3% respectively (fig1). Ages ≤ 10 to 15 years were identified to be more at risk and on the increase. The trend shows that age bracket ≤ 10 were on the increase while ages ≥ 26 are on the decline on sexual violence in girls and young women in South Western Nigeria. This result is consistent with WHO findings which showed that sexual abuse of children and young adolescents is widespread in all societies [10].

Rape (33.0%) and sexual assault (22.3%) were the most common form of sexual violence identified in this study while incest (14.0 %) is on the increase (fig 2). About 30.42% of 47% ({33%} rape and {14} incest) of the respondents reported were infected with HIV and other sexually transmitted infections. A significant association was found between sexual violence and HIV/STIs (CI 95%, $p < 0.0000$) (fig3). Seventeen respondents reported being infected with HIV {15from rape and 2 from incest}. However, 9.5%of the respondents did not know whether they had pre- existing infections before they were raped. HIV (8.0%) was more prevalent among the respondents involved in other sexual practices. Coercive intercourse has been suggested to be one important factor that is

increasing the acquisition of HIV in women. This is because violent sexual intercourse can cause abrasion and facilitates the entry of HIV through vaginal mucosa[11]. The perpetrators do not give their victims room to negotiate safer sex practice[12]. Therefore, wide spread of forced sex means that common STI/HIV prevention approaches emphasizing the use of condom or abstinence or faithfulness cannot protect all people from HIV and other Sexually Transmitted infections [13,14.]

From the study also, a good number of the respondents were practicing oral and anal sex, while some were lesbians and prostitutes. A previous study showed that physical and sexual abuse during childhood has also been associated with high-risk sexual behaviour in adolescence and adulthood[15]. However, this study did not capture whether these practices started before or after experience of sexual violence. Other sexual practices were significantly associated with sexual violenceamong the respondents who were sexually violated (p=0.05)

Young women who had no education (illiterates) and basic primary education were more sexually violated (P >0.05) compared with those who had secondary and tertiary education (P <0.05). This is suggesting that education, information/ knowledge could play a key role in preventing girls and young women from being sexually abused.

In this study also, fathers seemed to have more incidence rate (31%) as perpetrators of female sex abuse followed by neighbours (15.0%).Similarly, Prettitfor *et al*, in their study identified father or other male relatives as the most common perpetrators of sexual violence. Child care givers and neighbours, were also identified to be perpetrators of sexual violence on children between the age ≤ 10 and 11 – 15 years.

In the reporting of sexual violence to authorities, 13% of the respondents out of 47%who reported withdrew their cases from the authorities. Their reasons were that perpetrators bribe the authorities who in turn humiliate, intimidate and pay them less attention so they withdraw. Others who did not report want to protect family names, avoid stigmatization and hindrances from getting married. All these fears make them resign into silence. This finding agrees with WHO report (2011) on HIV and violence. Their report shows that the variation in estimated prevalence is because of under-reported cases due to shame, stigma, social and other cultural factors that prevent women from reporting sexual violence.

Conclusion: The study also revealed that sexual violence is a public health problem, common in all cultures, religion and affects any one irrespective of one's marital status. It also showed that sexual violence is rife though unreported cases in Nigeria. It is therefore imperative that parents and others stakeholders need to see this as a collective responsibility in ensuring that cases are reported , offenders exposed and prosecuted accordingly.

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Invited Article

The role of Budgeting and Finance Towards Moving Health Research to Policy

Olagundoye SR

Division of Finance and Accounts, Nigerian Institute of Medical Research Lagos Nigeria

Correspondence: sholagundoye@yahoo.co.uk

Summary

The traditional approach of budgeting, where past spending were being used as basis for the following year failed because some none-value-added activities continued to receive yearly allocation; while those that would assist to grow the economy, such as Research works, were neglected. Government is now using some modification of Zero based budgeting; where contending demands are prioritized based on political Agenda of existing administration.

At the political level, there are competing and even opposing demands of various political forces that will make national budget to fly.

Therefore, there is strong need, now to put in place necessary instrument to push the political wheel forward by sensitizing the appropriate committees on health at National Assembly, to see need for placing bill for a reasonable percentage of national budget, for research into National Health problems; while intensifying efforts to look for and sustaining other sources of funding through appropriate and effective Research grant proposals.

Keywords: Budget, finance, health research,

Introduction

Annual budget is meant to continue to expand the scope of wealth creation, generation of employment, building and sustaining infrastructure that help drive the economy as a whole and ultimately increase the (GDP) Gross Domestic Product of the nation. Anything short of this is an exercise in futility and deception of the people. One of the major problems we have encountered until a few years ago, was to rely on the traditional approach of budgeting; where past year's expenditure were being used as basis of allocation for the following years. This approach failed. Gradually it was discovered that the budgeting approach was short of meeting government expectations.

Nigerian Government is now using some modification of zero based budgeting; where contending demands are prioritized based on political agenda of existing administration; as we are now working, for instance, to achieve the transformation agenda of Mr. President, which includes the (MDG) Millennium Development Goals.

In April 2001, heads of state of African Union Countries met and pledged to set a target of allocating at least 15% of their annual budget to improve the health sector. At the same time, they urged donor countries to fulfill the yet to be met target of 0.7% of their GNP as Official Development Assistance to developing countries. It is unfortunate to note that about 10 years after, in 2011, WHO reported that only Rwanda and South Africa were able to achieve the Abuja Declaration target of "at least 15%"[1].

In 2012, Federal Ministry of Health got N284.97 billion (6.06%), as envelope, out of N4.7 trillion (1.295%) budgets for the country. The Federal Government allocated N60.9 billion for the Ministry of Health's capital, out of the National Budget. The two Research Institutions got N339.4 million for capital programmes. Direct Research works therefore got 0.55% out of the 2012 Federal Ministry of Health capital budget.

Table 1 below shows the trend in annual budget for research under the Federal Ministry of Health. These were direct research allocations for the two main research institutions under the Federal Ministry of Health.

Table 1: Financial Allocation to Research Institutes under the Federal Ministry of Health, Nigeria (2007 – 2012).[2]

Institution	Years					
	2007	**2008**	**2009**	**2010**	**2011**	**2012**
NIMR	300	223	50	29.9	195.5	85.1
NIPRD	450	535	100	113.3	163.6	254.4
Total	**750**	**758**	**150**	**143.2**	**359.1**	**339.4**

NIMR: Nigerian Institute of Medical Research Yaba

NIPRD: National Institute for Pharmaceutical Research and Development, Abuja

Many factors go into budgeting includes but not limited to rigorous analysis, forecasting, foresight and predictability of revenue sources. At the political level, there are competing and even opposing demands of various political forces that give National budget its political flavor.

Now is the right time to put in place necessary statutory instrument to Finance Health Research work, if we really mean the popular saying "a healthy Nation is a wealthy Nation". There is need to push the political wheel forward by sensitizing the appropriate committees on Health of national Assembly to see the need for pushing bill for a reasonable percentage of national budget for research into national health problems and challenges.

The timely release and wider circulation of medical Journals is more important now than ever; where research work can be disseminated for the users of this knowledge based effort. Seminars, conferences and collaboration among health Research workers are imperative, within the country and beyond the border.

The Monitoring and Evaluation Units must be strengthened, to ensure and convince financiers – government and other funders; that funds will be appropriately utilized and also target settings are achievable.

A strong committee comprising of well experienced Research Scientists that can steer and give direction to appropriate and achievable Research programs that will address National health problems.

Establishment and sustenance of annual forum of Chairmen of (HREC) Health Research Ethics Committees in Nigeria to ensure protection of human research participants.

Strong need to support the International Conference on Ethics and Genomics Research in Africa to build capacity of Nigerian and other African researchers to collaborate and compete for the Human Heredity and Health in Africa project Research Grant.[3]

According to the Royal Society's 2011 publication on "knowledge, Networks and Nations: Global Scientific collaboration in the 21st Century; over 35% of articles published in peer-reviewed journals had multiple nationalities sharing authorship, up to 10% from 1996.[4]

For now, and what can also add credibility to moving health research to policy, is to diligently pursue sources of external funding. For instance,

the new GRC (Global Research Council), headed by the Director of National Science Foundation, in Arlington, United states, now offers unprecedented opportunities for collaboration amongst publicly funded Research organisations and policy makers worldwide; but also requires greater accountability

While making efforts to move in the direction of external funding, we must bear in mind, if we want to sustain this source:

1. The Research work should be relevant to solving National health problems.
2. The terms and conditions of Research or program must be understood through (M.O.U.) memorandum of understanding; and acceptable to the Institute.
3. Your budget must past the test of rigorous analysis, forecasting and foresight of all what you need to complete the work.
4. Your work plan should be clear, achievable and well understood to your team.
5. Your programme or project team members must be knowledgeable and well briefed about the work, and their responsibilities.
6. Management of the programme funds must be well transparent and accounted for.
7. Reporting dates should be adhered as stated in the agreement with the funders.
8. Proper technical and financial records must be kept for at least 3 years or as specified in the M.O.U.
9. The Institute's policy on external Research grants Funds administration should be kept, and shared with the funding organisations, where necessary.
10. You should watch you're spending not to deviate beyond allowable rates – as stated in the signed agreement with the Donor.

Conclusion

I sincerely implore you all for now, in view of the current low level of funding from the Federal Government, to pursue collaboration and sourcing of Research funds from available external organisations. I will like to conclude by quoting Dr. Edward Mbidde, the Director of Uganda Virus Research Institute (UVRI) and beneficiary of International Association of National Public Health Institutes (IANPHI) grant, that *"our experience shows that modest investments, when effectively and efficiently utilized can have a huge multiplier effect with enormous dividends"*[5]*;* while we seriously work hard to partner with the appropriate government organs to putting in place necessary instrument that will statutorily finance health Research in our dear country for ultimate benefit of our people.

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Information to Contributors

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