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INFORMATION

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FOREWORD

The Pacific Journal of Medical Sciences (formerly Medical Sciences Bulletin) is a natural development in the active and scientifically productive academic life in the School of Medicine and Health Sciences, University of Papua New Guinea – it fulfils the need to record, publish, and thus share the ideas and the research findings of our talented academics and research students.

I welcome the publication of the Pacific Journal of Medical Sciences. I am impressed with the fact that the Medical Sciences Bulletin that has now metamorphosed into the Pacific Journal of Medical Sciences is the result of research and scientific collaboration between staff and research students of the Division of Basic Medical Sciences, Division of Health Sciences, and Division of Dentistry.

The Pacific Journal of Medical Sciences should now expand to become an outlet for research findings obtained in all Divisions in the School of Medicine and Health Sciences, the University of Papua New Guinea, as well as for results of international research collaboration.

As the Executive Dean of the School of Medicine and Health Sciences, I recognize the importance of research and technology in the overall academic activities of the University. We live in a time of unprecedented change. Advances arising out of scientific research are altering almost every aspect of the way societies operate. Papua New Guinea is no exception to this general trend. It is therefore important that research findings are disseminated. I see this Journal as a means of achieving this goal.

The journal should cover researches, seminar proceedings and findings from all aspects of medical sciences, from the cutting edge exploration of cell function by molecular tools to the integrative view of complex functions, as they become important when health workers are called upon to help patients in their plight. I therefore advise researchers and scientists, particularly in the School of Medicine and Health Sciences, University of Papua New Guinea, to take advantage of this medium to publish their findings.

The Pacific Journal of Medical Sciences should not only facilitate the exchange of scientific information within the University academic community, it should also familiarize us with the research areas of our colleagues and peers worldwide. This in itself will lead to scientific collaboration and friendship.

A major mission of this publication, therefore, is to foster the scientific intercourse among scientific researchers in various academic and research institutions in Papua New Guinea, the pacific region and the rest of the world.

We hope that this journal will blossom into an internationally recognized scientific publication that will serve to link our university scientific community with other scientists around the world.

I wish, on behalf of all academics and research students in the School of Medicine and Health Sciences, University of Papua New Guinea to congratulate all the members of the Editorial Board on the success of the journal, and thank them for their worthy efforts.

Professor (Sir) Isi H Kevau
Executive Dean, School of Medicine and Health Sciences
University of Papua New Guinea

RESEARCH PAPERS

AN INTERVENTION PROGRAM TO EVALUATE THE ADMINISTRATION OF ANTI-MALARIAL MEDICATIONS FOR CHILDREN ATTENDING URBAN CLINICS IN NCD, PAPUA NEW GUINEA

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ABSTRACT

Malaria is a major killer in the tropics and a major public health problem in developing countries and Papua New Guinea (PNG) is no exception. The aim of this study was to evaluate the influence of an education program on patients' carers' understanding and effective use of anti-malarial drugs for the treatment of uncomplicated malaria in children in general health clinics in PNG. The trial design involved a pre-post intervention study with a control group. The study was undertaken in the National Capital District (NCD), PNG using Gerehu Clinic as the intervention site and Hohola St Therese Clinic as the control site. Three questionnaires were developed to evaluate the process and outcomes of malaria drug treatment in the above health facilities. Prescribing data were collected from prescriptions and patient carers' interviewed prior to the intervention program. Following the provision of drug information to patient carers, similar drug information and compliance questioning was undertaken. Differences in the pre-post elements of the study and in the control group over the study period were evaluated using Chi-Squared, Kruskal-Wallis, Fisher's Exact or Student's t-tests as appropriate. In excess of 100 patients in the pre- and in the post intervention phases were evaluated for their understanding and effective use of the anti-malarial drugs. In addition, 100 clients were in the control group at another clinic. The use of medicines was strongly supported with more than 70% of carers indicating no problems with the medications. In patients 10 years or less or their carers, it was found, there was a significant improvement in the carers understanding of the medications. There was a statistically significant improvement in patient outcomes from 57.9% to 92.3% reported as cured following the intervention program. In conclusion, the study identified an improvement in patient outcomes with respect to malaria. Hence, the simple intervention program in influencing patient carers understanding on the appropriate and effective use of medications led to a marked improvement in patient outcomes.

Key Words: Malaria, Anti-malarial medications, PNG. (Submitted: November 2008; Accepted December 2008)

INTRODUCTION:

Each year, there are an estimated 500 million clinical cases of malaria and it is estimated to kill more than 2 million people annually, the majority of whom are children under 5 years of age in developing countries and the number of them dying of malaria is estimated to be four every minute [1, 2]. It is one of the leading causes of morbidity and mortality worldwide and most of these deaths are in the poorest regions of the world [3]. Although frightening, these figures are only part of the story, as they do not account for the severe social and economic consequences of the disease both for the affected individuals and for the mostly Third World countries where they live [4].

In PNG one of the leading causes of morbidity and mortality is malaria and it constitutes most outpatient treatment at 27% of cases, hospital admissions at 15% of cases, and deaths at 12% of cases [5]. Where else the statistics on the leading causes of morbidity and mortality rates in NCD indicated that malaria constituted most of the outpatient visits and ranked 1st at 28.3% of cases, hospital admissions ranked 5th at 4.6% of cases, and deaths ranked 9th at 6.9% of cases [5].

Currently in PNG, case management is one of the cornerstones of malaria control with the aim of reducing morbidity and mortality through prompt diagnosis and effective management of acute clinical episodes with anti-malarial drugs. Resistant strains have been reported from most parts of the world [6-10]. This is particularly a cause for concern in PNG where chloroquine and amodiaquine, both low cost, safe anti-malarials, are still clinically effective. However, despite the establishment of malaria standard treatment guidelines for children [11], malaria still remains a major health problem in PNG. Human behaviour, which includes inappropriate prescribing and patient behaviour in using anti-malarial drugs, is one major contributor to the development of parasite resistance [12]. Such behaviour includes incorrect prescribing practices, uninformed use within the household as part of self-medication, as well as non-compliance of patients to the full therapeutic dose regimen [12, 13].

PNG has the following treatment regimens for malaria [11]. Treatment A is for the treatment of uncomplicated malaria and has amodiaquine, chloroquine, and Fansidar® tablets. Treatment B is for treatment of severe malaria and has Artemether Inj, artesunate tablets & Fansidar® tablets (use quinine 300mg tablets if artemether & artesunate are not available). Treatment C is for the treatment of resistant malaria or treatment failure malaria and has artesunate tablets and Fansidar® tablets (use quinine 300mg tablets if artesunate is not available). For prophylaxis treatment, amodiaquine and chloroquine tablets are used.

Project Objectives

The main objectives of the study were:

To evaluate the level of appropriate and effective use of the anti-malarial drugs for uncomplicated malaria; To evaluate the impact of an intervention program on patient carers in the understanding of the use of anti-malarial drugs in children for uncomplicated malaria; To provide the patient carers with appropriate drug information on the management of uncomplicated malaria.

METHODOLOGY:

This study was designed using a pre-post evaluation with an intervention and control. The study was conducted using two Urban Health Clinics (Gerehu and Hohola St Therese Clinics) in the NCD. There are 15 urban health centres in the NCD which serve about 300,000 people. The selected centres are headed by a senior nurse and staffed by several nurses and community health workers. There are several medical practitioners who serve these centres on a daily rotating basis, but, most of the patients are seen by the nurses, who are also responsible for the prescribing and drug management. Drugs are given to these patients free of charge if available.

The data collection took place over a two-month period in February and March 2002. It included observation of drug provision at study sites and interviews of patient carers on the first day at the clinic and a follow up seven days later. Participants usually their carers, agreed to voluntary inclusion into the study. Standard treatment guidelines developed by the National Health Department of PNG [11] was used as the basis for the assessment of appropriate and effective use of drugs for children for malaria.

Three questionnaires were developed to evaluate the process and outcomes of malaria drug treatment in the above health facilities. Questionnaire A collected the participant's details such as; Patient's name, date of birth, weight, and gender; Name of clinic; Frequency of malaria episodes; Current diagnosis; Drugs given (name, dose, frequencies, duration); Who was interviewed?; Prescriber; and Date of attending the clinic. Questionnaire B surveyed the use of drug treatment and required by [14]: Listing of all medicines taken after consultations with prescribers at the clinic since birth; Identifying whether any medicines taken in the past have given rise to problems for the child and by how much; Identifying the problems that caregivers sometimes have with children's medicines such as storing the medicines, reading and understanding the label, remembering to give the medicines, and to give the medicines at the correct time; and Whether herbal or local remedies were given to the child to assist in treating malaria. Questionnaire C recorded (i) the date when the child was cured, for how long and whether the child completed the treatment, and (ii) If not cured, what did the carer do? Reviewed again at the clinic, go to hospital, or remain at home.

Owing to literacy reasons, the questionnaires were often completed with the help of the researcher questioning the carer. Pidgin-English language, the common language widely spoken in PNG was used throughout the study. Informed consent was provided before the process was convened.

Sample selection:

The pre- and post intervention was carried out at Gerehu Clinic and the control at Hohola St Therese Clinic. The sites were chosen by convenience and the safety of the researcher was also considered. Gerehu served a large population that could over a period of time provide a sufficient number available to the study. The control group site was chosen based on it being a different population, but was assumed to have similar characteristics and therefore avoiding the carry over effects of the intervention program.

The inclusion criteria to the study were: children within the age group of 0 – 10 years were included in the study; having diagnosed with uncomplicated malaria and prescribed with the first-line drugs of anti-malarial drugs; and those carers who consented to participate. The exclusions criteria to the sample were: those who do not give consent to participate; children with severe/complicated malaria or other concomitant diseases; those who were more than 10 years of age; and children in the intervention study who had participated in the pre-intervention study.

The subjects were selected using convenience sampling. A sample size of 103 subjects participated during the pre-intervention study where no intervention occurred and 100 with medical diagnosis of uncomplicated malaria participated during the post-intervention study where the intervention program occurred. Another 100 subjects participated for the control, which was studied over the period of both phases of the pre-post intervention protocols.

The intervention program

One of the important considerations in the design of the intervention was that it needed to be one that could be promoted subsequently by primary health care services within the study context of PNG, if it proved effective [12]. Though the ultimate goal was to effectively improve the understanding and effective use of the anti-malarial drugs treatment for uncomplicated malaria on an outpatient basis, the hypothesis was that one way to accomplish this was to improve provider-patient communication. This required an intermediate intervention program to change the behaviour of patient carers from a situation of inadequate communication from health workers on drug use and supplying poorly labelled drugs to one where they are provided significantly more verbal information and label drugs in away patient carers could easily interpret and understand. Not all clients in the study area are literate and labelling drugs with labels written in English was not felt to be an adequate communication strategy. The intervention therefore involved providing more

verbal information to patient carers as well as providing drug labels which provide information on the recommended daily dose with other relevant information, pasted on the envelopes/containers of anti-malarial tablets and given to patient carers.

The intervention program undertaken was in the following manner:

A dispensing label written in English and Pidgin-English outlining the drug name, strength, dose, dose frequencies, duration, storage and any other relevant information in taking the drugs and importance of completing the course of treatment was attached to the drugs. The carer was verbally advised and counselled in simple terms using mainly the Pidgin-English language emphasizing the following: Why the drugs were given; Dosages, dose frequencies, duration and directions in taking the drugs. If necessary, the preferred relationship to meals and to other medication, and the need to take repeated dosages within the same day at regular intervals, was also stated; The importance of completing the treatment; That drugs should be taken at a regular interval at the exact time to maintain its effectiveness considering its half-life factor; Tablets should be crushed evenly and mixed with something sweet to improve taste so that the child can take them easily; Tablets should be stored in a cool safe dry place preferably in a closed container/cupboard away from the reach of children. Liquid suspensions should be stored in a refrigerator. If no refrigerator, the suspensions should be stored in a cool dry place away from direct sun light. Any liquid suspensions leftovers after completion of treatment should be discarded; Bring the child back to the clinic if there is no improvement after treatment, or if the child is getting worse; If the child vomits the medicines on administration, give another dose; To follow up on the progress of the child and in the interest of the study, the carers were advised to come back to the clinic after 7 days and report to the researcher whether the child got well or not.

The SPSS package version 11 for windows was used to analyse the data for differences in pre- and post-intervention levels of appropriate drugs, appropriate doses, appropriate intervals and appropriate duration. Tests used for continuous data were student's T-test or one-way analysis of variance (ANOVA) and for categorical data, analysis was by Chi-squared, Kruskal-Wallis and Fisher's Exact tests as appropriate. The research protocol was approved by both the PNG Medical Research Advisory Committee including giving ethical clearance for it to be carried out in PNG and the Human Research Ethics Committee of Curtin University of Technology.

RESULTS AND DISCUSSION:

A total of 303 children participated in the survey in both the control and clinic groups as shown in Table 1. Out of this, 25 (8.3%) participated in control-pre, 75 (24.8%) in control-post, 103 (34.0%) in clinic-pre, and 100 (33.0%) in the clinic-post intervention periods.

Although the criteria admitted subjects up to 10 years, the mean age for the study was about 2 years old. It was confirmed in the study that there were no significant differences ($P > 0.05$) in the demographic variables (gender, age, and weight) between the groups as shown in Table 1. The young age would reflect the high susceptibility of this age group to malaria. On a weight basis, the overall mean for all groups was 11.01 kg. There was no significant difference in weights for all groups. A total of 160 (52.8%) males and 143 (47.2%) females participated in the study and there was no significant difference in gender in all groups. Therefore, the two clinics (groups) appeared to be comparable and similar in characteristics, which gave validity to the study.

Though statistically, there was a significant difference in the group, the vast majority of prescribing (94.4%) was performed by nurses at the clinics. The result shown in Table 2 resulted from the small differences for HEO and Doctor where there were low numbers or zero in some cells. Most urban health clinics are managed by a Nursing Officer and staffed by Nurses and Community Health Workers. Nurses performed 94.4% of prescribing at the clinics (Table 2).

Theoretically, this may be unacceptable, but it has become common practice in PNG where at the urban clinics, most prescribing is undertaken by Nurses. Most rural health centres are managed by HEOs and they would undertake most of the prescribing. In addition, nurses and community health workers undertook dispensing of drugs at the clinics.

As observed during the study, tablets were placed in sealed paper envelopes with only the name of the drug written on it.

Usually most drugs have no suitable labels with only the time indicated as to when to give it to the child. For example, if a drug is to be taken 3 times a day, then a time slot of 6 am, 2 pm and 10 pm was written as to when the drug is to be given. Most times the strength of the drug was not written on the label including other relevant information.
Analysis of these data in Table 3 using the Kruskal-Wallis Test also identified significant differences between control-pre and control-post subgroups ($P < 0.05$) including for clinic-pre and clinic-post groups ($P < 0.05$). There is also a significant difference ($P < 0.05$) between all the groups. These data show that the patient groups in both “post” subgroups had been given lower numbers of medications on previous consultations with the health services. Standard deviation data although of limited validity for these data however indicates a wide range is evident in the population.

The impact of this difference is difficult to isolate but could imply that carers in the “post” subgroups may have slightly less experience with medications from previous consultations. This may have some relationship with the carers’ drug compliance.

Table1: Patient demographics at the clinic pre-post and control pre-post groups

		Subgroups				Total
		Con-pre	Con-post	Clin-pre	Clin-post	
Sample size	N	25 (8.3%)	75 (24.8%)	103 (34.0%)	100 (33.0%)	303 (100.0%)
Age (years)	Mean	1.90	1.99	2.78	2.32	2.36
	SD	2.14	1.93	2.60	1.98	2.23
	P-value[1]	0.079				
Weight (kg)	Mean	10.04	10.16	11.87	11.01	11.01
	SD	3.97	3.60	5.51	5.25	4.92
	P-value[1]	0.094				
Gender	Male	15 (60.0%)	35 (46.7%)	59 (57.3%)	51 (51.0%)	160 (52.8%)
	Female	10 (40.0%)	40 (53.3%)	44 (42.7%)	49 (49.0%)	143 (47.2%)
	P-value[2]	0.455				

P-value[1] from one way-Anova Test P-value[2] from Pearson Chi-Square Test

Table 2: Prescribers compared at the clinic pre-post and control pre-post subgroups

Prescriber	Subgroup				Total
	Con-pre	Con-post	Clin-pre	Clin-post	
HEO	2 (8.0%)	1 (1.3%)		9 (9.0%)	12 (4.0%)
Nurse	23 (92.0%)	70 (93.3%)	103 (100.0%)	90 (90.0%)	286 (94.4%)
Doctor		4 (5.3%)		1 (1.0%)	5 (1.7%)
P-value	0.001				

P-value from Pearson Chi-Square Test

Table 3: Number of drugs taken by patient since birth compared separately in all groups pre-post, control pre-post and clinic pre-post

Group	Activity	Subgroup	N	Mean Rank	P-value
All groups	No. of drugs taken	Con-pre	25	187.02	0.000
		Con-post	75	125.89	
		Clin-pre	103	170.39	
		Clin-post	100	143.88	
		Total	303		
Control	No. of drugs taken	Con-pre	25	65.90	0.001
		Con-post	75	45.37	
		Total	100		
Clinic	No. of drugs taken	Clin-pre	103	110.65	0.023
		Clin-post	100	93.10	
		Total	203		

P-value from Kruskal-Wallis Test

Table 4: Patient carers' responses to duration of drug administration

Drug	Days count	Subgroups				Total
		Con-pre	Con-post	Clin-pre	Clin-post	
Amodiaquine 100mg tablet	Incorrect	4 (18.2%)	13 (20.6%)	24 (27.9%)	24 (29.3%)	65 (25.7%)
	Correct	18 (81.8%)	50 (79.4%)	62 (72.1%)	58 (70.7%)	188 (74.3%)
Chloroquine 150mg tablet	Incorrect			2 (28.6%)	2 (100.0%)	4 (30.8%)
	Correct	1 (100.0%)	3 (100.0%)	5 (71.4%)		9 (69.2%)
Quinine 300mg tablet	Incorrect	1 (100.0%)		1 (100.0%)		2 (100.0%)
	Correct					
	Correct					
	Correct					

P-value from Pearson Chi-Square Test

Table 5: Patient carers' responses to frequency of drug administration

Drug	Frequency count	Subgroups				Total
		Con-pre	Con-post	Clin-pre	Clin-post	
Amodiaquine	incorrect	4 (18.2%)	15 (23.8%)	24 (27.9%)	24 (29.3%)	67 (26.5%)
100mg tablet	Correct	18 (81.8%)	48 (76.2%)	62 (72.1%)	58 (70.7%)	186 (73.5%)
Chloroquine	incorrect			2 (28.6%)	2 (100.0%)	4 (30.8%)
150mg tablet	Correct	1 (100.0%)	3 (100.0%)	5 (71.4%)		9 (69.2%)
Quinine 300mg	incorrect	1 (100.0%)		1 (100.0%)		2 (100.0%)
tablet	Correct					

P-value from Pearson Chi-Square Test

Table 6: Patient carers' responses to dosage of drug administration

Drug	Dose count	Subgroups				Total
		Con-pre	Con-post	Clin-pre	Clin-post	
Amodiaquine	incorrect	4 (18.2%)	14 (22.2%)	25 (29.1%)	30 (36.6%)	73 (28.9%)
100mg tablet	Correct	18 (81.8%)	49 (77.8%)	61 (70.9%)	52 (63.4%)	180 (71.1%)
Chloroquine	incorrect			2 (28.6%)	1 (50.0%)	3 (23.1%)
150mg tablet	Correct	1 (100.0%)	3 (100.0%)	5 (71.4%)	1 (50.0%)	10 (76.9%)
Quinine 300mg	incorrect	1 (100.0%)		1 (100.0%)		2 (100.0%)
tablet	Correct					
	Correct	11 (84.6%)	9 (69.2%)	40 (62.5%)	11 (57.9%)	71 (65.1%)

P-value from Pearson Chi-Square Test

Table 7: Patient carers' responses to uses of drug

Drug	uses count	Subgroups				Total
		Con-pre	Con-post	Clin-pre	Clin-post	
Amodiaquine	incorrect	10 (45.5%)	25 (39.7%)	25 (29.1%)	22 (26.8%)	82 (32.4%)
100mg tablet	Correct	12 (54.5%)	38 (60.3%)	61 (70.9%)	60 (73.2%)	171 (67.6%)
Chloroquine	incorrect			2 (28.6%)	2 (100.0%)	4 (30.8%)
150mg tablet	Correct	1 (100.0%)	3 (100.0%)	5 (71.4%)		9 (69.2%)
Quinine 300mg	incorrect	1 (100.0%)				1 (50.0%)
tablet	Correct			1 (100.0%)		1 (50.0%)
	Correct	9 (69.2%)	12 (92.3%)	48 (75.0%)	16 (84.2%)	85 (78.0%)

P-value from Pearson Chi-Square Test

Table 8: Follow up data comparing all groups

Activity	Count	Subgroup				Total
		Con-pre N = 25	Con-post N = 75	Clin-pre N = 103	Clin-post N = 100	N = 303
Are they cured	No	3 (27.3)	9 (31.0%)	16 (42.1%)	3 (7.7%)	31 (26.5%)
	Yes	8 (72.7%)	20 (69.0%)	22 (57.9%)	36 (92.3%)	86 (73.5%)
Finish taking the	No	1 (9.1%)		2 (5.3%)		3 (2.6%)
medicines	Yes	10 (90.9%)	29 (100.0%)	36 (94.7%)	39 (100.0%)	114 (97.4%)
If not cured, what	Review at	3 (100.0%)	9 (100.0%)	16 (100.0%)	3 (100.0%)	31 (100.0%)
did you do	clinic					

P-value from Pearson Chi-Square Test

Table 9 Follow up data comparing control pre-post and clinic pre-post

Activity	Count	Subgroup		Total	P-value
		Con-pre	Con-post		
Are they cured	No	3 (27.3%)	9 (31.0%)	12 (30.0%)	0.570
	Yes	8 (72.7%)	20 (69.0%)	28 (70.0%)	
Finish taking medicines	No	1 (9.1%)		1 (2.5%)	0.275
	Yes	10 (90.9%)	29 (100.0%)	39 (97.5%)	
If not cured, what did you do		3 (100.0%)	9 (100.0%)	12 (100.0%)	
		Clin-pre	Clin-post		
Are they cured	No	16 (42.1%)	3 (7.7%)	19 (24.7%)	0.000
	Yes	22 (57.9%)	36 (92.3%)	58 (75.3%)	
Finish taking medicines	No	2 (5.3%)		2 (2.6%)	0.240
	Yes	36 (94.7%)	39 (100.0%)	75 (97.4%)	
If not cured, what did you do		16 (100.0%)	3 (100.0%)	19 (100.0%)	

P-value from Fisher's Exact Test

Tables 4 - 7 outlined the patient carers' understanding on the use of prescribed medications, which was evaluated using a standardized questionnaire [14]. It is notable the anti-malarial amodiaquine was quite well understood and generally high (>70%) levels of correct responses were reported. One would postulate that may be the patient carers are more exposed to the latest information on drugs in the urban sector and require further investigation.

In Table 9 when comparing clinic-pre with clinic-post, there was an improved cure rate from 57.9% (22) to 92.3% (36) and 42.1% (16) reduced to 7.7% (3) were not cured. In Table 8, a total of 97.4% of cases indicated finished taking the medicines and 31 (26.5%) cases indicated that they were not cured and return to the clinic for further investigation/review. With regard to carers that returned to the clinic to provide the outcome: It was too dangerous for the researcher to visit patient carers in their houses to follow up the outcome of the intervention program. The outcome is therefore more likely to favour those not cured as they could return to the clinic for further treatment. All patients were treated the same but there is a possibility of a Hawthorn Effect from those receiving the intervention on returning. It is noted however that about 38% (77) returned to respond at the clinic and 40% (40) at the control group. Although these numbers are a little low,

their comparability in both areas of the study and at approximately 40% provides a reasonable basis the intervention influenced overall outcomes.

This study was designed to test the hypothesis that by introducing an intervention program to improve patient information including proper labeling of drugs on the use and administration of anti-malarial drugs, would improve drug compliance and patient outcomes. As observed, advised given to patient carers on appropriate and effective use of medicines was always given in haste and this may have an effect on drug compliance. This is an example of poor or lack of communication between the prescriber and patient/carer [12, 15]. Generally patients knew very little about the nature of their illness, why they were taking a particular medicine or its potential effects [16]. This may have an effect on patients' drug compliance. In addition, nurses and community health workers mostly undertook administration of drugs at the clinics. Initial doses were given at the clinics. Liquid doses were given directly to the child while tablets were crushed in a medicine measure mixed with water and then given to the child. Possibly due to the slight bitter taste of the drug, it was observed that quite a significant number of children vomited the medicine at the clinic.

The Standard treatment for Common Illnesses of children in PNG states that, "if a child vomits, give another dose of drug" [11]. Unfortunately, this did not always happen.

This was an anecdotal report as the study design was not recording the frequency of this occurrence. The lack of availability of oral liquid formulations of these products for infants and children is an issue that warrants investigation. Hence, this study as shown in Table 10 found no differences on the patient carers' responses in the storing of drugs, reading labels and understanding instructions, remember to give the medicines and to give the medicines at the correct time for the control and pre-intervention periods of the study. However, there was a significantly improved difference observed during the post-intervention period in that the patient carers understanding and use of the drugs prescribed improved in the sense that they better understood how to administer the medicines effectively which evidently resulted in a significant improvement in patient outcomes in the post-intervention clinic group.

The results indicated that the education element of the intervention program achieved improved outcomes in relation to patient carers understanding on compliance and effective use of the administered drugs. That they were able to store the medicines properly, understand label and read instructions, remember to give the medicines, and to give the medicines on time. Reports of other studies conducted in outpatient settings have generally shown improvement in compliance, patient knowledge, patient satisfaction and relatively short-term indicators of improved pharmacotherapy [12, 17-22].

Table 10: Patient carers responses to storing, reading labels and understand instructions, remember to give the medicines and to give medicines on time compared in all groups pre-post, control pre-post and clinic pre-post groups

Group	Activity	Subgroup	N	Mean Rank	P-value
All groups	Store the medicines	Con-pre	25	164.92	0.000
		Con-post	75	177.00	
		Clin-pre	102	104.46	
		Clin-post	100	177.00	
	Read label /understand instructions	Con-pre	25	168.46	0.000
		Con-post	75	144.13	
		Clin-pre	102	105.21	
		Clin-post	100	200.00	
	Remember to give the medicines	Con-pre	25	118.20	0.000
		Con-post	75	116.19	
		Clin-pre	102	107.25	
		Clin-post	100	231.45	
	To give the medicines on time	Con-pre	25	115.10	0.000
		Con-post	75	116.59	
		Clin-pre	102	107.68	
		Clin-post	100	231.48	
Control groups	Store the medicines	Con-pre	25	47.50	0.014
		Con-post	75	51.50	
	Read label /understand instructions	Con-pre	25	56.36	0.153
		Con-post	75	48.55	
	Remember to give the medicines	Con-pre	25	51.00	0.884
		Con-post	75	50.33	
	To give the medicines on time	Con-pre	25	49.78	0.836
		Con-post	75	50.74	
Clinic groups	Store the medicines	Clin-pre	102	77.48	0.000
		Clin-post	100	126.00	
	Read label /understand instructions	Clin-pre	102	69.64	0.000
		Clin-post	100	134.00	
	Remember to give the medicines	Clin-pre	102	60.37	0.000
		Clin-post	100	143.45	
	To give the medicines on time	Clin-pre	102	60.37	0.000
		Clin-post	100	143.45	

P-value from Kruskal-Wallis Test

Another observation of interest that is incidental to the study is the fact that patient carers interpreted the interview and follow-up visits with the researcher as a sign of improved quality of care [12]. In fact the researcher was very well received. Almost all carers were very pleased with the visits and appeared to interpret them as a sign that the health system was showing more concern and interest in their children's welfare. There is considerable evidence that patients want to know more about the drugs they take and 92% of the respondents indicated that having a pharmacist available for personal consultation was important to them [23]. The possibility of integrating an interview for patient education on effective use of drugs and follow up visits as routine for clinical cases of malaria may be worth exploring.

Above all, our intervention program made an impact in improved understanding and effective use of drugs, drug compliance and patient health outcomes. As shown in Table 10, the data reflect the influence of the intervention program at the clinical intervention site and has achieved statistically significant improved outcomes in all four criteria in relation to patient carers understanding on the effective use of the administered medications. When comparing clinic-pre with clinic-post in Table 9, there was a significant difference ($P < 0.05$) in the cured group and the improved cure rate increases from 57.9% to 92.3%. When compared control pre with control post groups shown in Table 9, there was no significant difference ($P > 0.05$). This indicated that our intervention program has made an impact in improving patients' health outcome in the study setting.

CONCLUSION

It is evident that a patient intervention program designed to improve the administration of anti-malarial drugs in PNG had no statistically significant improvement. This may be because the current level of understanding was quite high (>70%) and the study experienced a ceiling effect. However, as shown in Table 10 the patient carers understanding on the appropriate and effective use of drugs was lower during the pre-intervention and control group. When comparing clinic-pre with clinic-post in Table 9, there was a significant difference ($P < 0.05$) in the cured group and the improved cure rate increases from 57.9% to 92.3%. When compared control pre with control post groups, there was no significant difference ($P > 0.05$) in the cured group. Therefore, the study identified an improvement in patient outcomes with respect to malaria. Hence, the simple intervention program in influencing patient carers understanding of the appropriate and effective use of medications led to a marked improvement in patient outcomes.

In addition, during the intervention period, it was observed that patient carers were very interested to see the researcher. For the first time there was someone available at the clinic to talk to them about their children's medicines. They viewed this as a sign that the health care provider was

interested in their health. This indicated that the activity should be encouraged and if others (doctors, nurses, HEOs, Community health workers) are not prepare to undertake this responsibility, then, may be the pharmacists and pharmacy technicians should take up this responsibility in PNG.

LIMITATIONS OF THE STUDY

- Only the short-term impact of the training program was evaluated. The fact that a one off training program does not usually causes a sustained change in provider behaviour [24]. Reinforcing mechanisms are needed. The follow on to this study is to design a checklist for supervisors to use in primary care clinics that incorporates evaluation of the adequacy of the information provided to patient carers on understanding and effective use of drugs. This study has shown that it is possible to increase information provision to patient carers by providers in health care clinics, at least in the short run. Increase in information provision to clients is associated with improved compliance to therapy. There definitely was an increase in patient carers' understanding of medications in the intervention period and improved patient outcomes. The long-term effect of this study may be well worth studying on any future research in the study setting.
- This study was conducted in an urban health clinic. There are also rural health centres in PNG. There may be few differences in between the urban and rural settings. There may be other assumptions but the most obvious one would be that health staff and patient carers are more exposed to the latest information on drugs in the urban than the rural sector.
- Development of systems that enable improvement in the provision of medicines including labeling, packaging, and a greater use of liquids preparations for children. The impact of this change would require further investigation.

RECOMMENDATIONS

Based on the information gathered in the study the following recommendations are made:

- Pharmacists and Pharmacy Technicians should undertake more patient counselling and education on appropriate and effective use of drugs and if possible do a follow-up. The education program to increase the patient carers' understanding and effective use of drugs would improve patient outcomes and drug compliance as shown in the study.
- Proper labelling and packaging of drugs should be encouraged and incorporated into standard practice.
- Further study is needed to expand and assess the long-term effect of this study

to include both rural and urban health clinics.

- Liquid suspensions of the anti-malarial drugs should be considered to address the practical difficulties in administering oral tablets to children.

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PREVALENCE OF MICROALBUMINURIA IN DIABETIC AND HYPERTENSIVE PATIENTS ATTENDING CLINICS IN PORT MORESBY GENERAL HOSPITAL

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ABSTRACT:

Microalbuminuria is an increase in urinary albumin concentration that cannot be detected with the conventional urinalysis albustick, clinistick, dipstick or multistick. The early detection of Microalbuminuria can serve as a vital subclinical parameter in preventing complications in patients with either diabetes mellitus or hypertension. The aim of this project was to evaluate the prevalence of Microalbuminuria among diabetic and hypertensive patients attending clinics in Port Moresby General Hospital.

This was a cross-sectional study with a calculated sample size of 140 subjects, which were then selected by simple random sampling. On-the-spot urine sample was collected from each of the 124 consented subjects. Urinalysis using Multistix G-10 was carried out on each urine sample on the day of urine collection. Of the 121 urine samples that were suitable for analysis 42 (34,7%) tested positive for albuminuria indicating clinical albuminuria and 79 (65.3%) tested negative for albuminuria.

All the 79 urine samples that tested negative for albumin were then assayed quantitatively for Microalbuminuria (MAU) according to the QuikRead 101 U-ALB protocol using the Orion QuikRead 101 equipment and reagent kit. Urine samples with albumin concentration in the range 20.0 – 200.0mg/L were positive for Microalbuminuria and classified as “MAU Present”. Urine samples with albumin level below 20.0mg/L were negative for Microalbuminuria and classified as “Normal”. A total of 44 (55.7%) of the 79 urine samples were positive for MAU and 35 (44.3%) were Normal. Gender distribution of the 79 urine samples indicates that 20 (25.3%) males and 24 (30.4%) females were “MAU Present”, compared to 13 (16.5%) males and 22 (27.8%) females that were “Normal”.

The results indicate that the prevalence of MAU was higher among females (30.4%) compared to males (25.3%), but this difference was not statistically significant ($p > 0.05$). Prevalence of MAU was higher male and female diabetic subjects compared to non-diabetic subjects. The High Normal BP category shows 18.2% male and 2.2% female subjects with MAU. In the category indicating Hypertension, there were more female (19.6%) than male (3.0%) subjects with MAU. Screening diabetic and hypertensive patients for MAU should be an integral part of the comprehensive management strategy for male and female patients and for those at risk of developing these conditions.

Key Words: Microalbuminuria, Diabetic, Hypertensive, PNG. (Paper submitted: October 2008, accepted November 2008)

INTRODUCTION:

Estimation of urinary protein is part of the initial clinical evaluation of patients with suspected renal or cardiac dysfunction[1]. This usually involves urinalysis or the assessment of total protein in urine. These procedures however, cannot be used to distinguish between glomerular or tubular proteinuria [1,2]. Estimation of plasma protein, such as, albumin in urine is a more acceptable and specific parameter for the assessment of pathological proteinuria of glomerular origin and for assessing the status of glomerular basement membrane and clearance [1,3]. Urinalysis is one of the procedures used for the assessment of pathological proteinuria [1 – 3].

Microalbuminuria (MAU) is an increase in urinary albumin that cannot be detected with the conventional urinalysis albustick, clinistick, dipstick or multistick [2 – 4]. In vulnerable individuals MAU is usually followed by progressive increase in proteinuria leading to clinical albuminuria (Macroalbuminuria) and declining glomerular filtration rate [2,3]. Macroalbuminuria is associated with progressive renal damage and subsequent development of end stage renal disease and increased coronary mortality among diabetic and hypertensive patients [2 – 6].

Several researchers have suggested that MAU is the first indicator of diabetic renal disease [4,5]. Diabetic nephropathy usually presents as intermittent MAU (incipient), progressing to persistent MAU, and then to MAU [2 – 7]. Thus, MAU is a useful subclinical parameter for identifying patients that are predisposed to diabetic renal damage [1 – 5]. MAU is also an independent predictor of cardiovascular diseases that can lead to premature death in patients with essential hypertension [2,3,5]. MAU is considered to be one of the most significant single predictor of progressive microvascular disease and macro-vascular disease, which include nephropathy, atherosclerosis, coronary disease and retinopathy [2 – 7]. MAU may precede and even predict later onset of Type 2 diabetes [6 – 8]. The suggestion that MAU may represent an independent manifestation of the cardiometabolic disorder syndrome X have

added new dimension to the study of MAU in diabetic patients, especially those with Type 2 diabetes [3 – 7]. MAU in non-diabetics is a subclinical parameter and a simple way to detect vascular disease as well as being a predictor of increased risk of acquiring Type 2 diabetes, hypertension, and cardiovascular disease [1,2,4,6].

Thus, the early detection of MAU can serve as a vital subclinical tool in the diagnosis and prevention of complications from diabetes mellitus and hypertension. In addition, it is much easier to prevent diabetic nephropathy by clinical intervention at the MAU stage [4,6,7,8]. The need for implementation of effective screening protocol of diabetic and hypertensive patients for MAU and timely therapeutic intervention cannot be overemphasized. Published data on the prevalence of MAU among diabetic and hypertensive patients in Papua New Guinea (PNG) is scanty. This apparent lack of published data prompted this study.

The aim of this project therefore, was to assess the prevalence of Microalbuminuria among patients attending diabetic and hypertensive clinics in Port Moresby General Hospital (PMGH). The major objective was to use the data obtained to advocate for setting up a protocol for screening of individuals attending the diabetic and hypertensive clinics in PMGH.

MATERIALS AND METHODS:

This was a cross-sectional study carried out from March 2008 to end of September 2008. The study population consisted of randomly selected subjects attending the diabetic and hypertensive clinics in PMGH and apparently healthy subjects in the general population outside PMGH. The PMGH was selected as the sampling site, because it is the major public general specialist and reference hospital in NCD and PNG; it also serves as the teaching hospital for the School of Medicine and Health Sciences (SMHS), University of Papua New Guinea (UPNG).

The sample size of 140 subjects used in this study was based on a design effect of one a relative precision of 10%, a confidence level (CL) of 95% and predicted non-response rate of 10%. As there was no available information on the likely prevalence rate of Microalbuminuria in PNG, an assumed prevalence rate of 10% was used. Selected subjects were appropriately informed about the study before requesting their informed consent. However, patients with end-stage renal failure, high fever, hematuria, leukocyturia, or cardiac failure were excluded from the study.

About 3.0ml of random upright spot urine sample was collected from each consented subject after completing and signing a pre-tested questionnaire that requested information on gender, age, smoking history, family history of diabetes and hypertension. Appropriate clinical information, such as diabetic status, blood pressure, weight and height of each subject were appropriately determined and recorded in the questionnaire. Appropriate precautions were taken to ensure that only one urine sample was

collected per individual throughout the duration of the study.

Urine samples collected were kept in a cool-box at 8.0^{oC} and transported to the Micronutrient laboratory in the SMHS. Urinalysis using Multistix G-10 was carried out on each urine sample on the same day of urine collection. Parameters determine included glucose, albumin, pH, blood and leukocytes.
The urine samples were then stored at 4.0^{oC} till required for further analysis. All urine samples that tested negative for albumin were then assayed quantitatively for Microalbuminuria according to the QuikRead 101 U-ALB protocol using the Orion QuikRead 101 equipment and reagent kit [4].

Assay for MAU was not carried out in urine samples with glucose above 50.0mmol/L, and those with macroalbuminuria (i.e., urinary albumin greater than 200 mg/L) [4]. Using random spot urine samples and the QuikRead 101 U-ALB protocol, MAU was defined as a urinary albumin concentration in the range 20 to 200mg/L [4].

Results were analysed using Excel 2003 data pack and SPSS Version 11 for Windows. Student's T-test and ANOVA were used to assess the statistical significance of the data. Ethical clearance and permission were obtained form the SMHS Ethical and Research Grant Committee and the CEO PMGH. This project was funded by research grant from the Office of Higher Education of Papua New Guinea.

RESULTS:

A total of 140 subjects were recruited for this study. Signed informed consent was obtained from 124 subjects, given a response rate of 88.6%. Thus a total of 124 urine samples were collected, of these only 121 (97.6%) were suitable for analysis.

Distribution of the 121 subjects according to location of urine sample collection indicates that 77 (63.6%), 23 (19.0%) and 21 (17.4%) urine samples were collected from subjects in the diabetic clinic, hypertensive clinic and the general population respectively.

Gender distribution of the 121 subjects with urine samples indicates 56 (46.3%) males and 65 (53.7%) females. The age range of all the male subjects was 21.0 – 87.0 yrs, their mean ($\pm$ SD) age was 51.9 $\pm$ 14.17 yrs, the 95% confidence interval (95% CI) was 48.1 – 55.7yrs, the median age was 54.5yrs with Interquartile Range (IQR) of 43.0 – 61.0yrs. For the female subjects, the age range was 17.0 – 79.0 yrs, their mean age was 46.0 $\pm$14.2 yrs, 95% CI was 42.3 – 49.7yrs, median age was 48.4yrs with IQR of 36.8 – 56.0yrs. There was no statistically significant difference ($p = 0.2$) between the mean ages of the male and female subjects.

The semi-quantitative test using the Multi-stick (G-10) was used to identify urine samples with albumin content greater than 200.0mg/L, which indicates clinical albuminuria (Macroalbuminuria). Of the 121 urine samples,

42 (34,7%) tested positive for albuminuria indicating clinical albuminuria and 79 (65.3%) tested negative for albuminuria. Gender distribution of the data indicates that urine samples of 23 (19.0%) males and 19 (15.7%) females tested positive for albuminuria, compared to urine samples of 33 (27.3%) males and 46 (38.0%) females that tested negative for albuminuria.

Distribution of the 42 subjects with clinical albuminuria according to the location of sample collection indicates that 35 (83.3%) were from the diabetic clinic and 7 (16.7%) were from the hypertensive clinic. All the urine samples of subjects recruited in the general population (control) tested negative for albuminuria.

The mean age of the male subjects with clinical albuminuria was 54.6 $\pm$ 9.1yrs, and their mean BMI was 27.0 $\pm$ 4.5 kg/m^2. The mean age of female subjects with albuminuria was 54.1 $\pm$ 11.5yrs and their mean BMI was 27.3 $\pm$ 4.8 kg/m^2. The mean age of male subjects that tested negative for albuminuria was 50.1 $\pm$ 16.7yrs and their mean BMI was 26.6 $\pm$ 3.8kg/m^2. The mean age of the female subjects that tested negative for albuminuria was 54.6 $\pm$ 9.1yrs and their mean BMI was 27.0 $\pm$ 4.5kg/m^2.

No statistically significant differences ($p > 0.05$) were obtained when ANOVA was use to compare the ages of male and female subjects with clinical albuminuria and male and female subjects that tested negative for albuminuria. A similar trend was observed when the BMI of the male and female subjects in the groups were compared ($p > 0.05$). No further analysis was carried out with data obtained from all the subjects with clinical albuminuria.

In order to avoid unintended bias in the interpretation of data based on location of sampling, all the 79 urine samples that tested negative for albuminuria were put into a common pool and assayed for Microalbuminuria (MAU). Urine samples with albumin level in the range 20.0 – 200.0mg/L were positive for Microalbuminuria and classified as “MAU Present”. Urine samples with albumin level < 20.0mg/L were negative for Microalbuminuria and classified as “Normal”.

A total of 44 (55.7%) of the 79 urine samples were positive for MAU and 35 (44.3%) were normal. Gender distribution of the 79 urine samples indicates that 20 (25.3%) males and 24 (30.4%) females were “MAU Present”, compared to 13 (16.5%) males and 22 (27.8%) females that were “Normal”. The results indicate that the prevalence of MAU was higher among females (30.4%) compared to males (25.3%), but this difference was not statistically significant ($p > 0.05$).

The mean ages of the male and female subjects with MAU were 54.3 $\pm$ 15.1 years and 46.5 $\pm$ 13.3 years respectively. Their age ranges were, for the male subjects 22.0 – 87.0 years and for the female subjects 17.0 – 65.0 years. The difference in the mean ages of the male and female subjects with MAU was not statistically

significant (p = 0.4). For the male and female subjects in the normal group, the age range was 21.0 – 75.0 years and 20.0 – 65.0 years respectively. The mean age for the male was 43.7 ± 17.7 years and for the female 38.7 ± 13.8 years.

The mean BMI of the female subjects (26.54 ± 4.6 kg/m^2) with MAU was not statistically (p > 0.05) different from the mean BMI of the male subjects (25.84 ± 4.21kg/m^2) with MAU. However, the mean BMI (25.84kg/m^2) of the male subjects with MAU was significantly (p = 0.001) lower than the mean BMI (27.85kg/m^2) of the male subjects in the Normal group. There was no statistically significant difference (p > 0.05) between the mean BMI of the female subjects with MAU and the female subjects (BMI = 26.77 ± 4.54kg/m^2) in the normal group.

The data was further analysed to indicate the prevalence of MAU in the various age groups. The prevalence of MAU was 12.1%, 21.2% and 18.2% among males in the 40 – 49 years, 50 – 59 years and ≥ 60 years age groups respectively, compared to 6.5%, 19.6%, and 6.5% prevalence among females in the corresponding age groups. The results indicate higher prevalence among the males compared to females in the corresponding age groups. The distribution of the male and female subjects with MAU and Normal urine samples according to their range of BMI is presented in Figure 1. MAU was present in the urine of both male and female subjects with BMI in the normal (18.5 – 24.9 kg/m^2), overweight (25.0 – 29.9kg/m^2) and obese (> 30.0k/m^2) ranges.

The distribution of male and female subjects with MAU and Normal urine samples according to their diabetic status is presented in Table 1. There was no statistically significant difference (p > 0.05) in the number of male and female diabetic patients with MAU.

The results also show that 15.2% of both male and female non-diabetic subjects were positive for MAU. In addition, 12.1% of male and 13.0% of female diabetic subjects were negative for MAU.

Table 2 shows the distribution of male and female subjects with MAU and Normal urine samples according to their Systolic and Diastolic blood pressure.

The systolic BP was within the normal range (< 130mm/Hg) in 39.4% of male and 34.8% of female subjects with MAU. The systolic BP of 21.1% of male subjects with MAU was in the 130 – 160mm/Hg range compared to 13.0% of females with MAU. The diastolic pressure of 45.4% of the male and 37.0% of the female subjects with MAU was within the normal range (<85.0mm/Hg).

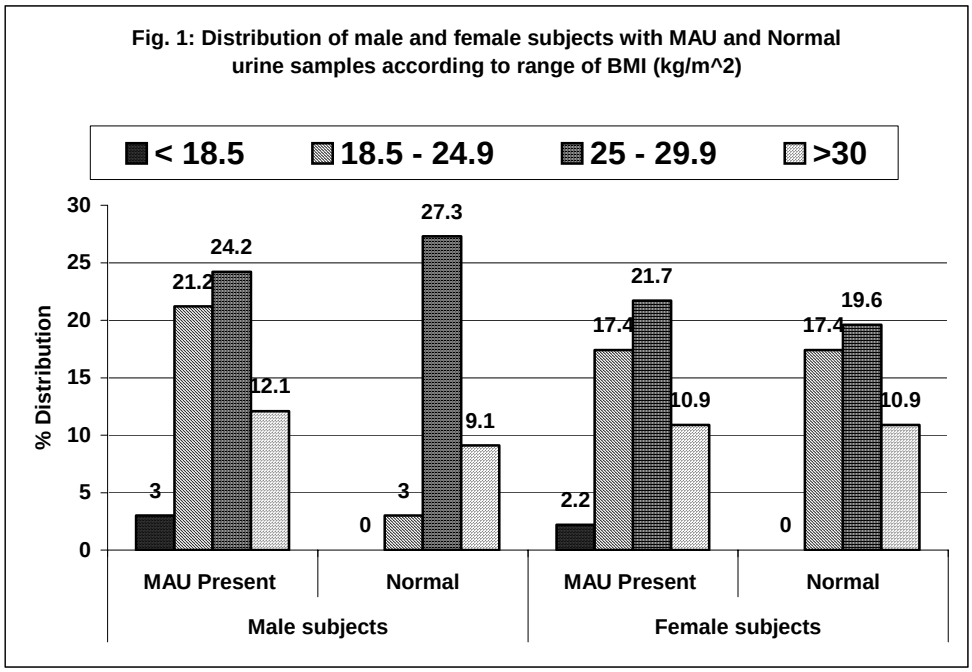

Table 1: Distribution of male and female subjects with MAU and Normal urine samples according to their diabetic status

	Male (n = 33)		Female (n = 46)	
Status	MAU Present	Normal	MAU Present	Normal
Diabetic	15 (45.4%)	4 (12.1%)	17 (37.0%)	6 (13.0%)
Non-Diabetic	5 (15.2%)	9 (27.3%)	7 (15.2%)	16 (34.8%)

Table 2: Distribution of Male and Female subjects with MAU and Normal urine samples according their Systolic and Diastolic Blood Pressures (mm/Hg)

	Male (n = 33)		Female (n = 46)	
Range	MAU Present	Normal	MAU Present	Normal
Systolic BP (mm/Hg)				
< 130	13 (39.4%)	8 (24.2%)	16 (34.8%)	16 (34.8%)
130 – 160	7 (21.2%)	5 (15.2%)	6 (13.0%)	5 (10.9%)
> 160	0	0	2 (4.3%)	1 (2.2%)
Diastolic BP (mm/Hg)				
< 85	15 (45.4%)	6 (18.2%)	17 (37.0%)	18 (39.1%)
85 – 90	5 (15.2%)	5 (15.2%)	4 (8.7%)	3 (6.5%)
> 90	0	2 (6.1%)	3 (6.5%)	1 (2.2%)

Table 3: Distribution of Male and Female subjects with MAU and Normal urine samples according to their Diastolic and Systolic blood pressure indicating Normal, High Normal and Hypertensive categories

Blood Pressure		Male (n = 33)		Female (n = 46)	
Blood Pressure Categories	Diastolic and Systolic (mmHg)	MAU Present	Normal	MAU Present	Normal
Normal	< 130 and < 85	13.0 (39.4%)	5.0 (15.2%)	14.0 (30.4%)	15.0 (32.6%)
High Normal	130 – 139 or 85 – 89	6.0 (18.2%)	3.0 (9.1%)	1.0 (2.2%)	2.0 (4.3%)
Hypertension	≥ 140 or ≥ 90	1.0 (3.0%)	5.0 (15.2%)	9.0 (19.6%)	5.0 (10.9%)

For further interpretation of the data the combined diastolic and systolic blood pressure was analysed. The blood pressure was separated into three categories to indicate Normal, High Normal and Hypertension using the recommended cut-off points for the Diastolic and Systolic blood pressures [9]. Table 3 shows the distribution of the male and female subjects with MAU and normal urine samples according to the categories of their diastolic and systolic blood pressure. The blood pressure was in the Normal BP category for 39.4% of male and 30.4% of female subjects with MAU. The High Normal BP category shows 18.2% male and 2.2% female subjects with MAU. In the category indicating Hypertension, there were more female (19.6%) than male (3.0%) subjects with MAU.

The subjects were asked about their family history of diabetes mellitus. The results indicate that family history of diabetes mellitus was prevalent in 27.3% of male and 26.1% of female subjects with MAU. However, 33.3% of the male and 26.1% of the female subjects with MAU had no family history of diabetes mellitus. Comparison of the data using ANOVA indicates that there were no statistically significant differences among any of these groups in relation to family history of diabetes mellitus.

When asked about their smoking habits, 36.4% of the male and all of the female subjects with MAU were non-smokers. However, 18.2% of the male and 13.0% of the female subjects in the normal group was current cigarette smokers.

DISCUSSION:

The introduction of the concept of MAU has unveiled new and exciting information with profound clinical implications for the care and in some cases prevention of complications in diabetic and hypertensive patients. The diabetic and hypertensive clinics in PMGH were chosen as the sampling site for this study because of the apparent lack of information on the prevalence of MAU among diabetic and hypertensive patients attending these clinics. Sampling of the apparently "healthy" subjects in the general population was intended to serve as control.

The non-response rate of 11.4% obtained in this study was slightly higher than the predicted 10% non-response rate used in calculating the sample size. The number of females recruited in each of the three sampling locations was slightly higher that the males. These differences were not statistically significant ($p > 0.05$). The number of subjects recruited from the Diabetic clinic was higher than that recruited from the hypertensive clinic. This difference was due to logistical reasons; it does not imply that there are many more diabetic patients than hypertensive patients attending clinics in PMGH.

Three of the subjects from the diabetic clinic were excluded from the study because in two cases the

quantity of urine was insufficient and in the other the urine container was not returned.

The results indicate that the urine samples of 35 of the 77 subjects recruited from the diabetic clinic and 7 of the 23 subjects recruited from the hypertensive clinic were positive for clinical albuminuria. This gives a prevalence rate of 45.5% and 30.4% of clinical albuminuria among patients attending the diabetic and hypertensive clinics in PMGH respectively. The duration of diabetes and hypertension in most of these patients was not recorded as part of this study. However, most patients with clinical albuminuria can develop overt diabetic nephropathy, leading to end stage renal disease [3,4]. Thus, the need for early detection and appropriate intervention aimed at preventing progression of the condition cannot be overemphasized.

The mean BMI of both male and female subjects with clinical albuminuria was within the range (25.0 – 29.9kg/m^2) indicating overweight. There was no statistically significant difference in the mean age of this group of subjects. This indicates possible common risk factor for diabetes and hypertension for both male and female subjects.

Screening of random urine sample for the early detection of MAU in susceptible individuals can serve as a way of either reducing or preventing the onset of renal damage and cardiovascular disease [3 – 7]. The excretion of albumin in urine is not constant, thus for clinical diagnosis of MAU urine samples should be tested at least three times within a 3 – 6-month period [10,11]. If the result is abnormal in 2 out of 3 tests then the patient is positive for MAU [10,11].

In the present study a single screening test for MAU was performed to obtain base-line data that can be used to assess the prevalence of MAU among patients in PMGH.

The results show that 44 of the 79 urine samples were positive for MAU, which indicates prevalence of 55.7%. This prevalence rate for MAU among the subjects in this study is higher than the 4.7% to 46.0% reported for patients with Type 2 diabetes and hypertension in the some studies [4,7,11]. The differences in the various results may be due to several factors, which include age, sex, race, severity of the disease and concomitant risk factors [4,7,11]. In our study the age range (17.0 – 87.0 years) and BMI range (15.22 – 38.33kg/m^2) of all the subjects with MAU were wider than that reported in some studies [7].

The mean ages and age ranges of both male and female subjects with MAU were higher than the mean ages and age ranges of male and female subjects in the groups with Normal urine. This result is similar to that reported by others [7]. The observed lower BMI among the males (25.84kg/m^2) with MAU compared to the females (26.54kg/m^2) with MAU and the subjects in the Normal groups may be due to the high number of elderly males in the MAU group. The age range of the males with MAU was 22.0 – 87.0yrs. Older individuals are more prone to developing negative

nitrogen balance, which leads to weight loss and lower BMI.

The general prevalence of MAU was higher among the female subjects (30.4%) compared to the male subjects (25.3%). Our data is different from that of Ahmedani et al [7], who reported that MAU was more frequent in males compared to females (37.1% vs. 29.9%). Unlike our data that refers to both diabetic and hypertensive patients combined, the findings of Ahmedani et al [7] was related to patients with Type 2 diabetes. Our result for diabetic subjects with MAU indicates higher prevalence of MAU among males (45.4%) compared to females (37.0%). The result is similar to that report by Ahmedani et al [7].

In general a person is said to have hypertension when the mean arterial pressure is greater than the upper range (110mm/Hg) of accepted normality under resting conditions [9]. This increase in the upper range usually occurs when the Diastolic blood pressure is greater than 90mm/Hg and the Systolic blood pressure is about 130 – 140 mm/Hg [9]. The combined diastolic and systolic results for blood pressure show that the prevalence of hypertension was higher among females (19.6%) compared to males (3.0%) with MAU. The results also indicate that hypertension among the males with Normal urine was higher than the males with MAU. Our results indicate that over 10.0% of apparently healthy male and female subjects in NCD may be hypertensive and or diabetic. This indicates the urgent need to advocate for voluntary screening for diabetics and hypertension among the general population in NCD.

CONCLUSION:

The prevalence of MAU among diabetic and hypertensive patients attending clinics in PMGH is 55.7%. MAU is a subclinical parameter, which is the most significant single predictor of progressive microvascular disease that can lead to macro-vascular disease if not detected and treated appropriately [4,10]. Thus, the clinical importance and the need for greater awareness of MAU in diabetic and hypertensive patients cannot be overemphasized.

Screening diabetic and hypertensive patients for MAU should be an integral part of the comprehensive management strategy for both groups of patients and for those at risk of developing these conditions.

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IMPACT OF HIV/AIDS- STIGMA AND DISCRIMINATION ON THE ACCESS TO VCT AND OTHER HEALTH SERVICES IN SELECTED POPULATIONS IN THE NATIONAL CAPITAL DISTRICT (NCD), PAPUA NEW GUINEA

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ABSTRACT

A number of research findings have linked stigma, discrimination and fear with poor participation in Voluntary Counseling and Testing (VCT) programs. Cultural factors, attitudes and behaviours strongly influence the spread of HIV/AIDS and these have been extensively studied in several sub-Sahara African countries. Treppe and Wambua believed that stigma, silence, discrimination, denial and lack of confidentiality would contribute to an environment of fear that undermines the prevention and treatment efforts, thereby increasing the impact of the HIV pandemic in Papua New Guinea.

The objective of this study was to investigate the Impact of HIV/AIDS-Stigma and discrimination on the access to VCT and related services in selected areas of the National Capital District, Papua New Guinea.

A semi-structured questionnaire survey comprising of closed and open ended questions was carried out among youths respondents (15-24 years) selected at random, but gender stratified, from two sub-urban areas of the National Capital District, Papua New Guinea. The areas studied were Elevala and Morata 1. Important questions included in the questionnaire aimed at exposing the existence of stigma, fear and discrimination that would occur when close relatives or/and people of the immediate community know about the HIV/AIDS status of individuals, and linked these to impacts on access to VCT and related services. In-depth focus group

discussions were also carried out to confirm issues encountered in the quantitative surveys and to disclose other concerns of the community inherent to HIV/AIDS stigma and discrimination.

Out of a total of 380 respondents from the areas surveyed, 364 (95.8%) indicated existence of self stigmatization, while 335 (88.2%) showed perceived stigma. The notion of perceived discrimination and discriminating others occurred among 322 (84.7%) and 349 (91.8%) respondents respectively.

Both stigma and discrimination were found to impact negatively on VCT and other services; with 255 (67.1%) respondents expressing fear of what to do with HIV positive results, 209 (55%) indicating self withdrawal from normal duties and 15 (3.9%) exhibiting suicidal tendencies in the event where HIV test would reveal positive results.

Despite the negative impacts of stigma and discrimination it was reassuring however, to see the majority of respondents; n=347 or 91.3 %) indicating willingness to utilize VCT services, and readiness for HIV testing; n= 266 (70.0%).

Focus group discussions showed consistencies in the above findings, but also revealed a strong attitude of abandonment and rejection of an HIV positive person by family members, relatives, friends and workmates. Scepticism whether service providers and caregivers would attend to HIV positive clients politely as they would do with other clients was also highlighted. These results which had little or no significant gender based differences, tended to agree with patterns of studies carried out elsewhere mostly in sub-Saharan African countries.

HIV/AIDS - Stigma and discrimination create fear and discouragement as reported by the individuals surveyed, and collectively forms a great barrier in the access to VCT and other related services.

Due to the wide diversity in cultural norms in Papua New Guinea, the study should be quickly tested in other areas including rural populations, such that outcomes may be used to complement and strengthen the ongoing government awareness on VCT in the country.

Key Words: HIV/ AIDS, Stigma, Voluntary, Counselling, Testing, Papua New Guinea
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INTRODUCTION:

During World AIDS Day commemorations held in 2006, the United Nations Secretary General Dr Kofi Annan strongly recognized that "HIV/AIDS has inflicted the single greatest reversal in the history of human development, and hence it has become the greatest challenge of our generation".

He emphasized on the need for country political leaders to work together with civil society groups in order to strengthen protection of vulnerable groups [1].

In Papua New Guinea (PNG), since the first patient testing positive for HIV was reported in 1987, the rates of infection have risen almost exponentially to more than 18,484 reported cases in 2006 [2] . According to the World Health Organization (WHO) representative to PNG [3,] if no decisive action is taken to reverse the trend, the above figures could reach one million in the next 10 - 15 years. One of the important UNICEF's activities in PNG focus on the HIV/AIDS prevention program particularly on the reduction of Mother To Child Transmission (MTCT) through a number of approaches including development of protocols, policies and equipping health workers with skills in Voluntary Counseling and Testing (VCT), promotion of feeding options for babies of HIV- positive mothers, and assisting in the testing of appropriate antiretroviral (ARV) drugs[4].

The recent mass burials of abandoned corpses of children and adults in the National Capital District (NCD), points to stigma and discrimination by relatives who disassociated themselves from the dead, apparently due to HIV/AIDS infections [5,6]. Students' research projects on HIV/AIDS undertaken in selected secondary schools in the NCD on social and behavior change have made reference to lack of adequate education, on HIV/AIDS.

Inadequate education is likely to perpetuate stigma, discrimination and denials, and if these are not fully and collectively addressed, they would hamper important initiatives being made to combat the HIV/AIDS in the country [7, 8.] The UNAIDS maintains that HIV/AIDS – related stigma is one of the greatest barriers to the provision of treatment, care and support to people living with HIV/AIDS (PLWHA) [9]. An important pre-requisite to the ARV treatment program is the VCT, access of which is encouraged by the National Strategic Plan (NSP) on HIV/AIDS [10]. However, there have been concerns by some government ministers that not many people are coming forth for VCT associated health services, and subsequently if required, for ARV treatments. The reasons for the poor response in VCT services need to be elicited through reliable research data. A number of research findings have linked stigma, discrimination and fear with poor participation in VCT programs [9,11,12]. Valdiserri has strongly stressed that, "To underestimate the insidious

power of stigma is to risk the very success of effective HIV prevention and care programs" [13]. In PNG some studies on the awareness and attitudes towards HIV among pregnant women were carried out at the Port Moresby Antenatal Clinic in 2003 [14]. This study revealed that a large number of patients (97%) knew that transmission of HIV was by sexual contacts (97%), and through MTCT (96%). However, misconceptions that could lead to stigma existed with patients who believed that HIV could be transmitted by mosquitoes (36%), and with respondents (17%), who thought care for AIDS patients, was a risk [14]. Detailed cultural factors, attitudes and behaviours already implicated in the spread of HIV/AIDS and extensively studied in several sub-Saharan Africa have not similarly and adequately been identified and investigated in PNG [15]. Treppe and Wambua re-enforces the fact that stigma, silence, discrimination, denial and lack of confidentiality contribute to an environment of fear that undermines the prevention and treatment efforts, thereby increasing the impact of the HIV pandemic in PNG [16]. For instance, in 2004, Maruia observes that HIV/AIDS infections among females had increased to 46% of the total cases in the PNG, hence suggesting a gender equalised epidemic in the country [17]. This led to the importance and emphasis on focussing on women and girls during the fight against HIV/AIDS in the Pacific [17]. The goal of PNG's NSP to reduce HIV to below 1% of population by year 2010 does not explicitly address vulnerability of young girls and women to HIV due to cultural biases and socioeconomic inequalities[18]. In the PNG HIV/AIDS Estimation Report for 2007, however, it was emphasized that accessible and equitable strategies for responding to the control of HIV/AIDS should also be gender sensitive, and include measures to ensure that there is no stigma, discrimination or barriers for people living with HIV [19]. Existing information on the existence of stigma and discrimination and inherent impacts to VCT is little or sketchy hence: the need for more research to investigate the reasons, why young girls and women among other youths become relatively more vulnerable to HIV/AIDS, in order to recommend and embark on appropriate interventions. Research studies in selected suburban sections of the NCD communities would identify status of attitudes, or change of behaviour and attitudes towards HIV/AIDS. The research studies should facilitate the understanding of the associations among the relatively low VCT service utilization rates, and HIV related stigma, discrimination and other psychological factors. Based on the outcomes, suggestions on intervention strategies needed to positively improve the current situation will be recommended.

The main objective of this study was to investigate the impact of HIV/AIDS - Stigma, discrimination, and other psychological factors on the access to VCT and related health services. The specific objectives were: To determine the major reasons / barriers that lead to low VCT, relatively low service

utilization and recommend appropriate interventions. To determine the prevalence of and factors linked to HIV/AIDS - Stigma, discrimination and recommend interventions.

METHODOLOGY

Elevala (Hanuabada) village, National Capital District (NCD):

Hanuabada – Elevala is a Motu-Koita village situated in the North West part of Port Moresby. The Motu and Koita are a group of people indigenous to areas in and around NCD PNG. They number about 30,000 of the 250,000 total population of NCD [19]. The rapid spread of HIV/AIDS virus constitutes one of the recognized threats to the current generation of Motu and Koitabu [20]. The village of Elevala, part of Hanuabada was selected at random from the North West section of Port Moresby for this study.

Morata 1 village, National Capital District (NCD)

The Morata 1 is a suburban area also of Port Moresby North West. Socio-economically, residents are middle class settlers' mostly unemployed people of mixed ethnic groups that speak English and Pidgin English. Early dropout from schools, unemployment has lead to many youth reverting to criminal activities including gambling, consumption of illegal drugs and illegal home brewed alcohol. It is a public knowledge in the NCD that the levels of crime in Morata are known to be considerably high.

Employing a standard questionnaire, volunteers from the two villages were interviewed. The volunteers were recruited at random from young adults aged 15-24 years stratifying the selections to involve both women and men in order to minimize any gender linked biases and influences on the study outcomes. Where a volunteer was outside the 15-24 years bracket, the next male or female was considered. The study targeted youths and young adults; females and males who have been the most vulnerable to the disease [18]. The age group of 15-24 years was therefore employed as identified by the United Nations for policy and programming response.

The questionnaire used in a similar study in Tanzania [21] was adapted with slight modifications, which included its re-design to suit the three major languages spoken in PNG notably; English, Pidgin and Motu (Appendix 1). The questionnaire was pre-tested with relatively fewer participants in two communities; Gogodala community at Badili and the 9-Mile Morobe settlement both at Port Moresby. After final modifications, the questionnaire which was semi-structured and comprising of closed and open ended questions was employed in this study. The questionnaire documented basic characteristics of participants such as gender, age, occupation, socioeconomic status, and languages spoken. In addition, the questionnaire focussed on important questions related to people's knowledge on the availability of HIV - testing services in the country, and

specifically whether people would like to make use of the VCT. The questionnaire further addressed issues that exposed the existence of stigma, discrimination and fear due to HIV/AIDS. Specific questions focussed on the impacts of stigma and discrimination on VCT particularly where close relatives or /and people of the immediate community, and work place would know about HIV- sero-positive status of individuals. Study questions were extended to investigate respondents' views whether PLWHA would withdraw from their immediate communities or whether they would face dismissal from their daily work places. The interviewers assessed both the quantitative and qualitative information given by the respondents in the above questionnaires and summarized the answers in "yes" or "no" quantifiable format of responses (Appendix 2).

The assessment of negative attitudes of respondents towards persons with or presumed to have contracted HIV/AIDS were used to indicate stigma and discrimination. All that respondents knew about the availability of VCT services, and whether they would be willing to make use of the services was also investigated. The associations between levels of stigma, discrimination as predicted from the participants' responses were documented. The knowledge of respondents about VCT and their willingness to utilize the VCT services were examined with the help of *Epi Info - Statcalc* software and *chi square* analysis was employed to test the significance of the differences encountered.

Before the study was carried out, its objectives were explained to the Chairman of Motu Koitabu and to Counsellors or community leaders of the other selected study sub-urban areas, who in turn, explained and communicated to residents about the objectives and benefits of the research and solicited their cooperation.

Five (5) research assistants were recruited and trained in order to acquire strong familiarity with the research question and objectives of the study. All the assistants were fluent in *English* and *Pidgin* languages, and two of them; a female and a male understood *Motu* in addition to the above two languages. Interviewers were also trained to be able to relate to the study population in a friendly non threatening manner. During training, emphasis was made on the need to maintain confidentiality, neutrality and ethical conduct during the interview processes.

A total of 408 questionnaires were distributed in a randomized, but gender stratified manner to 408 youths of ages (15 – 24) years. Respondents were allowed to fill questionnaires with or without explanatory help from interviewers. Only a total of 380 youths i.e. 184 (males) and 196 (females) returned filled questionnaires. In the process of interviews, 8 - 10 individuals were carefully identified and requested to join focus groups

discussions during meetings that were convened few days later in the School of Medicine and Health Sciences (SMHS) University of Papua New Guinea (UPNG). A separate, but briefer questionnaire was designed to guide an interviewer and a note taker during the focus group discussions. In order to allow free interactions, four focus groups consisting of; Gp1 (females), Gp2 (males) from Hanuabada Elevala area; and Gp3 (females), Gp4 (males) from the Morata 1 study area were formed. To avoid "*spill over effects"* from participants of one group to another group, the discussions with each focus group were held separately. Interviews were carried out in a secluded area to ensure confidentiality. Interviewers were required to introduce themselves, explain the objectives and benefits of the study to the participating individuals and to the community.

Informed consent was obtained from each consented participants, who was then requested to read and sign a confidential consent statement. Participants with difficulty to communicate in English had the consent statement read and explained to them in motu or pidgin languages before requested to sign. Each participant was clearly informed of their freedom to withdraw from the study at any time. In all cases interviewers assured the participants of their anonymity, confidentiality and right to withdraw from the study if they desired so.

The first questionnaire (Appendix 1) documented a closed (Yes or No) and open ended responses or free views. Hence, expert analysis and summary of participants answers to the questions in the first questionnaire was carried out by the interviewers with the aid of another, but simplified questionnaire (Appendix 2) which indicated only closed answers; Yes or No for all questions. This approach facilitated the ease in analysis and quantification of the blend of closed and open ended responses pointed out above. Collected data were coded, collated and analysed by the Epi Info - Statcalc software. Chi square and p values of various forms of data were computed. The level of significance was set at $p = 0.05$.

Ethical clearance and permission for this study was obtained from the Medical Research Advisory Committee (MRAC) of the National Department of Health PNG.

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RESULTS

Out of 408 questionnaires distributed, 380 (93.1%) participants i.e. 184 (45.1 %) males, and 196 (48.0 %) females returned filled questionnaires from the two study areas, which were treated collectively as a whole. The basic characteristics of the participants are displayed in Table 1. Ages of all individuals surveyed were within the 15 – 24 years

target group for policy and programming response as stated earlier in this report. Of the 380 participants, 82 (21.6%) or 52 (13.7%) females and 30 (7.9%) males did not have the minimum primary school education. The rest 298 (78.4%) were educated to primary, secondary or college/ university levels. The differences in these data were highly significant; $p < 0.001$. From Table 1, it was also evident that almost half of the youths n = 181 (47.6%) did not have any employment. Among those without employment, females constituted a larger proportion of 111 (29.2%) against 70 (18.4%) males. Employment in the public and informal sectors was as low as 77 (20.3%). Although details are not provided here the real employment scenario looked bleak given that most people were engaged in the informal sectors such as sales of local crops and vegetables in local markets, and sales of betel nuts that do not offer much for a living. Quite a few youths worked as office/bank clerks, shop salesmen and saleswomen, club and restaurant attendants, or as artisans such as carpenters, electricians, auto mechanics, plumbers and masons. Although this study describes in brief the educational and socioeconomic status of people in the area of survey, it does not intend to make firm linkage with the HIV/AIDS study outcomes. Where presumptive associations have been made, these require future and separate investigations before viable conclusions.

Table 2 outlines the prevalence of the responses of the 380 participants to various research questions; self stigmatization, perceived stigma, perceived discrimination from others and possibility of respondent in discriminating others. Of the 380 people interviewed, 364 (95.8) gave responses that indicated self-stigmatization as a major barrier to VCT. In a similar pattern perceived stigmatization by others was also rated high as a limiting factor to VCT and related services; n = 335 (88.2%). Perceived Discrimination of respondents from others, and the possibility of the respondents discriminating others or people infected with HIV/AIDS virus were rated considerably high with responses of n = 323 (85%) and n = 349 (91.8%) respectively.

As evident from the *chi square* data, the above findings on stigma and perceived discrimination did not show significant gender based differences; $p > 0.05$ (Table 2). There was no clear relationship of the results with the levels of education, however, it was noted that only 78.4% of the respondents had a primary level education or above. The significant number of youths without basic education i.e. n = 82 (21.6%) could have presumably contributed as well to the relatively high levels of stigma and perceived discrimination observed.

Table 3 summarizes the respondents' views on rejection by close family members, dismissal from work place and self withdrawal from duties

following disclosure HIV +ve results. In this study 282 (74.2%) believed they would be rejected by relatives and close family members. A smaller proportion of 87 (22.9%) thought they will not be rejected by their love ones, while 11 (2.9%) of them were either undecided or did not provide answers to the question. The differences among these findings were statistically significant ($p < 0.05$). Given that fear of rejection would serve as a major barrier to voluntary counselling and HIV testing, these findings are important and should be considered in formulating interventions.

In Table 3, a considerable proportion of respondents n= 226 or 59.5% thought they would be dismissed from work place subsequent to positive HIV test results. Although these figures may not seem very high, they are, however close to the cumulative number of employed and schooling respondents (n= 199 or 52.4 %) as depicted in Table 1. Consequently, dismissal from work place for those employed or schooling is again a great fear and obstacle that would discourage individuals from undertaking the VCT.

Regarding self withdrawal from duties: Of 380 respondents surveyed, 209 (55.0%) or 75 (19.7%) males and 134 (35.3%) females felt they would withdraw from duties due to HIV +ve test. However, 100 (26.3%) or 60 (15.8%) male and 40 (10.5%) female respondents will not withdraw but showed self encouragement to continue with their normal duties. The rest 71 (18.7%) or 49 (12.9%) males and 22 (5.8%) females did not answer this question. It seems in these findings that women were almost twice as much more likely to withdraw from daily duties than men. The reasons for these findings while statistically significant need to be explored. The total numbers of respondents who indicated fear of dismissal from work place due to HIV+ test n = 226 or 59.5% as seen in Table 3 agrees with the cumulative number of respondents who were either employed or schooling (52.4%, Tables 1).

In Table 4, the availability of support from friends, relatives and health workers subsequent to HIV +ve results is displayed. The majority of respondents, 354 (93.2%) with an almost equal distribution by gender 45.8% (174) males and 47.4% (180) females believed they will get support from friends and relatives. These findings, which are statistically significant ($p < 0.05$) are re-assuring to HIV +ve individuals, particularly given that the immediate families as indicated in Table 3; n= 282 (74.2%), would reject HIV +ve persons. Regrettably, quite a large proportion of respondents; n = 339 (89.2%) with almost equivalent* distribution by gender; males = 169 (44.5%) and females = 170 (44.7%) strongly believed they will not get support from health workers once their sero-status were known to be positive.

A fewer number of respondents 36 (9.5%) will not expect lack of support from health workers in the

event of a positive HIV sero-status. Five (5) or 1.3% respondents to this study did not answer this question. Overall, gender based differences in the responses to the question of lack of support from health workers were statistically insignificant; $p > 0.05$. In this study it could be agreed that the high indicators of lack of support from health workers (n= 339 (89.2%) could contribute to increased HIV/AIDS- stigma and drive away many people from accessing the voluntary counselling and testing for HIV.

Table 5 illustrates the responses to the questions of fear of what to do with HIV positive results and to whether there would be possibilities of suicide after sero - positive results. Of the 380 respondents interviewed, and appreciable number; n = 255 (67.1%) expressed fear of what to do with the HIV positive results. About half of these or n = 118 (31.1%) did not show fear of HIV test. Quite a few of them; n = 7 (1.8%) provided no responses to the question. The finding that a high level of fear exists about what to do with the HIV positive results does point to stigma, and this must be addressed as a pre-requisite to VCT and associated services.

A question was posed to test respondents' views about the possibilities of suicide following HIV + results (Table 5). It was encouraging to find that, of 380 respondents, only a small number; n =15 (3.9%) said" yes" and a relatively large proportion; n=356 (93.7%) gave a "no" answer to this intriguing question, while 9 (2.4%) of them were either undecided or did not want to respond. Although only a relatively small number; n =15 (3.9%) showed inclinations to suicide, this matter cannot just be ignored given its serious impacts on individuals and the community. There about 75 VCT sites in the country [19].

Out of these about 16 sites are located in the NCD. Table 6 displays respondents' knowledge of VCT services and VCT sites in PNG. Of the 380 interviewed subjects, 308 (81.1%) or 136 (35.8%) males and 172 (45.3) females knew about VCT services in PNG. As many as 65 (17.1%) said they did not know of VCT sites in the country. A few of the respondents; n=7 (1.8%) did not answer this question.

Asked to name or mention a VCT, only a considerably low number of interviewees; 246 (64.7%) could name at least one VCT center. In Table 7, the responses to the questions on willingness to utilize VCT and to the attitudes towards HIV test have been summarized.

The question whether or not respondents were willing to utilize VCT and whether they were willing to do HIV test or not, received quite similar patterns of responses. The majority of them indicated they were willing to utilize VCT; n = 347 (91.3%), and also willing to do HIV Test; n = 343 (90.3%). The distributions of the responses by gender were almost equivalent.

Table 1: Basic characteristics of respondents (age: 15-24yrs)

Characteristics	Male		Female		Total		P- value
	n	(%)	n	(%)	N	(%)	
Education(attained)							
None	30	(7.9)	52	(13.7)	82	(21.6)	
Primary	60	(15.8)	80	(21.1)	140	(36.8)	
Sec/college/univ	94	(24.7)	64	(16.8)	158	(41.6)	p< 0.001
Employment (currently)							
None	70	(18.4)	111	(29.2)	181	(47.6)	
Public& informal sectors	52	(13.7)	25	(6.5)	77	(20.3)	
Students	62	(16.3)	60	(15.8)	122	(32.1)	p< 0.001

Figures in parenthesis are percentages

Table 2: Response of Participants to various research questions on stigma and Discrimination

	Male		Female		Total		
Research question	n	(%)	n	(%)	N	(%)	p -value
Self Stigmatization							
YES	179	(47.1)	185	(48.7)	364	(95.8)	
NO	4	(1.0)	9	(2.4)	13	(3.4)	
UNANSWERED	1	(0.3)	2	(0.5)	3	(0.8)	p > 0.05
Perceived Stigmatization by others							
YES	158	(41.6)	177	(46.6)	335	(88.2)	
NO	23	(6.0)	17	(4.5)	40	(10.5)	
UNANSWERED	3	(0.8)	2	(0.5)	5	(1.3)	p > 0.05
Perceived Discrimination from others							
YES	150	(39.5)	173	(45.5)	323	(85.0)	
NO	34	(8.9)	23	(6.0)	57	(15.0)	
UNANSWERED	0	0.0	0	0.0	0	0.0	
Possibility of respondents Discriminating others							
YES	164	(43.2)	185	(48.7)	349	(91.8)	
NO	17	(4.5)	9	(2.4)	26	(6.9)	
UNANSWERED	3	0.8	2	(0.5)	1	(0.3)	p < 0.05

Figures in parenthesis are percentages

Table 3: Response of participants to various research questions on rejection, dismissal and self withdrawal

Research question	Male		Female		Total		
	n	(%)	n	(%)	N	(%)	p- value
Rejection by family							
YES	124	(32.6)	158	(41.6)	282	(74.2)	
NO	54	(14.2)	33	(8.7)	87	(22.9)	
UNANSWERED	6	(1.6	5	(1.3)	11	(2.9)	p< .05
Dismissal from work place							
YES	133	(35.0)	93	(24.5)	226	(59.5)	
NO	30	(7.9)	32	(8.4)	62	(16.3)	
UNANSWERED	21	(5.5)	71	(18.7)	92	(24.2)	p < 0.001
Self Withdrawal from duties							
YES	75	(19.7)	134	(35.3)	209	(55.0)	
NO	60	(15.8)	40	(10.5)	100	(26.3)	
UNANSWERED	49	(12.9)	22	(5.8)	71	(18.7)	p< 0.001

Figures in parenthesis are percentages

Table 4: Availability of Support from Friends /Relatives and Lack of Support from Health Workers after HIV+Ve Results

\	Male		Female		Total		
	n	(%)	n	(%)	N	(%)	p -value
Support after HIV +ve Results							
YES	174	(45.8)	180	(47.4)	354	(93.2)	
NO	8	(2.1)	15	(3.9)	23	(6.0)	
UNANSWERED	2	(0.5)	1	(0.3)	2	(0.8)	P> 0.05
Lack of support from Health workers							
YES	169	(44.5)	170	(44.7)	339	(89.2)	
NO	12	(3.2)	24	(6.3)	36	(9.5)	
UNANSWERED	3	(0.8)	2	(0.5)	5	(1.3)	p > 0.05

Figures in parenthesis are percentages

Table 5: Participants responses to various research questions on stigma and Discrimination

	Male		Female		Total		
Research question	n	(%)	n	(%)	N	(%)	p -value
Fear of What to do with HIV+results							
YES	95	(25.0)	160	(45.1)	255	(67.1)	
NO	84	(22.1)	34	(8.9)	118	(31.1)	
UNANSWERED	5	(1.3)	2	(0.5)	7	(1.8)	p < 0.001
Elements of suicide after HIV+ve test							
YES	8	(2.1)	7	(1.8)	15	(3.9)	
NO	171	(45.0)	185	(48.7)	356	(93.7)	
UNANSWERED	5	(1.3)	4	(1.0)	9	(2.4)	p > 0.05

Figures in parenthesis are percentages

Table 6: Respondents knowledge of VCT services and VCT sites

	Male		Female		Total		
Research question	n	(%)	n	(%)	N	(%)	p -value
Know about VCT services							
YES	136	(35.8)	172	(45.3)	308	(81.1)	
NO	46	(12.1)	19	(5.0)	65	(17.1)	
UNANSWERED	2	(0.5)	5	(1.3)	7	(1.8)	p< 0.001
Correct naming or mention of VCTsite							
YES	116	(30.5)	130	(34.2)	246	(64.7)	
NO	60	(15.8)	54	(14.2)	114	(30.0)	
UNANSWERED	8	(2.1)	12	(3.2)	20	(5.3)	p > 0.05

Figures in parenthesis are percentages

Table 7: Willingness to utilize VCT, and attitudes towards HIV test

Research question	MALES		FEMALES		TOTAL		
	n	(%)	n	(%)	N	(%)	
Willingness to utilize VCT							
YES	171	(45.0)	176	(46.3)	347	(91.3)	
NO	13	(3.4)	20	(5.3)	33	(8.7)	p > 0.05
UNANSWERED	0		0		0		
Willingness to do HIV Test							
YES	163	(42.9)	180	(47.4)	343	(90.3)	
NO	17	(4.5)	13	(3.4)	30	(7.9)	
UNANSWERED	4	(1.0)	3	(0.8)	7	(1.8)	p > 0.05
Readiness to do HIV Test							
YES	125	(32.9)	141	(37.1)	266	(70.0)	
NO	53	(13.9)	49	(12.9)	102	(26.8)	
UNANSWERED	6	(1.6)	6	(1.6)	12	(3.2)	p > 0.05

Figures in parenthesis are percentages

A total of 171 (45%) males and 176 (46.3%) females indicated " yes" to VCT utilization, while 163 (42.9%) males and 180 (47.4%) females showed willingness to do HIV Test. Chi square analysis showed no significant gender based differences in the results, ($p > 0.05$). Although generally large number of respondents were willing to utilize VCT services, 347 (91.3%) and do HIV test 343 (90.3%), only a relatively smaller number of respondents 266 (70%) demonstrated readiness to do the HIV test. Most probably, the decline of the number of respondents ready for the HIV test could be attributed to stigma and fear of being discriminated.

The similar figures outlined in Table 5, which stress on fear of what to do with HIV positive test results, could offer further explanations as to why only 70 % of respondents indicated readiness for HIV testing. Hence; to re-emphasize, stigma and fear of HIV need to be reduced or if possible eliminated through appropriate awareness campaigns in order to facilitate an unimpeded access to the voluntary counselling and testing for HIV.

Focus group discussions: Focus group discussions were held with four groups; two from Morata (male and female groups) and two from Hanuabada, also male and female groups. Groups consisted of 5-7 participants and discussions with each group were held separately. Apparently, the findings from the discussions were mostly consistent to the outcomes discussed above under the quantitative and qualitative section; except where we noted new revelations and negative attitudes as consequences of HIV sero-positive results such as:

- A strong sense of withdrawal from social activities.
- An intense fear of being discriminated by family, relatives and friends.
- Strong beliefs that HIV +ve individuals will be blamed.
- Experience where relatives of focus group members were mistreated by health workers.
- Many youths are afraid until VCT program is designed to motivate people.
- Lives of HIV +ve individuals will be shortened because of too many worries and discrimination from families and the community.
- The person's knowledge that "there is no cure to the disease makes the person die quickly".
- An unusual proposal of one youth to be paid some money in order to be tested was thwarted by other focus group members.

There were also some re-assuring findings:

- A few individuals remarked that they will seek VCT and subsequent services including treatment if required.

- Some females said "there are lots of ways to get help, through medicines and counselling". In addition, they revealed that practical approaches like "getting medicines, eating properly, just living a normal life, looking after own self and doing more regular exercises instead of thinking to kill own self " were the right thing to do.
- A male respondent further remarked," It depends on the attitude of the person; the person who lives positively, will have a prolonged life".
- A number of the young people are aware of the Waigani Anglicare VCT project and the 4-mile Poro support VCT project.

DISCUSSIONS

This study has demonstrated the existence of high levels of HIV/AIDS – stigma and discrimination as indicated by most of the respondents from the areas surveyed. An estimated 95.8% of the respondents believed self stigmatization was a matter of concern in VCT services, while 88.2% respondents thought perceived stigmatization was also an important issue that needed consideration when implementing VCT. Of the interviewed respondents, 85.0% felt perceived discrimination from others prevailed, while 91.8% of respondents saw the possibility of people in the community discriminating HIV/AIDS infected individuals. The impacts of stigma and discrimination were numerous, with as many as 74.2 % of respondents agreeing that HIV positive people would be rejected by their families. A substantial proportion of respondents; 59.5% feared employers would dismiss sero-positive workers from employment. In addition, a staggering large proportion; 89.2% of those interviewed believed HIV+ve persons will not get support from health workers. The above discriminatory attitudes could result into considerable rates of self withdrawal from duties as pointed out by 55% of the respondents. Relatively larger numbers of respondents; 91.3% showed willingness to utilize VCT services. About 90.3% indicated willingness to do HIV test. Ironically, only a relatively smaller number of interviewees; 70% showed readiness to do the HIV test, and this could again be explained by the fear due to stigma and discrimination as pointed out earlier.

Knowledge of VCT site could be a good indicator of the ability of a person to access VCT and associated services such as ART. Of the 380 interviewed individuals, a considerable total of 308 (81.1%), or 136 (35.8%) males and 172 (45.3) females knew about VCT services in the country. However, the fact that as many as 65 (17.1%) did not know or mention a single VCT site seemed to cast doubt or contradict the knowledge of VCT claimed above (Table 6). In fact when we attempt to explain the outcomes of Table 6, we do note from Table 1 that only 158 (41.6%) of the youths interviewed had attained education levels of secondary school and above. The rest had either

primary school; n = 140 (36.8%) or no education at all; n = 82 (21.6%). It has been found that low VCT service utilization could be due to lack of adequate education [22, 23], and this should be considered as an important area that would require intervention.

It was clear from this study that stigma, discrimination and associated impacts as detailed above constitute strong obstacles and barriers to the voluntary counselling and testing (VCT) for HIV. As a consequence, delivery of VCT related services such as coping with HIV, promotion of condom usage and recommendation of ARTs to affected individuals would be hampered. Generally, the numbers of males or females responding to issues of concerns were almost equivalent, suggesting gender equalized interests and concerns in the control of the disease. The fact that relatively large numbers; n = 82 (21.6%) or 52 (13.7%) females and 30 (7.9%) males did not have the minimum primary school education, remains a matter of concern. Low or no education would mean less knowledge about VCT and consequently limit access to benefits of the numerous health promotions and awareness campaigns being made to fight the HIV/AIDS pandemic. The low level and low calibre of employment shown in Table 1 could point to vulnerability of youths; some to HIV/AIDS and some to even criminal activities. This, however, would warrant further investigations before any conclusions. Findings from the focus group discussions were mostly consistent to the outcomes of the quantitative and qualitative surveys. There were however, new issues emerging such as lack of adequate education to facilitate knowledge and understanding of important information inherent to HIV/AIDS and poverty and its consequences. These issues could represent in-depth feelings of many youths and therefore they need to be taken into serious considerations when designing viable and sustainable interventions towards motivating people to gain access to VCT and related services. Although data obtained from quantitative and qualitative questions, and information from focus group discussions could collectively be used as baseline indicators, these indicators may not fully represent the entire country of which about 85% of its population lives in the rural areas in different ethnic groups and cultures. An extension of the study to the rural areas of PNG is therefore strongly recommended.

CONCLUSIONS

High levels of HIV/AIDS - stigma and discrimination have been highlighted in this study. Both HIV/AIDS stigma and discrimination will continue to impact negatively on the access to VCT and other health services in the areas under study, and most likely in other areas of the country unless appropriate interventions are made. There is the need to join ongoing government initiatives to combat HIV/AIDS-stigma, discrimination and associated fear of rejection by others or dismissal

from work place and other daily activities. HIV/AIDS-stigma and discrimination are undisputed obstacles and barriers to the access of VCT and other health services, and must therefore be eliminated as an important step to fight the disease and its transmission. The youths, particularly the young girls and young women, are the future of the nation, and yet more vulnerable to the pandemic. They should therefore be targeted as a priority consistent to United Nations policy. Significant issues on lack of education, and lack of employment and their negative impacts on the control of HIV/AIDS emerged from this study, and these need to be investigated further and addressed accordingly. The study should also be extended to other parts of the country.

RECOMMENDATIONS

Although the data obtained could be used as baseline indicators, these data may not necessarily represent the entire country of which about 85% of its population lives in rural areas amidst different ethnic cultures and challenges. An extension of the study to the rural areas of PNG is therefore recommended in order to be able to design appropriate and agreeable interventions to complement and strengthen the ongoing government initiative and awareness campaigns on the VCT in the country.

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Appendix 1

QUESTIONNAIRE – QUANTITATIVE / QUALITATIVE SURVEY

Impact of HIV/AIDS- Stigma and discrimination on the access to VCT and other health services in selected populations of the National Capital District, Papua New Guinea

For the interest of readers of this report, questions in this questionnaire have been written in the three languages widely used and spoken in Papua New Guinea; English, Pidgin and Motu. Otherwise, surveyed respondents received a single and simplified questionnaire written in only one language; English or Pidgin or Motu in order to avoid confusions.

INTRODUCTION

One of the government initiatives to reduce the rates of HIV/AIDS infections is the Voluntary Counselling and Testing (VCT).

The VCT service is considered to be an important basis to control the transmission of the HIV epidemic.

Your views shall contribute into the successful implementation of the VCT activities and other related health services.

A: GENERAL INFORMATION

- Interview District _____
- Number [ ]
- Age of respondent [ ]
- Sex of respondent [ ]
- Area of residence _____
- Education level [1] No education
  [2] Primary Education
  [3] Secondary education
  [4] College or University Education
- Occupation _____

B: MAIN QUESTIONS AND EXPLANATIONS

1.0 About Stigmatization

Explanations:

The main ways of HIV transmission known in this country are:

(a) Heterosexual transmission
(b) Blood transfusion
(c) Mother to Child Transmission (MTCT)

Question:

1.1 *English:* Have you heard about the availability of HIV testing services in the country?
Pidgin: Yu harim pinis olsem igat hap we ol manmeri insait lo kantri husat igat AIDS I ken go na testim blut blong ol? _____
Motu: Oi kaomai vadain HIV seia dalana ia noho inai country dekenai?

1.2 Would you like to use these services?
Pidgin: Yu ting yu ken i go na ol dispela lain i helpim yu long testim blut blong yu? _____
Motu: Oi ura inai daladiaoi diba? _____
(a) If yes, explain briefly
Pidgin: Sapos yes, tok wai yu laik kisim dispela helpim.
_____
motu : bema oi mani oi kiki sisina _____
(b) If no, explain briefly
Pidgin: Sapos nogat, tok wai yu less lo kisim dispela helpim.
_____
motu : bema lasi mani oi kiki sisina _____
_____

1.3 How would you feel if you are told you have contracted HIV infection?
Pidgin: Bai yu pilim olsem wanem sapos ol I tok yu kisim HIV pinis?
(i) Firstly, state your own thinking _____
Pidgin: Givim tingting blo yu yet pastaim.
_____ *Motu:* Oi emu lalo be edena bomana?
_____
(ii) Secondly, what do you think your relatives or friends would think if they know?
Pidgin: Nau traim tok wanem samting ol famili na ol fren blo yu bai ting lo yu.
Motu: Oi emu varvra bona tura dia dore idia laloa oi be mai emu HIV/AIDS?
_____

2.0 About withdrawal and discrimination

2.1 Withdrawal:
If you discover you have contracted HIV, what would you do regarding your life and your usual business activities?
Pidgin: Sapos yu luk save olsem yu gat AIDS, bai yu mekim wanem lo laif blo yu na long ol wok yu save mekim lo wanwan dei?
_____*Motu:* Bema oi diba oi be HI gorere oi danaria vadaeni emu mona mauri be do ede bamona?
_____

2.2 On perceived discrimination:
If people such as relatives, friends, workmates etc. would know you have contracted HIV, what do you think your relationship with them would be?
_____
Pidgin: Sapos ol kain lain olsem ol wantok na ol fren wantaim ol wanwok blo yu i save olsem yu kisim AIDS, wanem samting bai i kamap namel lo yu wantaim ol?
_____ *Motu:* Bema emu varavara, turadia, or gaukara hebou taudia idia iba oi be inai gorere danu, oi laloa emui hetura do ia namo?
_____

2.3 On discriminating others:
Other people think that if they have acquired HIV/AIDS, they will be discriminated by their relatives, their friends etc. What are your views about this?
_____
Pidgin: Planti ol narapela man na meri save ting olsem sapos ol I kisim AIDS, ol wantok na ol fren blo ol bai mekim nogut long ol. Yu ting wanem lo dispela kain pasin?
_____ *Motu*: Taunimanima haida idia laloa bema inai gorere idia danaria neganai, edia turadia bona vara ese do idia hadikadia. Oi emu laloa be dahaka?
_____

3.0 About Rejection and/or Dismissal from existing relationships (as stated in the concerns).
3.1 Considering place of your work or place of daily activities/business, in the school, or college, or where you live, or your membership in a club or associations, if your colleagues know that you have contracted HIV, what do you think shall happen?
_____
Pidgin: Yu traim tingting lo ples blo yu lo wok o ples blo wokim bisnis na ol narapela wok na tu long skul, kolis, or long ples yu save stap long em wantaim ol club blo yu, sapos ol lain poroman blo yu i save olsem yu gat AIDS, yu ting wanem samting bai kamap?
_____
Motu: Oi emu gaukara gabu, noho gabu, sikuli gabu or morie gabudia haidai emu turadia bem idia diba oi be mai emu HIV, dahora oi laloa do ia vara?
_____

3.2 What do you think if a close partner such as a husband, wife, lover, friend or close relative would do if she/he knows through any means, or from your self, that you have contracted HIV?
_____
Pidgin: Yu ting wanem samting bai I kamap sapos man o meri blo yu o wanpela best fren blo yu o wanpela wantok husat i klostu moa yet lo yu i save olsem yu i gat AIDS? _____
Motu: Bema oi emu bamona namona ta,emu tau , emu hahine turana namona na varavara ta sibona ia diba or oi eses oi hadibaia oi be HIV danu neganai dahaka ia karaia?
_____
_____

4.0: About lack of support related to disclosure of results

4.1 If you get to know that you have been infected with HIV, whom would you inform first _____, and why
Pidgin: Sapos yu painim aut olsem yu gat AIDS, bai yu tokim husat pastaim long ol narapela na wai bai yu tokim dispela man or meri pastaim lo ol narapela.
_____ *Motu:* Bema oi diba be HIV gorere danu, daika do oi hadibaia dahaka guna _ _____ _____

4.2 What are your views regarding hospital services if service providers know that you have HIV infection?
Pidgin: Yu ting wanem lo ol helpim ol hausik bai givim sapos ol wokman lo hausik i save olsem yu I gat AIDS?
_____
Motu: Oi emu laloa be dahaka bemu hosipele iava durua henia taudia haida idia diba be HIV danu?
_____

5.0: About Fear of what to do with the test results
5.1 If you do an HIV test, and you get the results, how would a negative or positive result help you?
Pidgin: Sapos yu go lo test na kisim result blo yu, bai ol result I helpim yu *olsem wanem?*
(a) If *Negative*
Sapos result i tok yu nogat AIDS
_____

(b) If *Positive* _____
Sapos result i tok yu gat AIDS.

Motu: Bema HIV testi ta oi abia bona idia hadibanu, ia namo o ia dika be bamona do ia durumu?
(a) If *Negative*
Bema dika ?
_____
(b) If *Positive*
Bema namo ?
_____

6.0: About lack of benefit from testing as there is no cure or vaccine
6.1 Many people hesitate to do an HIV test because there is no cure or vaccine for the disease. Would you still have interest to do the HIV test?

Pidgin: Plant ol man na meri i save less lo go lo testim blut bilong long wanem ol i save olsem i no gat marasin blo AIDS I stap. Yu ting bai yu go het yet na go lo testim blut bilong yu?

_____
Motu: Taunimanima namo be idia ura lasi HIV testi idia karaia badina ina HIV gorere be muramura lasi bona hanamoa dala lasi. Oi laloa inai testi do oi karaia?
_____

7.0: About Fear of shortening ones life as a result of testing.
7.1 It has been said elsewhere, and I believe by a number of people, that after doing an HIV test with positive results their lives have become shortened. What are your views on this kind of thinking and belief?

Pidgin: Ol sampla lain I bin tok lo ol narapela hap olsem taim ol manmeri i go long test na painim aut olsem ol I gat AIDS, laif blong ol I save sot. Yu ting wanem lo dispela kain ting ting na bilip?
_____
Motu: Gabu haida dekenai bona lau diba taunimanima momo idia gwau HIV testi ia hedinarai oi be mai emu HIV emu mauri be do ia kwadogi. Oi emu laloa dekenaibe edena bamona?

_____

If you would be tested for HIV, what would you do to avoid such a situation, i.e. to avoid the possibility of shortening your life?

Pidgin: Sapos yu go lo test, bai yu mekim wanem samting lo abrusim ol hevi, kain olsem lo mekim laif blo yu I go sot.

_____

Motu: Bema oi be emu HIV testi oi karai, dahakai do oi karaia inai mauri ha kwadogia kahanai?

_____

8.0: About: HIV testing is not a common practice

8.1 How many people do you know who have done an HIV test?
Pidgin: Hamas man meri yu save long ol i go long test blo AIDS pinis?
Motu: Taunimanima hida oi laoa inai testi idia karaia vadaeni?
(a) Number of people _____
Pidgin: Namba blo manmeri _____
(*Motu:* Taunimanima hida) _____

(b) How did you know? _____
Pidgin: Yu bin save olsem wanem? _____
Motu: Edena bamona oi diba?) _____

(i) From the infected people themselves (Numbers)

_____

Pidgin: Long ol lain we I gat AIDS yet.

_____

Motu: Mai edia gorere taudia sibodia dekenai

_____

(ii) From other people (Numbers)

Pidgin: Long ol narapela man meri

_____

Motu: Haida dekenai _____

(iii) Other sources (explain in brief and state the number of sources if available)

_____

Pidgin: Long ol narapela hap (traim givim name blo hap yu kisim dispela toktok long em)

_____

Motu: Gabu haida dekana?

_____

8.2 Do you think the exercise of encouraging Papua New Guineans to undertake VCT for HIV shall <u>be successful</u> or <u>not</u> <u>and why?</u>

Pidgin: Yu ting dispela wok blo askim ol lain insait lo kantri husat i gat AIDS long kisim helpim bai kamap gut or nogat na sapos yu tok yes o no, wanem tingting blo yu?

_____

Motu: Oi laloa PNG taudia ha goadiinai VCT HIV totna be do ia namo lasi? Bona dahaka dainai?

_____

8.3 Are you personally ready to do an HIV test?

_____

Pidgin: Yu yet yu redi long go long test o nogat?

_____

Motu: Oi laloa oi be oi hegaegae inai HIV testi totona?

_____

9.0: About lack of conducive environment for VCT

9.1 Considering the current situation in the country, are the VCT services for HIV encouraging?

_____

Pidgin: Sapos yu lukluk nau long AIDS insait long kantri, yu ting wanem taim ol manmeri i wok long go long testim blut bilong ol? Em i wok na i mekim ol plant manmeri o go moa yet o nogat?

_____

Motu: Inai nora dekenai PNG lalona,inai VCT HIV totona be ia goada?

_____

9.2 In your opinion, what should be done, or what kind of environment should be made available to enable everyone willing to do HIV test to do so easily?

_____*Pidgin:* Long tingting blo yu, yu ting wanem samting ol i mas mekim o
wanem kain ples o rum ol I mas yusim lo mekim ol test na givim ol
toktok long ol manmeri igat AIDS we em bai mekim ol manmeri I
hamamas long go moa yet na kisim ol dispela helpim?

Motu: Oi emu lloa dekenai, dahana do hekara,o gabuedebamona ta do ia ehakara, taunimanima lala dia do idia ura inai HIV testi abia totona?

_____

10.0 Lack of knowledge on the existence of VCT services in the country/town/city:

10.1 Do you know any place in the country where HIV testing services are provided?

_____

Pidgin: Yu ken klia long sampla hap we ol I save wokim ol tests or givim stia tingting long ol manmeri igat AIDS?

_____

Motu: Oi diba gabu haidi inseni HIV testi idia karaia?

_____

10.2 If no, what are the reasons why you do not know this?

_____

Pidgin: Sapos nogat, givim wanem as na yu no save lo dispela hap?

_____

Motu: Bema lasi,badina be dahakabona dahaka daina oi diba lasi?

_____

Interviewer's signature _____
Date of interview _____

Appendix 2

Summarized questionnaire format for important responses from the main questionnaire (Appendix 1).
The questions were allocated, "YES or NO or UNANSWERED" after careful analysis.

About Stigma

1.3i Self stigmatisation

From the responses given, do you or can you interpret them as self-stigmatization?

1.3ii Perceived stigmatization by others?

Can the responses given be interpreted as being perceived stigmatization by others?

About Withdrawal

2.1 Self-withdrawal from normal duties?

Is the response given indicative of self-withdraw from normal duties?

About Discrimination

2.2 On perceived discrimination:
Is the response given indicative of discrimination by his/her family members, colleagues, or fellow workers?

2.3 On discriminating others:
From the responses, are there any elements or possibilities that Respondents will discriminate others (i.e. HIV +ve people)?

About Dismissal

3.1 Possibilities of being dismissed
From the response given do you detect any possibilities of being dismissed by his/her employer, workplace, institution, club, etc.?

About Rejection

3.2 Possibilities of being rejected by from immediate relationship
From the response given do you detect any possibilities of being rejected by or from immediate relationship e.g. sex partnership, close friend or relative?

About lack of support as a result of disclosure of results

4.1a Availability of support following disclosure of results
Recognition of the availability of support following disclosure of results.

4.2 Any elements of suspecting lack of support from health service providers
From the response given do you detect any elements of suspecting lack of support from health service providers as a result of the health workers' knowledge of the individual's sera-status?

Fear of what to do with HIV test results

5.1b If positive - any fear?
From the response given do you detect any fear of what to do with Positive results

Benefits from testing of HIV

6.1 Elements of the willingness to test despite the absence of cure or vaccine?
From the response given do you detect any elements of
willingness to test despite the absence of cure or vaccine?

Suicidal tendencies

7.2 Does the respondent show any elements of suicide
From the response given does the respondent show any elements of intending to shorten his/her life following a bad HIV test result?

HIV testing in PNG

8.3 Readiness or non-readiness to test for HIV - does it imply that because it is a non-common practice?
From the responses: Readiness or Non-readiness to test for HIV?
Does it imply that because it is not a common practice?

Lack of conducive environment In PNG

9.2 Indicate need for changes in the way VCT services are being conducted in the country?
Does the respondent indicate need for changes in the way VCT services are being conducted in the country?

Knowledge of VCT services In PNG

1.2 Willing to utilize these services
Is the respondent willing to utilize the VCT services

SHORT COMMUNICATIONS

DEVELOPMENT OF TRADITIONAL MEDICINE BASED ON SCIENTIFIC RESEARCH

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INTRODUCTION

Traditional medicine is widely used in most countries in the region. It is accepted as a valid health system in many countries, and safe and effective traditional medicines are valuable contributions to society. However the practice of traditional medicine is still mainly based on "social and customary" use. Most of the traditional medicines have not been fully tested using modern scientific means, although extensive and long-term use and experiences from generation to generation provide good evidence of its effectiveness.

The important role played by traditional medicine using medicinal plants in preventive, promotive and curative aspects of health coverage continue to receive increasing global recognition. Unfortunately, the use of medicinal plants to treat illnesses without supporting scientific data is not encouraged by health regulatory agencies and scientific community in general. Medical doctors and pharmacists are often reluctant to prescribe, recommend or support use of such plants and plant products. Efficacy and safety are the two main concerns cited. The health professionals and the general public need authoritative information on the beneficial properties as well as possible harmful effects of plant-based traditional medicines. Less understood and appreciated is the fact that there exist a large range of plants which have been fully researched and documented in terms of chemical, biological and pharmacological activity. These plants are commonly used as medicines, nutritional or dietary supplements.

To provide encouragement and build confidence and self-reliance in the users of medicinal plants, it is important to develop reference materials describing not only traditional uses but also, the chemical constituents, the pharmacological and biological activities, and the clinical trials for those plants that are commonly used around the world as medicine. Subjects covered should also include recognition, preparation, use, botanical characteristics and quality considerations of each plant. The World Health Organization (WHO) has published the International Pharmacopoeia[1] and monographs[2], although this contains quality specifications and descriptions only for a few selected plant materials. Some other works published recently also provide useful information[3, 4, 5]. In addition, British Herbal Pharmacopoeia (BHP), British Herbal Compendium (BHC), German Pharmacopoeia, recent editions of U.S. Pharmacopoeias provide monographs on a large number

of plants. What is indeed needed is development of national formularies for herbal medicines and natural substances for each region and country[6, 7].

In most cases, information on medicinal plants popular in Western societies have been well documented (examples include: St. John's Wort, Kava, Gingko, Valerian, Ginseng, Echinacea, etc.) but this is not so for a large number of plants used as primary source of medicine in developing countries.

The objective of this paper is to highlight the need and importance of compiling relevant scientific literature that can provide scientific evidence, rationale as well as justification for continued use, effectiveness and popularity of certain medicinal plants commonly used in traditional medicine.

Based on published literature and our experience with traditional healers in Papua New Guinea six plants (Alstonia scholaris, Carica papaya, Cassia alata, Centella asiatica, Hibiscus rosa-sinensis, and Morinda citrifolia) were selected to serve as an example. The criteria used for selection of these plants were the distribution and uses of these plants in PNG and elsewhere, the amount of general and scientific information available on the plant, and consumer interest. Table 1 shows detailed description of each of these plants.

CONCLUSIONS

The application of scientific methods in the isolation and identification of active chemical constituents, determination of biological activity, and clinical trials of herbal medicines, is the most appropriate way to provide grounds for acceptance and use of plants in traditional medicine. Research efforts should specifically focus on the evaluation of active constituents for efficacy, bioavailability and toxicity. However, this is not to suggest that attempts should be made to transform traditional medicine into modern medicine since such an attempt would be self-limiting and contrary to fundamental philosophy and principles of traditional medicine. At best, what is required is to ensure, through minimal but targeted research, that a medicinal plant or product thereof is not only efficacious but also safe. Fortunately, abundance of information is already available on many plants used in traditional medicine.

There is urgent need to embark on a program of research and study on herbal medicines and bring together existing information on major herbal medicines and medicinal plants. This exercise should be undertaken and promoted at national level.

The basic goal should be to identify, access and promote commonly used local plants which have reasonable scientific data and evidence based on research to support their claimed beneficial effects. These plants could be added to national list of drugs for use in primary health care. Such a program would also help to revive and sustain an awareness of plants as sources of medicine, preserve indigenous knowledge and encourage their utilization and conservation.

Plant	Local Names	Common Names	Description	Traditional Uses	Chemical Constituents	Pharmacological Activities	Remarks	Ref
Alstonia scholaris	Puto, Sipuel, Budo	Dita-bark tree; Devil's tree	Large evergreen tree with milky sap	Diarrhoea, dysentry, malaria, fever, Pain	Alakaloids, triterpenes, sterols	Antibacterial, antifungal, anthelmintic, antimalarial	No clinical trial reported; recommended for malaria and respiratory conditions	8, 9,
Carica papya	Popo, Kowai Pawpau, Loku	Pawpaw, Papaya	Soft-wooded, fast growing tree; fruit edible	Ringworm, cough, sore eyes, cuts, wounds,	Papain, sterols, fatty acids, fixed oils	Antibacterial, antifungal, wound healing acceleration	Experimental data support antibactrial activity of leaves	3, 8, 9,
Cassia alata	Tilivur, Kabaiura, Unahi maluana	Ringworm bush	Shrub, fruit a legume, yellow candle like flowers	Ringworm, grille, eczema	Anthraquinones, sterols	Purgative, antifungal, antibacterial, analgesic	Clinical data support uses for antibacterial and antifungal effects of leaves	3, 8, 9,
Centella asiatica	Milaina, Yotubukona	Indian pennywort, Gotukola	Small prostrate thin aromatic herb	Stomach, Muscle, joint pains, ulcers, wounds	Asiatic acid, centolloside, sterols	Anti-inflammatory, wound healing, antibacterial, antipyretic	Wound healing properties supported by clinical trials	3, 8, 9,
Hibiscus rosa-sinensis	Banban, Hibiscus, Gelegwaugwau	Red hibiscus, Rose of China	Shrub, attractive flowers ranging red to orange to yellow	Diarrhoea, dysentry, sore eye, stomach aches, body Pains	Sterols, undecanoic acid, quercetin	Antipyretic, analgesic, anti-inflammatory,	Experimental trials show analgesic effects of the leaves	8, 9,
Morinda citrifolia	Leki, Noku, Nono, Oko	Indian mulberry, Awl tree	Small tree with large fleshy fruit	Aches, pains, diarrhoea, dysentry, cough, cold	Anthraquinones, caproic acid, flavonoids	Analgesic, antibacterial, antiascaris	Analgesic, antibacterial properties	3, 8, 9,

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PAPERS PRESENTED AT THE JOINT DIVISIONAL SEMINAR SERIES: 2008
DIVISIONS OF BASIC MEDICAL SCIENCES, HEALTH SCIENCES & DENTISTRY

ADHERENCE TO HIGHLY ACTIVE ANTIRETROVIRAL THERAPY (HAART): IS NUTRITION AN ISSUE?

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Papua New Guinea (PNG) National AIDS Council Secretariat (NACS) held the "HIV and AIDS National Research Agenda Workshop" in October 2007. At the workshop plenary session on development of recommendations and priorities for research in PNG: Adherence to Medication by people with HIV/AIDS was selected as the First priority area, and Nutrition in the care of people with HIV/AIDS was selected as the Second priority area [1].

Unanimous decision to highlight Adherence and Nutrition as major priority areas for research was significant, because Highly Active Antiretroviral Therapy (HAART) is currently used for treatment of people with HIV/AIDS in several provinces in PNG [2,3].

One of the major concerns with scaling-up the use of HAART in Resource-Limited Settings is the emergence of drug resistance HIV strains caused by Non-Adherence to medication, resulting from suboptimal drug levels [4].

Antiretroviral (ARV) drugs are capable of significantly reducing the rate of replication of HIV in HIV positive individuals [5,6]. There are three important classes of ARV drugs, the Reverse Transcriptase Inhibitors (RTI), Protease Inhibitors (PI) and Fusion Inhibitors (FI). The RTI and PI classes of drugs are the recommended ARV drugs for use in resource-limited settings [5,7]. The third class of ARV drugs, the Fusion Inhibitors, are not recommended for use in resource-limited settings [7]. There are two types of RTI, the Non-Nucleoside Reverse Transcriptase Inhibitors (NNRTI) and the Nucleoside / Nucleotide Reverse Transcriptase Inhibitors (NRTI). The NNRTI drugs block conversion of HIV RNA into DNA (Reverse Transcription), thus the genetic information of the Virus cannot be copied into the DNA of the host's cell [5]. The NRTI drugs are incorporated into the Viral DNA, preventing production of new copies of the Virus [5,7]. The PI drugs block Protease enzyme from assembling the genetic materials needed to form new HIV, which ultimately stops the Virus from infecting more Host cells [5,7]. The recommended ARV drugs for use in resource-limited settings are presented in Table 1.

One ARV drug alone cannot sufficiently reduce replication of the HIV, thus a combination of ARV drugs are recommended to optimise efficacy and reduce the chances of drug resistance [7,8]. The combination of ARV drugs is referred to as Highly Active Antiretroviral Therapy (HAART).

The WHO recommended Four Sets of HAART for use in Resource-Limited Setting, which includes countries in Africa, Latin America, Asia Pacific and Oceanic regions including PNG [7,8]. The four First-Line HAART Regimens recommended by WHO for Resource-Limited Settings are: [7,8].

Stavudine + Lamivudine + Nevirapine {d 4T/3TC/NVP}
Zidovudine + Lamivudine + Nevirapine {AZT/3TC/NVP}
Stavudine + Lamivudine + Efavirenz {d 4T/3TC/EFV}
Zidovudine + Lamivudine + Efavirenz {AZT/3TC/EFV}

HAART is effective when used properly because it significantly reduces HIV replication, effectively suppresses the Virus and thus allows regeneration of $CD4^+$ T-Lymphocytes Mediated Immune Response[5,7,8].

Table 1: Classes and Types of Anti-Retro-Viral (ARV) drugs recommended for use in resource-limited settings [5,7].

Class	Type	Examples of Drugs
Reverse Transcriptase Inhibitors (RTI s)	Non-Nucleoside Reverse Transcriptase Inhibitors (NNRTI s)	Efavirenz, Nevirapine
	Nucleoside / Nucleotide Reverse Transcriptase Inhibitors (NRTI s)	Abacavir, Didanosine, Lamivudine, Stavudine, Tenofovir, Zidovudine
Protease Inhibitors (PI s)	Protease Inhibitors (PI)	Indinavir, Lopinavir, Nelfinavir, Ritonavir, Saquinavir
Fusion Inhibitors (FI)		--

Prolonged suppression of the HIV by HAART is only achievable if the Virus does not get the chance to start replicating and thus develop drug-resistance HIV variants [7]. If Viral Replication occurs during the use of HAART treatment, genetic variation may occur in the HIV leading to emergence of variants that might be resistant to HAART [5,7]. Transmission of resistance HIV strains in the population can presents major public health problems for long-term efficacy of HAART.

Adherence to treatment protocol is a significant predictor of the effectiveness of HAART [7,8]. Adherence to medication refers to "the extent, to which the behaviour of an individual, taking medication, following a diet, and/or executing lifestyle changes, corresponds with agreed recommendations from either the health care or medical provider" [6,7]. Adherence is a collaborative process designed to optimise clinical outcomes of the patient.

Non-adherence has many different manifestations, none of which are mutually exclusive; it includes failure to follow drug schedules for whatever reasons, taking incorrect doses of medication, stopping consumption of the medications partially or completely [5,6,7]. Potential consequences of non-adherence to the HAART treatment protocol may include failure of the treatment, resistance and cross-resistance and transmission of resistance strains of the HIV to others [7]. Non-adherence to HAART may cause substantial decline in health, increased frequency of opportunistic infections, faster progression of the disease [6,7,8]. Non-adherence or Inconsistent adherence to HAART treatment regimen may lead to development of drug resistant mutations in HIV resulting in treatment failure, it increases the probability of at-risk populations becoming infected with Multi-resistant HIV with severe Public Health consequences [9]. Thus, the need for Very high levels of adherence to medication by people with HIV/AIDS using HAART must be maintained at all times.

A Multitude of Variables affects adherence to HAART. This presentation is mainly related to the issue of Adherence and Food & Nutrition in Resource Limited Settings, such as PNG.

HAART and Food & Nutrition Interactions can be viewed from several prospective:
Effects of some foods on HAART efficacy and/or Adherence, Effects of HAART on Nutrient Utilization, Side effects of HAART on Food Consumption, Nutritional status of person with HIV/AIDS and Adherence to HAART Regimens, just to mention a few [5,7,8]. Management of Interactions between HAART and Food & Nutrition partly involves, developing and communicating information about the interactions, identifying and implementing appropriate food and nutrition responses and addressing food security constrains [5]. It is important to be drug-specific on issues related to HAART and food interactions, because of the different types of drug – food interactions.

To date, in PNG, since the commencement of the Roll-out of HAART in 2006, there are no published data on HAART and food interactions or the other related issues. This is a significant issue because, failure to effectively manage HAART and Food & Nutrition Interactions may lead to reduce efficacy of the medication or to aggravation of side effects, which may results in Non-adherence [2,3,5,7.8].

Management that includes proper and effective HAART and Food & Nutrition interactions is one of the crucial components of ensuring maximum adherence to HAART regimens [8].

Declaration of the commitment by United Nations General Assembly Special Session (UNGASS) dedicated to HIV/AIDS recognizes the need to integrate food support as part of a comprehensive response to HIV/AIDS [4]. The UNGASS Declaration of June 2006, Article 28 States that "… all people at all times, will have access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life, as part of a comprehensive response to HIV/AIDS" [4].

According to the UNGASS Declaration: It was agreed that "All member states of the United Nations General Assembly MUST recognized that where Anti-Retroviral Therapy is necessary, Food is a Key Element in Strategies to Promote Adherence to it and its efficacy" It is still not apparent when implementation of Article 28 of the UNGASS declaration will be fully implemented by the PNG National AIDS Council.

Several documented evidence shows improvement to adherence in countries implementing Article 28 of the UNGASS Declaration. Results from the Uganda Project indicated that adherence to ART and its efficacy are significantly influenced by access to adequate food and nutrition [4]. People on HAART receiving food supplementation recover much faster [4]. Medicines are strong and many need to be taken "on a full stomach", which is difficult for people in Resource-Poor Settings ("Meds don't matter if you have nothing to eat!") [4].

Recent survey conducted in some African countries indicates that lack of food prevented or delayed HIV-positive patients from taking their medication [10]. Even where HAART is provided "Free" several patients lack sufficient nutritional support and fail to take their medication properly when they are hungry [10]. When the patients began ART, their appetite generally improved but many were still unable to afford food [11]. Food support programs did not receive enough supplies to support the growing number of patients, since several ART regimens require the drugs to be taken with food, the unavailability of nutrition resulted in increased non-adherence [10,11]. These authors stated that taken the medication on empty stomach causes vomiting and stomach pains, which the patients mistake for the side effects of the drugs.

According to Megazzini et al, [12] food recipients had substantially greater increase in CD4+ count at 12 months compared to non-recipients of foods, in addition, the mean number of days late for pharmacy visits per month was lower among food recipients versus non-recipients. A monthly household food ration for food insecure patients commencing HAART improved adherence by 40% and resulted in a better CD4+ response at 12 months of therapy [12].

Au et al [13] reported that a surprising obstacle to HAART initiation for 76% of patients in Rwanda was the fear of developing too much appetite on HAART but not having enough to eat. When nutritional supplementation was provided for these patients, significant increase in adherence was observed. These authors concluded that increasing and integrating nutritional supplementation into ART programmes significantly improve adherence and maximize the benefits of HAART [13].

CONCLUSION:

Success or Failure of HAART, both as a Treatment Strategy for Patients and a Public Health Strategy to prevent the spread of Multi-drug Resistant HIV, is dependent upon the ability of patients to Adhere to Therapy. Support to assist patients in their Adherence Efforts should be Comprehensive and considered a High Priority in the Delivery of HIV Primary Care and Social Services.

The urgent need for the NACS to implement Article 28 of the UNGASS declaration of June 2006 as an integral part of the comprehensive management strategy for people living with HIV/AIDS cannot be overemphasized.

HAART is an essential component of treatment and care for people living with HIV/AIDS. Efficacy of ARV treatment depends on the nutritional status of people living with HIV/AIDS. Therefore, nutritional assessment and counselling should be an integral part of all HIV/AIDS treatment programs [7,8].

RECOMMENDATIONS:

Training of health workers has intensified with the roll out of a National training on the comprehensive management of HIV/AIDS with the Integrated Management of Adults and Adolescent Illness (IMAI) model. Nutrition support for people living with HIV/AIDS should be included as part of the training program.

A National Surveillance Plan for 2007 - 2010 has been developed and is being implemented by the National Department of Health with substantial support from bilateral and multilateral partners and research institutions. Nutrition should be included in this plan.

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THE ROLE OF β BLOCKERS IN STRESS MANAGEMENT: A REVIEW & SUGGESTIONS

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(Presented by: Dr. Subhra Datta)

INTRODUCTION:

Stress is body's normal response to anything that disturbs its natural, physical or emotional balance [1 – 5]. The sympathetic system is strongly activated in many emotional states. Either mental or physical stress can excite the sympathetic system. Body has inbuilt mechanisms to cope with stress [1,3,5]. Extreme/abnormal stress leads to posttraumatic stress disorder (PTSD) [4,6 – 9]. Some individuals are more prone to PTSD than others. In recent years, many wars, rape, atrocities are creating a huge numbers of people suffering from PTSD. These men and women are draining health resources and creating huge social and family problems. Recent studies show that if a β-blocker (propranolol) is introduced following a traumatic event to a subject, it prevents the development of PTSD [9 – 15].

This review is aimed to suggest the rationale of such claims by understanding the role of catecholamines in stress and how a β blocker could help to prevent the development of PTSD. A study should be taken up in PNG Melanesian patients, following a trauma (physical or mental), by giving propranolol, for the management of stress along with other standard existing medications and study the probable beneficial effects in prevention of development of PTSD.

Factors which produce stress:

Trauma, injection, intense heat or cold, burn, hemorrhage, surgery, hypoglycemia, injection of toxic or necrotizing substance, restraining of animals or man, immobilization, debilitating diseases, histamine release during allergy, sudden fear or apprehension, pain and sever exercise, can lead to stress in a person [3 – 5].

Role of brain and endocrine system in producing or combating stress [5,16 – 18]:

The central role of brain is to coordinate the protective and damaging effects of stress mediators.

- There is a two-way communication between the brain and the cardiovascular, immune, and other systems via neural and endocrine mechanisms.

- Limbic system, mainly hippocampus, amygdala, and prefrontal cortex respond to acute and chronic stress by undergoing

structural remodeling, which alters behavioral and physiological responses.

Role of limbic system [4,17]:

Limbic system controls instinctual behavior and emotions essential for survival of self & species. Behaviors include sexual behavior, maternal behavior, food intake behavior and associated emotions like fear, anxiety, aggression & placidity. In human there is also disgust, which is a unique emotion. The addiction is also another aspect of emotions.

The limbic system serves as the route by which emotional information is passed to the hypothalamus and hypothalamus exteriorizes the autonomic response of the emotional behavior.

Role of cerebral cortex & brainstem in stress [17]:

Cerebral cortex functions in elaborating the conscious experience of the emotional feelings. It also initiates the neural mechanisms that direct many of the motor responses during emotional behavior.

The cerebral cortex with other forebrain structures that account for the modulation, direction, understanding or even inhibition of emotional behaviors. Neurons in the amygdala receive input from sensory areas of the cerebral cortex, providing an interface with the sensory world, and they project to parts of the brain involved in emotional responses.

Role of Neurotransmitters mainly Catecholamines in Stress [13,16,19]:

The neurotransmitters in the limbic system are mainly norepinephrine, serotonin and dopamine. Norepinephrine is an excitatory neurotransmitter, whereas serotonin and dopamine are usually inhibitory in nature. Dopamine helps to cope up with stress. Glucocorticoids and other stress hormone like cortisol complement the action of the neurotransmitters.

Is stress beneficial or harmful?

Good effects of stress [20]:

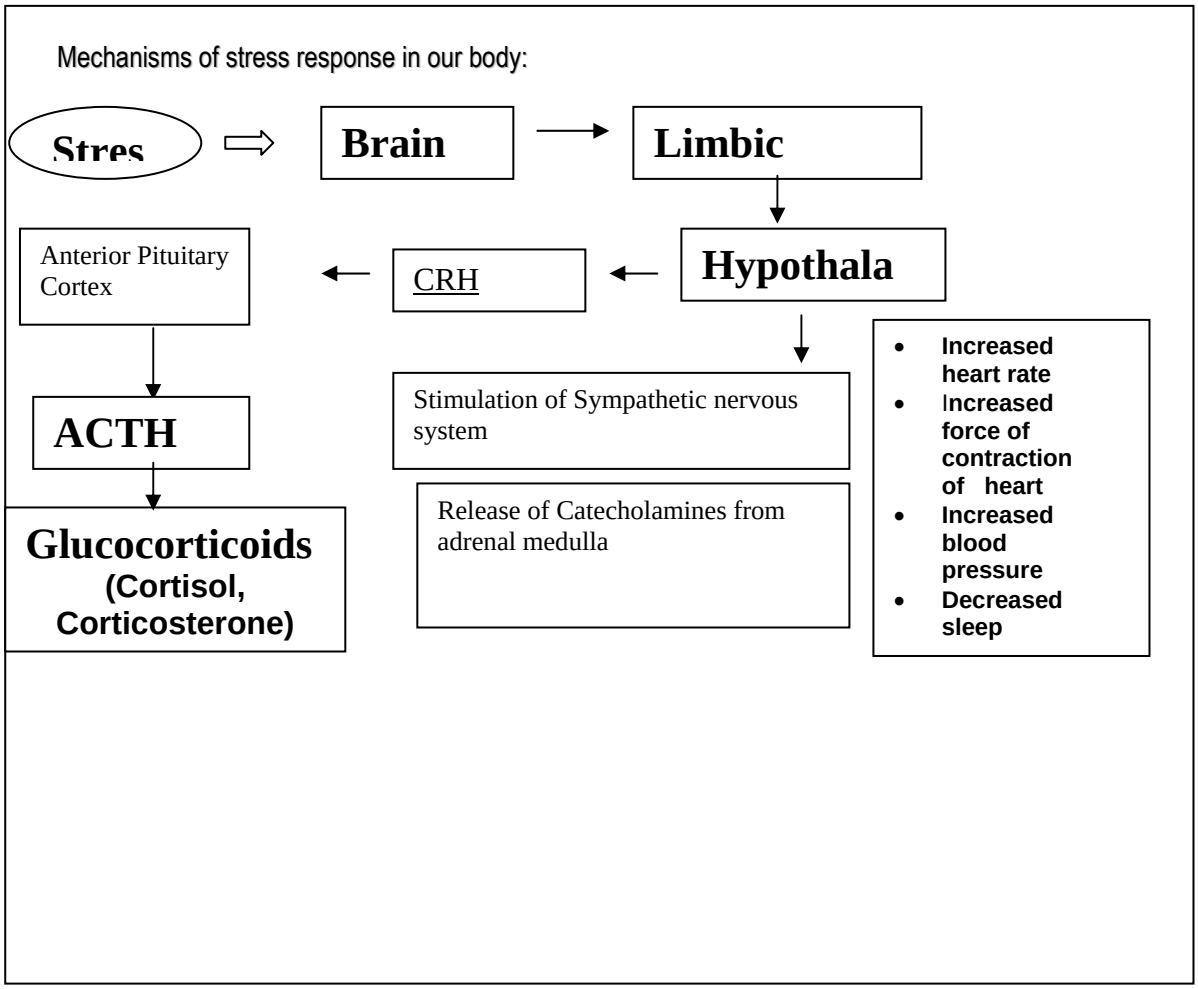
- Stress serves as a stimulus to reach an adequate level of accomplishment and success.

- Fight-or-flight response, the activation of the sympathetic nervous system during stress constitutes a guide on how to meet emergencies in which physical activity may be required and bodily damage may occur.

Bad effects of stress [5]:

Prolonged stress enhances development of certain diseases.

However, stress is neither good nor bad. It is just important for survival.


Mechanisms of stress response in our body:
Stres
Brain
Limbic
Hypothala
CRH
Anterior Pituitary Cortex
ACTH
Glucocorticoids (Cortisol, Corticosterone)
Stimulation of Sympathetic nervous system
Release of Catecholamines from adrenal medulla
Increased heart rate
Increased force of contraction of heart
Increased blood pressure
Decreased sleep

Abnormal manifestations of stress, Posttraumatic Stress Disorder (PTSD):

PTSD is a clinical syndrome that may develop following extreme traumatic stress in vulnerable individuals. Posttraumatic stress disorder (PTSD) is an abnormal response to extremely stressful events such as: any serious accident, injury, assault, rape, or exposure to warfare or a disaster causing many casualties [1,6 – 9].

Symptoms of PTSD [4]:

The symptoms of PTSD are grouped into three major categories:

- Re-experiencing the traumatic event
- Avoidance of stimuli associated with the event or numbing of responsiveness
- Symptoms of increased arousal

Symptoms may last for years and the person becomes prone to drug addiction and alcohol abuse, which breaks down families and create a huge problem for the society.

Etiology & Pathophysiology:

It is hypothesized that in PTSD, there is excessive release of norepinephrine from the locus coeruleus in response to stress [16,17]. Increased noradrenergic activity at locus coeruleus projection sites in hippocampus and amygdala theoretically facilitates encoding of fear-based memories. A greater sympathetic response to cues associated with the traumatic event occurs in PTSD. Complications include depressive illness and alcohol misuse. In a small proportion of cases the condition may show a chronic course over many years and a transition to an enduring personality change [2,4,7,9].

Role of limbic system in memory formation (in producing PTSD):

Emotional arousal has been shown to enhance memory. Emotion has powerful influence on learning and memory. Key areas of limbic system involved are hippocampus in producing short term, declarative memory formation. Memory consolidation is greatly influenced by the impact of the experiential event, and that impact is magnified by strong emotions and with the hormones released during such emotions.

What is the role of propranolol in stress related behavior?

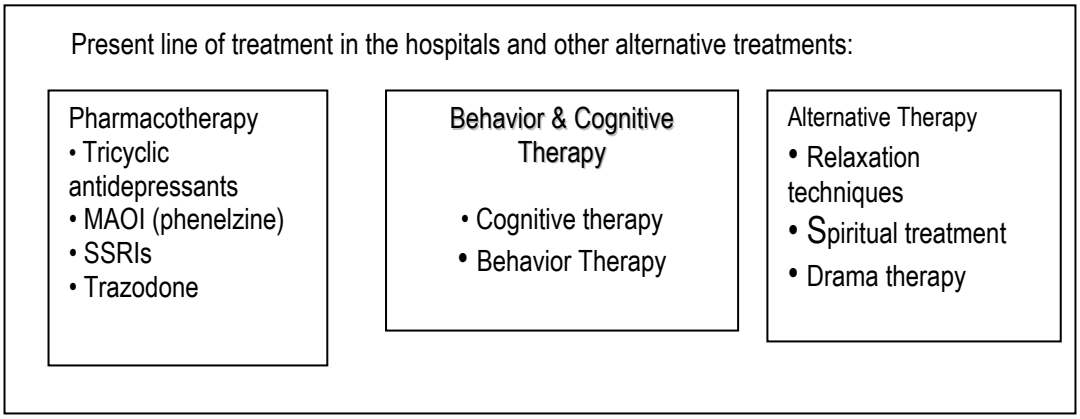
Propranolol is a β-receptor blocker. It is normally used to control the systolic blood pressure in hypertension. But since most of the stress induced behavior and the unpleasant memory relating the stressful stimuli are also consolidated by noradrenaline, propranolol is thought to prevent such memory formation and the development of posttraumatic stress syndrome [15].

A few important clinical studies in patients [10 – 14,21]:

Pilot study by Pitman & Colleagues [12]:

This was a double blind placebo controlled study. Patients were randomized, within 6 hrs of event experienced 23 on placebo, 18 on propranolol 40mg q.i.d 10 days. Followed by 9 days dose gradually decreased to zero. Results: tested 3 months after,

propranolol group 0/18; placebo 6/23 physiologic responders during script – driven imagery of the traumatic event. Results showed that in acute post-traumatic condition, propranolol might have preventive effect on subsequent Posttraumatic stress disorder.



Study by Vaiva & colleagues [13]:

A total of 11 patients put on propranolol 40mg t.d.s 7 days, followed by taper period 8 – 12 days, were compared with 8 patients who refused propranolol but agreed to participate in the study. In this non-randomized study, the two groups did not differ on demographics, exposure characteristics, physical injury severity or peri-traumatic emotional responses.

Results showed that PTSD rates developed in 3/8 in refusal group & 1/11 in those receiving propranolol. These results also suggested that propranolol may be useful for mitigating PTSD symptoms or perhaps even preventing the development of PTSD.

Case Report by Taylor & Cahil [21]:

A female 44yrs experienced 5 similar motor vehicle accidents. The last 3 accidents cause severe PTSD episodes of over 6 months each, despite multiple pharmaco-therapies. Following 6th accident, severe PTSD symptoms reemerged. 48 hrs after this trauma, propranolol (60 mg) b.d orally (1.75 mg/kg/day) was given. PTSD symptoms were rapidly and markedly reduced. The Clinician-Administered PTSD Rating Scale score was reduced from an initial 86 to 56 by 11 days posttrauma. Propranolol may be particularly effective in the prevention of initial or re-emergent PTSD symptoms

Therapy of acute PTSD in children [11]:

A total of 11 Cases of PTSD in children were studied. Each child was physically or sexually abused or both, presented in agitated & hyper-aroused state. They were treated with propranolol. Scores on an inventory of symptoms of posttraumatic stress disorder indicated that patients exhibited significantly fewer symptoms while receiving medication than either before or after they received medication.

DISCUSSION:

The obvious treatment approach for PTSD is to have patients recall the traumatic event while under the influence of propranolol. The idea is that during recall, the memory and its associated emotion have to be re-consolidated, and this is blocked by the β blocking drug propranolol. Each time a memory is recalled, it is vulnerable, and recalling multiple times in the presence of the drug that impairs that memory might be especially effective. It is also important to note that though propranolol is classically used to control hypertension, its use in prevention of PTSD does not cause any significant fall in blood pressure.

What is the management of PTSD at present in PNG?

- There is currently no pharmacological treatment for curing PTSD available in PNG except antidepressant drugs, which are not too effective.
- It is possible that propranolol may prove to have primary roles in a disorder that is only modestly responsive to antidepressant treatment.
- This treatment has the potential to become the first pharmacological treatment to prevent the development of PTSD.

CONCLUSION AND SUGGESTIONS:

- Results of different international studies clearly indicate a considerable swing towards using propranolol, in immediate post-trauma period, as it can have preventive effect on subsequent development of PTSD.
- That a clinical study should be taken up in PNG to assess the role of propranolol to avoid the development of post traumatic stress syndrome immediately following any violent incidence like observation of murder or in cases of rape and other abuses in Melanesian population.
- The doses should be adjusted based on the data available and the desired result in Melanesian population.
- The treatment should be induced in vulnerable group of patients with known low threshold of stress tolerance.

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THE VALUE OF X-RAY PELVIMETRY IN MANAGING A MOTHER IN LABOUR

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INTRODUCTION:

It is very important that the attending obstetrician should be able to make decisions on how a mother should deliver her baby. There are a number of factors that need to be known to make this important decision. One of them is to ensure that the birth passage is adequate to accommodate the head of the foetus during labour. That information can be obtained through clinical pelvimetry and or x-ray pelvimetry.

Indications:

Since the early use of x-ray pelvimetry the list of indications where longer than it is today. This is because the role that x-ray pelvimetry used to play before is now taken over by ultrasound. Therefore, the role left for the x-ray pelvimetry to perform is restricted to the determination of the dimensions of maternal pelvis as well as see whether the foetal head is fully engaged or not.

Below is a list of indications for x-ray pelvimetry:
Primigravida with breech presentation; Primigravida with less than 150cm in height; Previous caesarean section; Atypical foetal attitude; Abnormal pelvis; Abnormal progress of labour

The indications above are not regarded as absolute but relative pending on the decision of the attending obstetrician after the clinical assessments and previous obstetric history of the parturient patient.

Techniques:

The x-ray pelvimetry is an examination that consists of performing four projections namely the erect lateral, supero-inferior, antero-posterior and outlet originally. However, the value of supero-inferior and outlet projections were considered little therefore not normally performed today.

The lateral projection is the single most useful projection that contributes supplement data to the method of delivery for the mother nearing labour or in labour. The antero-posterior (AP) is another projection that may sometime be used. The AP today is a modified projection whereby one side of the pelvis is covered while the other side is exposed and vice versa. This projection is easy to do and

measurements can be done directly on the radiographs.

The conjugate diameter, which is the diameter measured from the interior part of the pubis symphysis to the anterior aspect of the superior sacrum. AP if performed can be used to measure the transverse diameter of the pelvic inlet as well as the mid pelvic diameter known as the interspinous diameter. These measurements are checked against the average values. These average values have been obtained from various examinations are from developed countries. Fig. 1 and Table 1 show the two projections and the table for average-values.

Interpretation:

The prognostic view of the different measurements varies with different obstetrician. For example the following is a view from Grainger and Allison by Winfield: [1].

- AB diameter (conjugate diameter)
  - On average is 11.0 to 12.5cm
  - 11.7cm or more needed to predict safe delivery for a term infant in breech presentation
  - Less than 10.5cm relate to increase difficulty in vaginal delivery
  - 10.0cm with occipital presentation may permit a trial of labor
- Likelihood of caesarean section is increased when the bi-ischial (BB) diameter is less than 10.0cm

This makes the measurements obtained from x-ray pelvimetry not definite but rather a guide only as to whether labor should be initiated, continued or terminated for select cases.

Disadvantages of x-ray pelvimetry

Like any other procedure there are downsides to this diagnostic procedure. The disadvantages include the following: irradiation, increased caesarean section, inconclusive results and finally in accurate measurements.

Irradiation is an important factor when considered carefully had made so many obstetricians in developed countries to not utilise this procedure. This is because when a person is irradiated using the lower doses from diagnostic range, the probability of inducing radiation cancers as well as genetic changes are there. No matter how small the amount of radiation dose would be that the mother and foetus would receive, the risks are there. This is the single most important factor making this procedure less utilised today.

Fig. 1 Schematic diagram obtained from Grainger and Allison, 1986 [1]

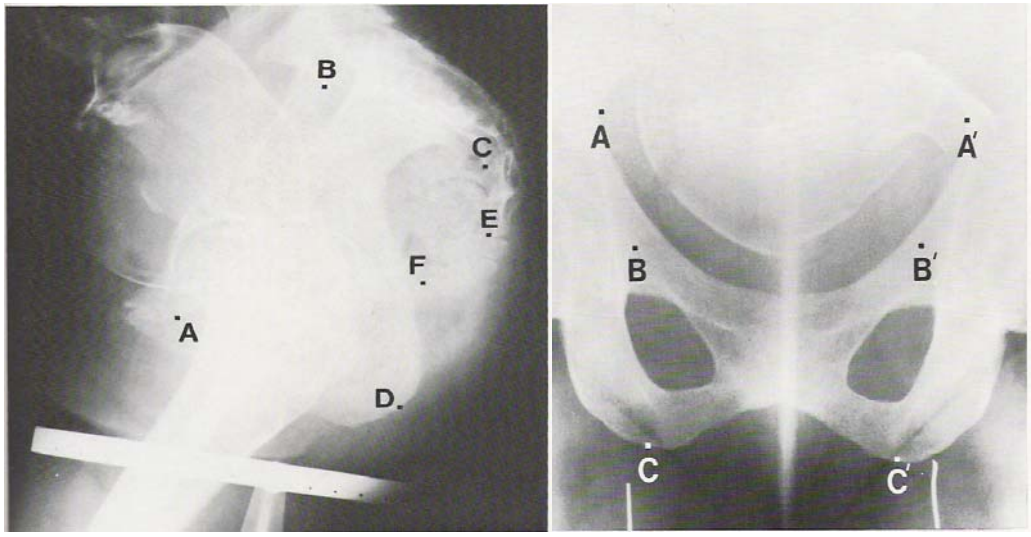

Table 1: Table of Average values [1]:

	Average diameter in cm
Pelvic inlet	
Anteroposterior	12.5
Transverse	13.0
Midpelvis	
Anteroposterior	12.5
Transverse (Interspinous)	11.0
Pelvis outlet	
Anteroposterior (post sagittal)	7.5
Transverse (Intertuberous)	10.5

However, Jones [2] advocates that developing countries may still have a need of this procedure even though he admits that prognosis is not usually accurate since different observers would deal with given information differently.

According to Kariwiga [3] increase in caesarean section is another problem obstetrician's face when x-ray pelvimetry is done. She further added that that procedure was stopped a while back due to this reason.

Since x-rays diverge as they come from a source the distortion of a structure is definitely there. Since x-ray pelvimetry deals with measurements it is important that the details techniques must be carefully employed to get a very accurate measurement. There are nomograms and formulas, which can be used to eliminated magnification as much as possible. However, if a ruler is used and modified AP is done there is no need for formulas or nomograms since dimensions can be measured directly on the radiographs.

Inconclusive results pose another thought to the use of x-ray pelvimetry. This aspect may reduce the value of x-ray pelvimetry. However, generally it may be used as a guide rather than a definite outcome since there are other factors involved in dystocia.

Alternative methods

Ultrasound is the modality of choice for imaging of the foetus. It has definitely replaced x-rays in that regard. However, ultrasound is not capable of measuring the dimensions of maternal pelvis and therefore cannot be a substitute for x-ray pelvimetry. Clinical pelvimetry also has methods in place to measure the conjugate diameter. Externally as well as internal are in place. The accuracy of the measurements is questionable therefore it is unlikely to replace x-ray pelvimetry.

The emerging CT pelvimetry definitely would be superior in terms of accuracy in measurements but the radiation dose may be an aspect that might continue to be debated upon.

Conclusion

Carefully performed x-ray pelvimetry though not conclusive contributes supplement data to the management of an abnormal labor. Thus has definite value in that regard.

The question of whether or not it should be used would require further strategic investigation in our PNG context.

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A RETROSPECTIVE ASSESSMENT OF ANTIBIOTIC SUSCEPTIBILITY PATTERN OF *NEISSERIA GONORRHOEAE* AND PREVALENCE RATE OF GONORRHOEA IN PORT MORESBY GENERAL HOSPITAL FROM 2005 TO 2006

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(Presented by: Ms. Paula Pusahai-Riman)

INTRODUCTION:

Gonorrhoea is a bacterial infection caused by a Gram-negative coccus [diplococci extracellar or intracellar] known as *Neisseria gonorrhoeae* (*N.gonorrhoeae*). The species is a human pathogen, survives poorly outside the human host and is sexually transmitted. Spread of *N.gonorrhoeae* is facilitated by various virulence

factors [1]. Any changes in the surface structure of the gonococcus render the bacterium avirulent.

The aim of this retrospective study was to determine the prevalence rate of gonorrhoea in Port Moresby General Hospital (PMGH) in 2005 and 2006.The objective was to assess the antibiotic susceptibility pattern of *N. gonorrhoeae* within this period.

METHODS:

The study was carried out in the Diagnostic Microbiology laboratory Pathology Department, PMGH. The PMGH is the major referral hospital for Papua New Guinea and serve as a teaching hospital for School of Medicine and Health Sciences (SMHS), University of Papua New Guinea (UPNG).

Total number of patient visiting the Heduru Clinic (sexually transmitted infection clinic) that was diagnosed with gonorrhoea was further tested for the presence of *N. gonorrhoeae*. The species were tested for susceptibility test and the records were obtained from January 2005 to December 2006.

Ethical clearance for this project was obtained from the ethical and research grant committee in the SMHS UPNG.

Permission to collect and use the data was corroboratively sorted from the Discipline of Medical Laboratory Science, Pathology Diagnostic Laboratory and Heduru Clinic at the PMGH.

RESULTS:

The total number of patients that visited the Heduru Clinic in 2005 and 2006 was 2030. Of these 61% (1240) were males and 39% (790) were females. In 2005 the number of male patients that visited Heduru clinic was 717 compared to 523 male patients in 2006. In contrast, in 2005 the number of female patients that visited Heduru clinic was 429 compared to 361 female patients in 2006 (Figure1).

During the two-year study period, the diagnostic microbiology identified a total of 532 patients diagnose with gonorrhoea that was due to *N. gonorrhoeae*. Of these 388 (73%) were male and 144 (27%) were female patients.

Detailed analysis of the dates of diagnosis of the 532 patients indicates that 310 (58.3%) were diagnosed in 2005 and 222 (41.7%) were diagnosed in 2006.

Gender distribution of the data indicates that of the 310 patients diagnosed in 2005 a total of 246 (79.4%) were male patients and 64 (20.6%) were female patients. In 2006 a total of 142 (64%) male patients and 80 (36%) female patients were diagnosed with *N. gonorrhoeae* (figure 2).

The data was further analysed according to the age range of male and female patients diagnosed with *N. gonorrhoeae*.

The results obtained for 2005 is presented in Fig. 3. In 2005, the age groups most affected in both genders were in the 16 - 45 years range.

In the age group, over 45 years there were only males affected. The result for 2006 is presented in Fig. 4.

The trend observed in 2005 was similar to that in 2006 for the age range 16 – 45 years. However in the age groups over 45 years both males and females were affected.

Further analysis of the data for 2005 and 2006 was carried out to identify the antibiotic susceptibility pattern for *N. gonorrhoea*.

The standard antibiotics used include the following: Ceftrixone (CRO), Penicillin (PG), Spectinomycin (SH), Tetracycline (TE), Naladixic acid (NA), and Ciprofloxacin (CIP).

Figure 5 shows the results obtained for patients seen in PMGH during the year 2005.

The results show 99.3%, 99.3%, 95.0% and 98.8% sensitivity for Ceftrixone, Spectinomycin, Naladixic and Ciprofloxacin respectively.

The lowest sensitivity (5.6%) was for Penicillin followed by Tetracycline (35%). The result obtained for 2006 is presented in Fig. 6. The percentage of Antibiotic susceptibility pattern to *N. gonorrhoea* for 2006 was similar to the results obtained for 2005.

DISCUSSION:

Prevalence of gonorrhoea

N. gonorrhoeae is an important cause of gonorrhoea affecting humans in the community. It is one of the common STI at the Heduru clinic at the PMGH [2] but rank sixth in the USA [3].

During the two-year study period, the diagnostic microbiology identified a total of 532 patients diagnose with gonorrhoea and due to *N. gonorrhoeae*.

The disease is affecting all genders with less female because of asymptomatic trend in females.

The wide distribution of condom may have provided safe sex hence a decline in STI. Furthermore hormonal secretion is most probably the reason and sexual habits may play a part in the dissemination of the species.

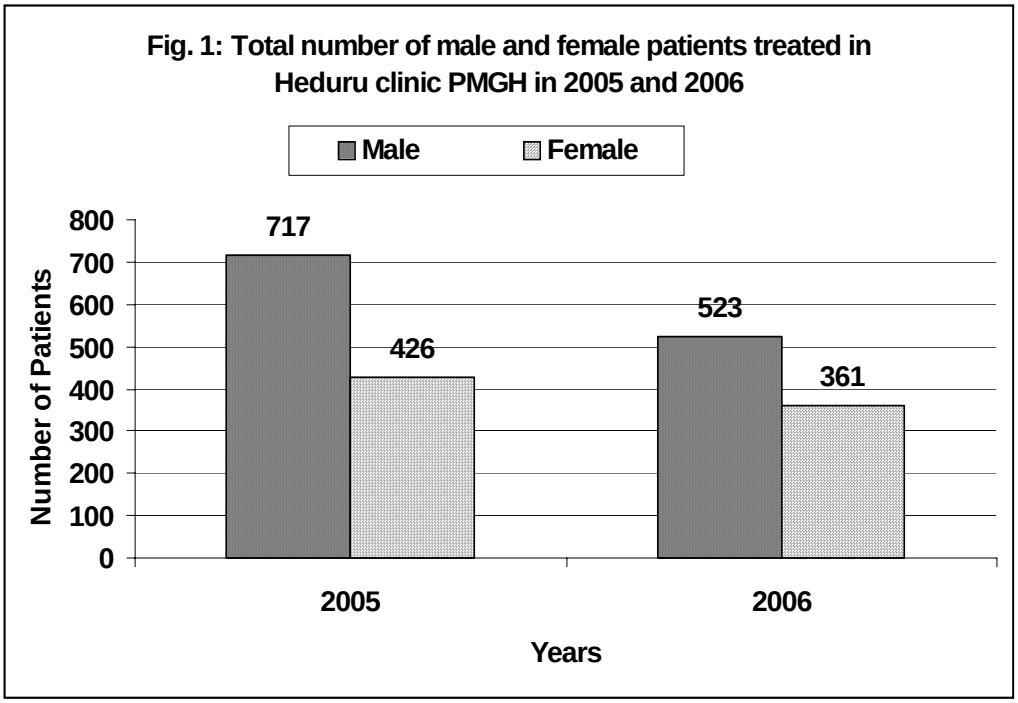


Fig. 1: Total number of male and female patients treated in Heduru clinic PMGH in 2005 and 2006

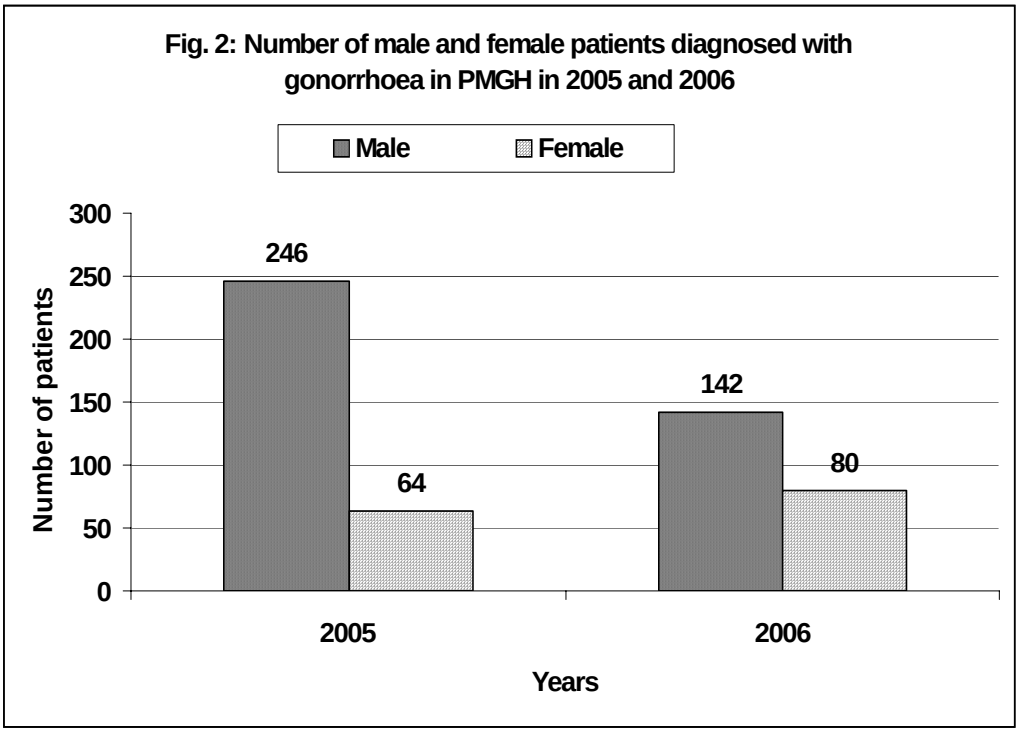
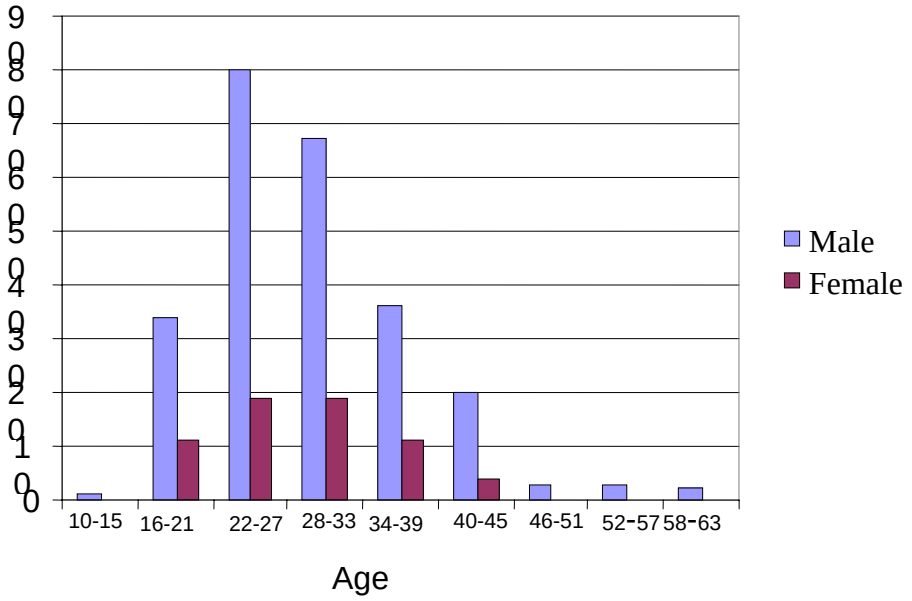


Fig. 2: Number of male and female patients diagnosed with gonorrhoea in PMGH in 2005 and 2006

Fig.3 Age distribution of total number of patients tested for *N.gonorrhoeae* in 2005.



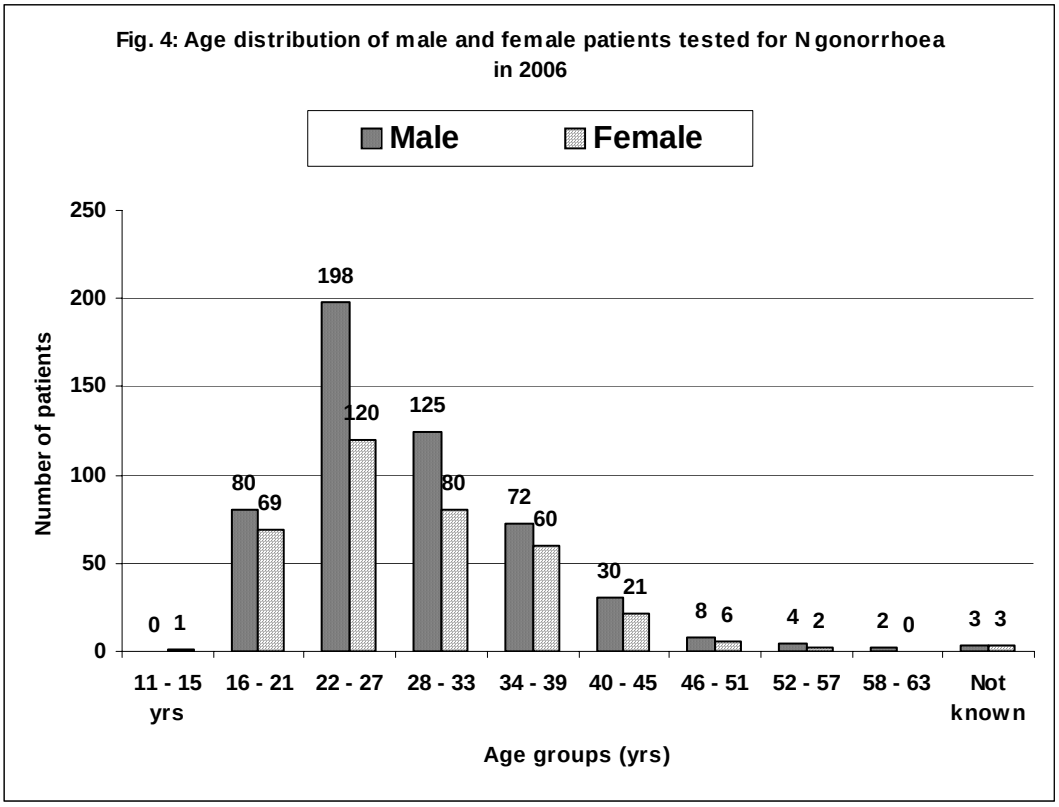


Fig. 4: Age distribution of male and female patients tested for N gonorrhoea in 2006

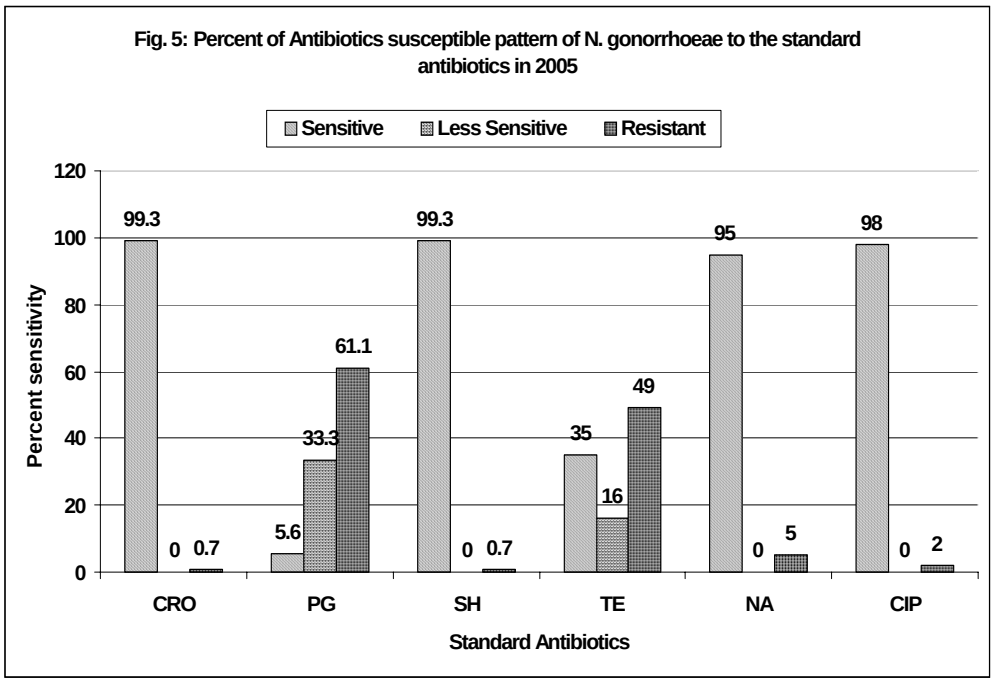
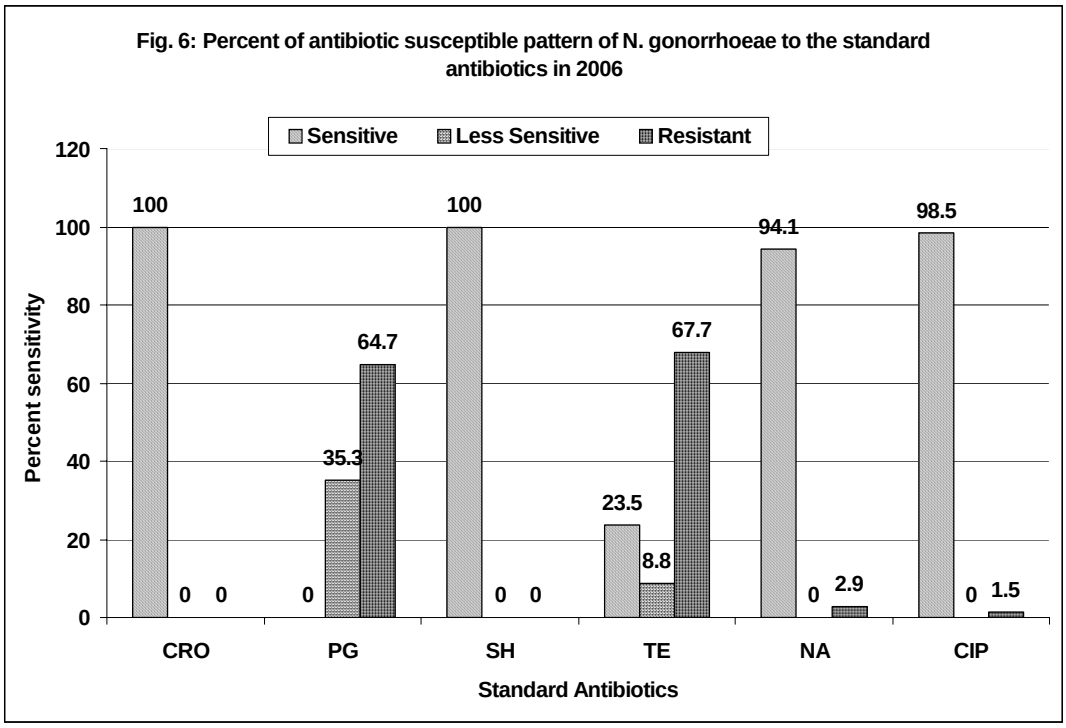


Fig. 5: Percent of Antibiotics susceptible pattern of N. gonorrhoeae to the standard antibiotics in 2005



Resistance to antimicrobials agent

The 532 isolates of *N. gonorrhoeae* were from 2005 and 2006. Of this the 212 isolates showed resistance to Penicillin (61.1% and 64.7%) and Tetracycline (49% and 67.7%) in both years respectively. The resistance pattern is consistent to what has been reported by other researchers [4, 5].

There are few variation patterns of the isolates and this may reflect the use of antibiotics to treat other sexually transmitted infections. Some researchers have indicated that in some cases isolates were resistant to Naladixic acid (Quinolones) [5]. It might indicate that the isolates were not expressing some of their resistance determinants or that they have a new type of resistance. The Naladixic drug is also active for the treatment of urinary tract infection or UTI [5]. Many of the isolates were sensitive to Ceftrixone, Spectinomycin and Ciprofloxacin and would indicate that they are little used in this hospital.

CONCLUSIONS:

Most of the gonorrhoea was susceptible to antibiotics, which is not use in the treatment for *N. gonorrhoeae* at the Heduru clinic.

However Penicillin and Tetracycline are showing resistant and should be further tested for resistance

determinants such as TEM-1 plasmid mediated resistance in *N. gonorrhoeae* for Penicillin resistance.

It is interesting that the study showed that a number of patients at STI clinic having gonorrhoea have declined compared with past studies. Also variable number of males and females having gonorrhoea with highest incidence rate in the age were between 22-33 years.

Spectinomycin and Ceftriaxone appear sensitive while Ciprofloxacin and Naladixic acid slowly becoming resistance, while Penicillin and Tetracycline have continued to show resistance trends.

RECOMMENDATIONS:

There is an urgent need for further studies (phenotype and genotype) to assess the antibiotic resistance *N gonorrhoeae.* To include antimicrobial agent currently use in the treatment in the susceptibility tests.

To carry out Intensive awareness campaign on the preventive measures and proper use of antibiotics.

To further improve the channels of communication (specimen collection, transportation and use of antibiotics) among medical officers, nurses and medical laboratory scientists in pathology.

Bed-side testing of patients for antibody to gonococci and gonococcal antigen in accredited STI clinics should be introduced.

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ISOLATION OF 6 , 22-HOPANEDIOL FROM *PYXINE COCOES*, LICHEN USED AS TRADITIONAL MEDICINE IN PAPUA NEW GUINEA

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INTRODUCTION:

Traditional medicine has been in existence for generations in PNG and the indigenous enthopharmacological knowledge has been passed from generation to generation[1]. Some of these medicines are still being used in most rural areas to treat diseases. However, there have been limited investigations into these medicines to validate their safety and efficacy to support or ensure their integration with modern medicine.[2] In the indigenous communities, traditional medicine was used and prescribed based on trial and error and on general observations made over a long period of time [3]. The active ingredients in these medicines are often yet to be identified and quantified. There is therefore a need to build up leads provided by these folk medicines and herbals and to undertake larger and more widespread screening of them. These traditional medicines can better serve modern societies if their thorough chemical analyses and appropriate therapeutic, toxicological, and pharmacokinetic profiles are established by research.

Perhaps one of the exciting compounds originating from traditional medicine was the discovery of 5-hydroxy-6-methoxy-7-(3-methyl-but-2-enyloxy)-2H-1-benzopyran-2-one, a new coumarin isolated from the lichen *Psiadia dentata*, which is traditionally used to treat abscesses[4]. The latter exhibited inhibitory activity against poliovirus and weak activity against HIV. The mechanisms of action are not well understood as yet [4].

One of the most common herbal medications used to treat inflammatory diseases are lichens [5,6]. Lichens are slow growing and are symbionts of algae and fungi, which occupy a vast range of habitats, ecosystems and substrates and produce unique biochemical compounds that may become potential lead compounds for drug discovery research [7]. Lichens produce both primary metabolites for their metabolism and structure and secondary metabolites, which they secrete onto their surface as hyphae or crystals [8]. Among the list of commonest chemicals that have been reported from lichens include: acids, esters, furans, atranorin and derivatives of atranorin [8]. Lichen derived compounds have been known to exhibit antibacterial, antiprotozoal,

antiviral, antiproliferative, anti-inflammatory, analgesic, antipyretic and antitumor activities and UV protection [9]. A broadly active compound isolated from the lichen *Cladonia foliacea*, usnic acid has applications in medical, pharmaceutical, cosmetics and agriculture [9]. Both enantiomers (+) (-) of usnic acid showed activity against *Enterococcus faecalis*, *Enterococcus faecium, Staphylococcus aureus* and *Mycobacterium tuberculosis* [9]. Two other lichen derived compounds, atranorin and fumarprotocetraric acid also showed activity in similar antibacterial assays [9].

Barbatic acid, a herbicide originally isolated from lichens was shown by Takahagi *et al*. to inhibit electron transport in the membranes of atrazine-tolerant tobacco cells [10].

A microcystin, [(A)DMAdda]microcystin-X(Ha)R was discovered from a lichen associated cyanobacterium *Nostoc* sp., and its activity as an eukaryotic phosphatases 1 and 2A inhibitor was examined [11]. Phosphatases are enzymes that remove phosphate groups from their substrate by hydrolyzing phosphoric acid monoesters into phosphate ions and molecules with free hydroxyl groups [11].

METHODOLOGY:

Biological material:

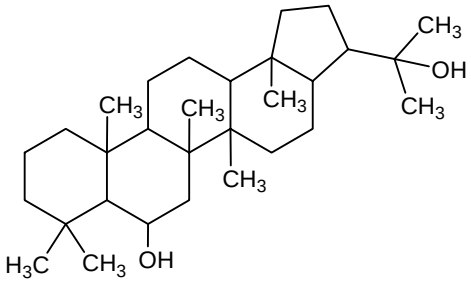
Traditional herbal healer use Lichen to treat inflammatory conditions. The sample was collected and submitted to the University of Papua New Guinea for investigation under the traditional medicine component of the ICBG program. The lichen was identified as *Pyxine cocoes.*

General experimental procedure: NMR data was collected using a Varian INOVA 500 (^{1}H 500 MHz, ^{13}C 125 MHz) NMR spectrometer with 3 mm Nalorac MDBG probe and referenced to residual solvent (δ_H 7.25; δ_C 77.0 for $CDCl_3$). The crude hexane extract was dissolved in methanol and isolation was undertaken with a reversed phase phenyl hexyl column on a Beckman HPLC instrument.

Extraction and isolation: The dry lichen specimen (100.5 grams) was exhaustively extracted with 500 mL of hexane overnight to yield 2.00 grams of crude extract. A portion of the crude extract (0.1809 g) was dissolved in MeOH and purification was performed on reverse-phase phenyl hexyl HPLC using a gradient of 70% acetonitrile in water to 100% acetonitrile over a 20 minute run at a flow rate of 4.5 mL/min. Nine peaks were resolved and detected on the chromatogram at the UV measurement of 168 nm. Peaks A, B and C were collected and pooled together as fraction A. 6β-22-hopanediol (1) was isolated as peak I at the retention time of 16.5 minutes.

RESULTS AND DISCUSSION:

The crude hexane extract of the lichen, *P. cocoes* was purified on reversed phase phenyl hexyl HPLC using a gradient of acetonitrile/water over 20 minutes yielding fractions A – I. A previously reported lichen derived triterpene, 6β,22-hopanediol (1) was isolated as a white solid. [12]



1

Interestingly, this compound was not able to ionize well in both our positive ion and negative ion HRESIMS analysis thus impeding the determination of its molecular weight.

The structure was therefore determined solely by the analysis of NMR data. The ^{1}H NMR spectrum showed eight methyl singlets, one oxygenated proton and ten overlapping methylenes (Table 1). Additionally five quaternary carbons and two oxygenated carbons were observed in the ^{13}C spectrum (Table 1).

The methyl carbon chemicals shifts and the overlapping methylenes suggested a cyclized terpenoid system. The ^{1}H NMR spectrum showed that the proton signals had a lot of overlaps between chemical shifts of δ_H 1.58 and δ_H 2.08 that made it difficult to integrate the methylenes and determine the coupling constants and therefore the structure was elucidated using the HMBC correlations for the most part. The proton chemical shifts of the methylenes were also assigned primarily by analysis of HSQC correlations.

The ^{1}H NMR spectra from the 500 MHz instrument showed eight prominent methyl singlets between the chemical shifts of δ_H 1.18 and δ_H 1.50.

From the HMBC spectrum the two methyl peaks at δ_H 1.32 (H-23) and δ_H 1.45 (H-24) showed correlations to the same set of carbons at the chemical shifts of δ_C 33.9, δ_C 44.1, δ_C 61.1 and to each other indicating that they were a dimethyl substituent.

The carbon at δ_C 33.9 (C-4) did not show any HSQC correlations so it was considered a quaternary carbon and assigned as a vicinal carbon to the dimethyl.

This carbon (C-4) further showed multiple bond correlations to the methylene protons at δ_H 1.62 (H-3) and the methine proton at δ_H 1.15 (H-5).

The methine proton at H-5 resonated as a singlet, which suggest that there were no vicinal protons

Table 1: ^{1}H and ^{13}C Data for 6-22-hopanediol (1) ^{13}C NMR spectrum recorded in $CDCl_3$ at 125 MHz. ^{1}H NMR spectrum recorded in $CDCl_3$ at 500 MHz.

atom	^{13}C	^{1}H, mult	HMBC (H→C)
1	40.7, CH_2	1.95, m	2, 3, 5, 10
2	18.8, CH_2	1.69, m	1, 23, 24, 25
3	44.1, CH_2	1.62, m	2, 4, 5, 23, 24
4	33.9, qC		
5	61.1, CH	1.15, s	1, 3, 6, 7, 23, 24, 25
6	69.1, CH	4.23, m	5, 7
7	45.1, CH_2	1.83, m	5, 6, 26
8	43.0, qC		
9	50.0, CH	1.58, m	11, 25, 26,
10	39.6, qC		
11	21.7, CH_2	2.27, m	9, 12
12	24.3, CH_2	1.74, m	11, 13
13	49.8, CH	1.67, m	18, 19, 27, 28
14	42.2, qC		
15	34.6, CH_2	1.56, m	13, 14, 17, 27
16	21.2, CH_2	1.88, m	17, 18, 21
17	54.3, CH	1.76, m	18, 21, 22
18	44.3, qC		
19	41.5, CH_2	1.85, m	13, 17, 20, 28,
20	26.9, CH_2	2.08, m	17, 18, 19, 21
21	51.3, CH	2.56, q, (10 Hz)	16, 17, 18, 20, 29, 30
22	74.2		
23	21.9, CH_3	1.32, s	3, 4, 5, 24
24	36.8, CH_3	1.45, s	3, 4, 5, 23
25	17.3, CH_3	1.18, s	1, 2, 5, 9, 10
26	18.4, CH_3	1.36, s	7, 8, 9, 14
27	17.2, CH_3	1.30, s	8, 13, 14, 15
28	16.3, CH_3	1.08, s	13, 17, 18, 19
29	28.5, CH_3	1.50, s	21, 22, 30
30	30.5, CH_3	1.50, s	21, 22, 29

The methyl carbon at δ_C 17.3 (C-25) showed HMBC correlations to the methylene protons at δ_H 1.95 (H-2) and δ_H 1.69 (H-3) and the methine protons at δ_H 1.15 (H-5) and δ_H 1.58 (H-9) while the corresponding methyl protons (H-25) had a correlation to the quaternary carbon at δ_C 39.6 (C-10) and was supported by the singlet observed on the ^{1}H NMR spectrum. Additionally, the quaternary carbon (C-10) showed multiple bond correlations to the protons at H-5, H-1, and H-2 thereby completing the assignment of ring A.

Bon observed at δ_C 69.1 (C-6) had a one bond correlation to the proton at δ_H 4.23 (H-6) and the

downfield shifts in both suggested oxygenation. From the HMBC correlations it was observed that the C-6 carbon coupled with the methine proton at C-5 and the methylene protons at δ_H 1.83 (C-7), which correlated to the methyl carbons at δ_C 18.4 (C-26). The corresponding methyl protons at δ_H 1.36 (H-26) appeared as a singlet indicating the absence of vicinal protons, showed multiple bonds coupling to the methine at δ_C 50.0 and the quaternary carbons at δ_C 43.0 (C-8) and δ_C 42.2 (C-14) and thereby constructed the ring B. From the HMBC spectrum a correlation was also observed from C-9 to the methylene protons at δ_H 2.27 (C-11), which further correlated to the carbon at δ_C 24.3 (C-12). The H-12 protons showed multiple bond correlations to the quaternary carbon at δ_C 49.8 (C-13) and an unusual four-bond correlation to the methyl carbon at δ_C 42.2 (C-28). The connectivity from the H-26 methyl protons to the quaternary carbon at δ_C 42.2 was used as the basis for enclosing ring C.

Ring D was constructed using HMBC correlations observed from the methyl carbons at δ_C 17.2 (C-27) and δ_C 16.3 (C-28). The C-27 carbon showed prominent signals to the methylene at δ_H 1.56 (C-15) while the C-28 protons at δ_H 1.08 correlated to the methine carbon at δ_C 54.3 (C-17), the quaternary carbon at δ_C 44.3 (C-18) and the methylene carbon at δ_C 41.5 (C-19).

The carbon spectrum showed a downfield chemical shift of δ_C 74.2 indicative of an oxygenated carbon. The absence of HSQC correlations in the HSQC spectrum indicated that this carbon was a quaternary carbon, and the HMBC spectrum exhibited correlations to the methine protons at δ_H 1.76 (H-17) and δ_H 2.56 (H-21) and the methyl protons at δ_H 1.50. Integration of the peaks at δ_H 1.50 gave six protons which was equivalent to two methyl groups and subsequent analysis of the HSQC spectrum indicated that the methyl protons at δ_H 1.50 coupled to the carbons at δ_C 28.5(C-29) and δ_C 30.5 (C-30).

Evaluation of the HMBC spectrum concluded that the two methyl groups were in an isolated system and attached to ring E via the carbon at δ_C 51.3 (C-21). Other key HMBC correlations were observed from the C-21 carbon to the protons at H-16, H-17, H-18, H-20, H-29 and H-30.

The relative configuration was confirmed by the downfield carbon shift of δ_C 69.1 (C-6) which was suggestive of a □hydroxyl [13].

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STANDARDIZATION OF HERBAL MEDICINES OF PAPUA NEW GUINEA WITH A PARTICULAR FOCUS ON *Alstonia scholaris* Linn. R. Br.

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INTRODUCTION:

Alstonia scholaris Linn. R. Br. (Apocynaceae) is a large evergreen tree that grows up to 50 metres. Its leaves are oblong or short-acuminate and glabrous. They are arranged in whorls of 4-7 and usually crowded at the end of the branches. Its flowers are small greenish-white and strongly scented and the seeds have hair at both ends. It has white, milky sap. *A.scholaris* is commonly distributed throughout the lowlands of PNG and is an inhabitant of primary and secondary forests, lower montane rainforests, monsoon forests and savannah woodlands[1].

The tree is used as a traditional medicine in many parts of PNG and the world for various ailments including diarrhoea, dysentery, malaria, pain, headaches, fever, ulcers, cough, shortness of breath, asthma, pneumonia and TB; also used as a tonic, febrifuge and tonic to aid digestion and stimulate appetite; remedy for liver and intestinal problems; treatment of chronic malaria with enlarged spleen; used as anti-diabetic, anthelmintic, and anti-epileptic[2, 3].

Extensive work has been done on the isolation and identification of chemical conststuents of *A. scholaris*. Many of these compounds are indole alkaloids and a few are amino acids. *A. scholaris* has been shown to possess some pharmacological activities including antiplasmodial, immuno-stimulating effect, anti-cancer and hepato-protective; anti-nociceptive, anti-inflammatory and anti-ulcerogenic[4-7]. Toxicity studies have revealed dose dependant effects[8-9].

Rationale for Selection of Plant

Alstonia scholaris was selected in this study because of its wide application as a traditional medicine in many parts of PNG and elsewhere. It is also used in a variety of disease conditions.

Theoretical Framework

Standardization has been defined as the adjusting of an herbal drug preparation to a defined content of a constituent or a group of substances with known therapeutic activity respectively by adding excipients or by mixing batches of herbal drugs and or herbal drug preparations[10].

Standardized extracts are those, which have been manufactured to contain consistent levels of one or more phytochemical constituents derived from the starting material. There are two main types of extracts: active and marker extracts. Active constituent extracts contain phytochemicals important for a given therapeutic effect. The compounds are isolated and concentrated to an amount not normally found in the plant. Marker extracts contain a characteristic compound (or group of compounds) used to signify the presence of other compounds that may give the herb its therapeutic properties. The active compound is usually not known[11].

Contrarily, standardization is not just about producing a product with defined biochemical content. Many factors determine the levels of chemical constituents of the plant as a starting material, an intermediate or a final product. These includes source of raw material, time of collection, manufacturing.

Thus the approach would be to minimize the inherent variation through a more appropriate notion of standardization - a comprehensive process inclusive of information and controls necessary to produce a final product that is homogenous and reproducible. Measures include correct identification, proper collection, storage techniques, processing of starting material, manufacturing process and the necessary concomitant quality control of steps.

Standardization has positive as well as negative attributes. The former includes an increased consumer confidence and acceptability; an informed decision on choice of therapy; improved business prospects for herbal medicines of PNG; and provision of products with reasonably consistent composition that can be used in clinical trials. On the other hand, the drawback lies in the inherent nature of an herbal medicine wherein the entire preparation is considered as the active principal. According to literature, herbal extracts standardized to contain a specified amount of active compound have been discovered in later research that the 'active constituent' is in fact not responsible for the proposed activity.

Thus the approach would be to standardize *A. scholaris* extract to marker compounds, which are present in the starting material, the intermediate and the final product at the same amount.

Aims and Objectives

The overall objective of the study would be to produce a standardized extract that is stable, has correct potency and is reproducible when administered by the herbal practitioner within the setting of the traditional use the plant.

Specific Aims/Objectives

All aspects of the study will be directed towards the following primary aims:

- Safeguarding of health i.e. the plant must be safe to use.

- Enhancement of quality through good collection and pre-processing techniques and GMPs where appropriate.
- Identifying an extract that will be comparable to the traditional use of the plant.
- To show that the analytical method chosen is suitable.
- Developing practical guidelines that can be applied in the local setting

METHODOLOGY

A literature review will be conducted to establish the safety and evidence of major phytochemical constituents of *A. scholaris.*

Leaves, barks and sap will be collected from trees with respect to the natural habitat of the plant and analysed pharmacognostically and chemically. Pharmacognostic work will be carried out with a view to authenticate the raw material through macro- and microscopic characterization, general identity and purity tests.

Chemical analysis aims to obtain information on the nature and content of constituents present. This will require continuous extraction and subsequent quantification of selected marker compounds from the dried powdered starting material of each plant part using TLC or HPLC.

It would be preferable that the compounds selected are heat-labile since the plant parts will be subjected to heat at some point during preparation of the different forms.

Decoction and infusion of the leaves and barks will be prepared consecutively including a mixture of extract lots with varying strengths; and compared against the chromatographic finger-print profile of the starting material. A drug extract ratio (DER) shall be determined, analysed for its biological activity and related to a dosage that is comparable to the traditional use of the plant.

Projected Final Outcome

The final outcome of the study would be to attain a product having a batch-to-batch reproducibility, and one, which will form part of a national formulary on herbal medicines of PNG.

A set of recommendations in the form of a monograph with respect to the pharmacognostic parameters investigated; and to develop guidelines on how to identify, collect, pre-process, manufacture and administer the herbal medicine will also be produced.

This information will be disseminated to communities and traditional medicine practitioners through Department of Health Promotion Branch as well as through the existing mechanism of Traditional Medicine Practitioners' training in all parts of the country.

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CAN PNG DEVELOP AND PRODUCE SOME OF ITS OWN MEDICINES?

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INTRODUCTION

The process of discovery of medicines is complex with no easy steps, lengthy with no promise for success despite the advances in predictive sciences. The task is even more daunting for a developing country with limited resources and manpower. In this article I shall briefly outline the process and assess the potential for discovering and producing some medicines locally. The idea arose from discussions with final year pharmacy students doing the Design of Medicines course.

Figure 1 outlines the process in a nutshell. As shown in the figure, there are many factors that play, sometimes crucial roles to achieving the goal of medicines discovery.

Aim and Objectives

The main aim was to assess the potential for discovery and manufacture of some new medicines in PNG. The objectives were to assess the demand for new medicines based on the morbidity and mortality rates in the country, to review existing policies to determine the extent to which they support the bid to develop and manufacture new medicines. Further to assess the resources required for developing and manufacturing of medicine and to review researches that have been done on drug discovery and related topics to see the extent to which the objectives are likely to be met.

The Role of the Government in the Development of Medicines:

The role of the government in any country is crucial for facilitating any development but more so for medicines innovation because of their exacting requirements. The government is expected to facilitate the development of any industry by generating short and long term Policies and strategies, setting out priorities and directions. The policies and plans must then be enshrined into laws and regulations followed by their implementation and enforcement to create an atmosphere of peace, stability etc which allow industry to grow and flourish. In many cases the governments are further required to make budgetary provision for basic and applied research of national interest.

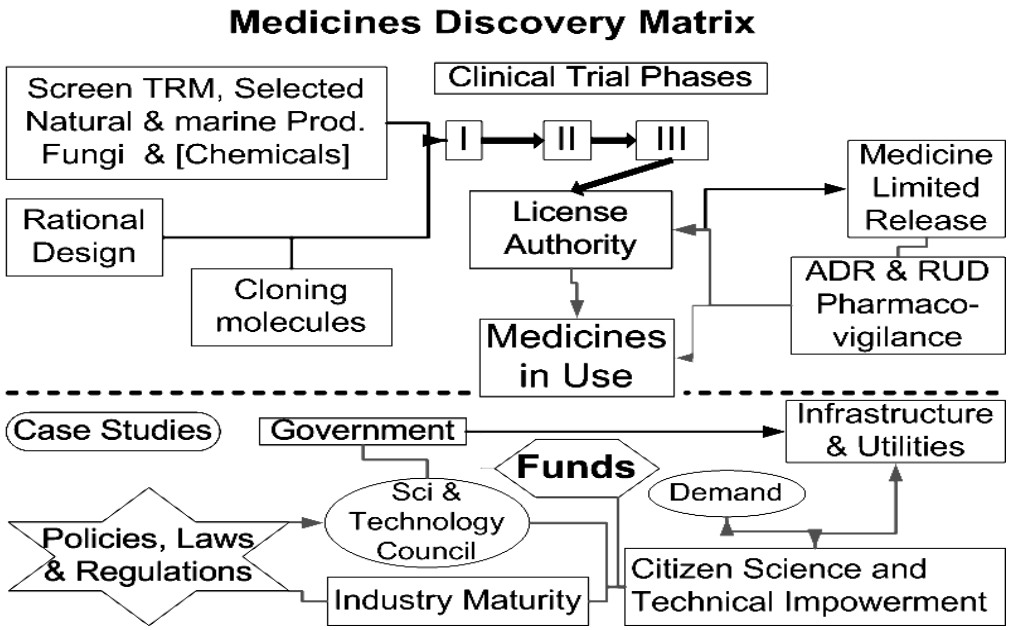

Figure 1: Some of the main factors in the Medicines discovery matrix

Not all the policies and plans will go very far unless the infrastructure: both *hard* and *soft* are provided and maintained. Examples of *hard* infrastructure include communication based such as roads, telephone network; utilities like water and electricity. S*oft* infrastructure includes statutory bodies such as science-based authorities and the embodiment of science and scientific emancipation of the population. Some examples include the Institute of Medical Research (IMR) and National Agricultural Research Institute (NARI). Currently established research bodies deal with adaptation of known scientific solutions for application in PNG with limited room for innovation.

Policies and Plans

The policies of the Central Government its Departmental and Statutory agencies are the blue print declarations that guide these bodies in the implementation of identified goals. The available main policies in PNG include the Medium Term Development Policies (MTDP), OHE Incentives Policy, National Drug Policy and National Health Plan (2000 -2010) as well as the traditional Medicines Policy.

The MTDP comprise the Government's main program for recovery and development which focus on good governance; export-driven economic growth; and rural development, poverty reduction

and empowerment through human resource development [Department of National Panning and Rural Development, 2004] [1].

The MTDP makes no reference to original research at all. The closest thing to original research may be considered under general resource mobilization and alignment, natural endowment, empowering PNG and improving skills… [1].

But this is a tortuous approach which is unlikely to easily facilitate in medicines development. The National Higher Education Policy and Implementation Strategy is a reform plan and an action strategy to stabilize and develop higher education by addressing key issues of academic programs, resources, research, science and technology at the national and/or institutional levels [Office of Higher Education, 2000] [2]. The policy though general makes no budgetary allocation to support original research[1].

Morbidity and Mortality as impetus for demand of Medicines discovery

One of the main driving forces to seek new medicines is the presence of diseases in the community for which there is no proper or quick cure. In PNG the top ten causes of out patient attendance in health facilities and leading mortality in 2006 were simple Malaria was the most common cause of attendance at the out-patient in health facilities [3]. Malaria figures show that the number of attendance is three times more than skin diseases. The next diseases were cough, pneumonia and other respiratory diseases. Injuries and diarrhoea were next in line followed by pneumonia (all ages), ear infections and complicated Malaria (Treatment Failure Malaria – TFM).

Mortality in 2006 was led by pneumonia in children aged less than 5 years. The top six killer diseases caused 400 - 700 deaths. Thus the impetus for innovation in medicines should be directed at countering malaria, skin conditions, childhood pneumonia and tuberculosis (TB).

The Medicines Discovery Matrix

The process of medicines discovery is complex requiring training in science, experience and investment in both scientific tools and reagents. There is no easy starting point and whichever entry point is taken promises no success. However the more money is invested with rigorous internal assessments and regulations the more likely a medicine may be discovered. Many developing countries pin their hopes on traditional medicines and natural products as their starting points in the quest for new medicines. Figure 2 shows a scheme based on this concept. Apart from a few notable examples achieved in the 19th and early 20th centuries the success rate of this approach has been less than 0.1%. It is therefore noteworthy to embark on it with caution.

How much does it cost to develop a new medicine?

Most worrying for many developing countries is the financial cost of medicines discovery. Often political leaders demand that institutions given public finances to innovate medicines must give a date when that would be achieved. They show consternation on learning that no one can predict

the date let alone success. This point has proven a serious stumbling block in public financing. Using past trends as a guide the time to market from discovery of new medicine is about 15-20 years (except for medicines against priority diseases which may be fast tracked).

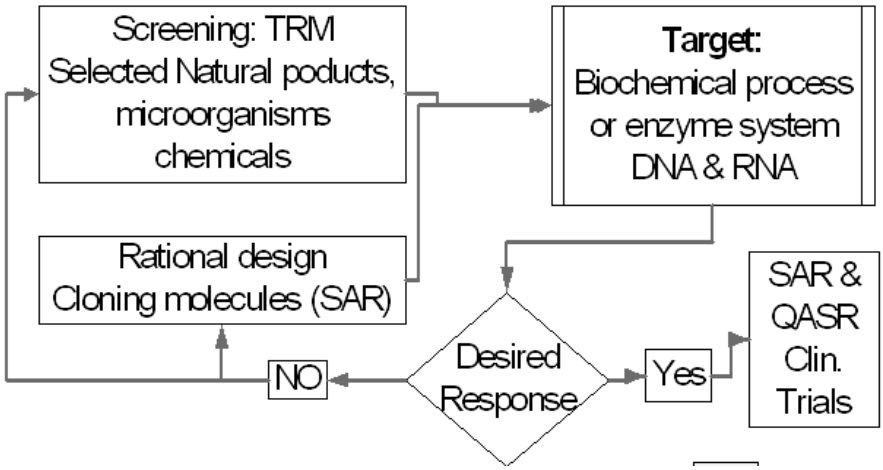

Figure 2: A condensed flow chart in the medicines discovery matrix

Yet developing countries must be part of the innovation gambling. The current estimate of the cost of innovation by Pharmaceutical industry is the staggering 800 million American Dollars. Though the sum may be unattainable it gives a sobering food for thought in this arena. Once a medicine hits the market it has a patent life span of 15- 20 years.

PNG Case studies

What has been achieved in PNG?

A number of respondents in the National Capital District known to be doing research were requested to give information about their work. Most of the research taking place is on-going with a planned time span of 3-20 years. Each of the respondents had achieved some goals in their research activities, for example, Dr Rai (personal communication) has established a Traditional Medicine (TRM) database with over 1500 medicinal plants catalogued. Mr. Piskaut (personal communication) has successfully discovered compounds with activity against TB but has not taken further steps.

Significance

Most of the researches utilized PNG's plants, animals and minerals to try to discover new medicines. Most of the researchers have encountered many problems that hindered them from carrying them out effectively and efficiently. Some of the problems met were lack of appropriate resources (laboratory equipments and chemical reagents) in the university, funding and technical

support limitations, and lack of similar research information within the country.

Case study I: Dr Andrew Masta (personal communication)

Dr. Masta's, research is on Human Papilloma Virus (HPV), oral and cervical cancer, determining Human Genetic Polymorphs and Anti-Retroviral Therapy (ART) resistance in PNG. He collaborates with Professors Chan and Cho of the Yang-Ming University of Tropical Medicine in China. The objective of his researches was to improve the understanding of molecular pathogenesis and determine molecular markers for cancers and resistance for ART. It is an on-going research that has taken over three years now. Since the research started he has presented his findings in scientific medical conferences and published in international journals.

Case Study II: Dr. Prem. P. Rai (personal communication)

He has been doing research on herbal medicine and medicinal plants in PNG in collaboration with Associate Professor Matainaho involving the UPNG, International Cooperative and Biodiversity Group (ICBG) of USA (personal communication). The aim of the research is to document medicinal plants and the traditional methods and preparations of these plants prior to their use in treating common sicknesses and diseases such as: fever, headache, and general body aches by the people in the rural or remote areas. It is an on-going research that has taken over five years and since it started, over 1500 medicinal plants used in PNG have been catalogued. TRM database has been established, successfully completed research on five medicinal plants. He was instrumental in writing a national policy on TRM which was launched May. The importance of the research includes; medicinal plants show potential of drug discovery, and provide rationale for many medicinal plants used in traditional healing in the country. The major obstacles slowing the research include lack of appropriate resources in the universities; necessitating aspects of the work to be outsourced, minimal time allocation and limited access to funds.

DISCUSSION

There are serious odds against reasonable chances of discovering medicines that would eventually be introduced in the PNG market and elsewhere. The government does not have specific policies targeting medicines discovery and development. The direct result of this is that funds have not and cannot be allocated to support this important area easily. The science base seen from the public universities' general capital equipment and recurrent expenditure is very narrow. It is clear that only very limited fundamental or applied research can be undertaken. There are minimal laboratory equipments and less so new ones to support research. Taking the two case studies as illustration show that the limitation of resource support is starkly clear and researchers struggle to get the minimum work done. For reasonable speed of development, investment in highly trained manpower is essential. Currently there is limited supply of experts in just about every sector and more so in the areas of medicines discovery. Many service areas struggle to meet targets due to shortage or uneven manpower supply.

Many researchers work in vertically linked programs with little lateral interaction; that is being connected to institutions overseas and no internal equivalent networking.

There is limited engaging forum for exchange of ideas and collaborative work. There is only one scientific forum devoted to the practice of medicines that regularly feature issues of national interest but has no capacity to follow through in an agenda stance.

CONCLUSION

Medicines discovery investment is the riskiest most expensive venture any company/group can undertake. There a big difference between a novel structure and a useful medicine. Because of the potential for serious harm (cf thalidomide, 1960's); pharmaceutical industry is one of the most regulated worldwide. The capital investment and running costs for medicines discovery are upward of $800 million.

RECOMMENDATIONS

To significantly increase a chance of discovering new medicine, scientists need to have multi-target for their molecules. There is a need to set up a regular forum for exchange and advancement of ideas. Researchers need to develop a research agenda as a guiding blue print (principle). Researchers should adopt advocacy embracing science and scientific practice in all walks of life and further advocate for the creation of a broad based science council to solicit and disburse funds on a competitive basis.

ACKNOWLEDGMENT

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1. Department of National Panning and Rural Development, (2004); The Medium Term Development Strategy, 2005-2010: "Our Plan for Economic and Social Advancement"
2. Office of Higher Education, (2000); Papua New Guinea National Higher Education Policy and Implementation Strategy: National Higher Education Plan, 2000-2004.
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2. Gillett JE. The health of women in Papua New Guinea. PNGIMR: Kristen Press, 1991

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