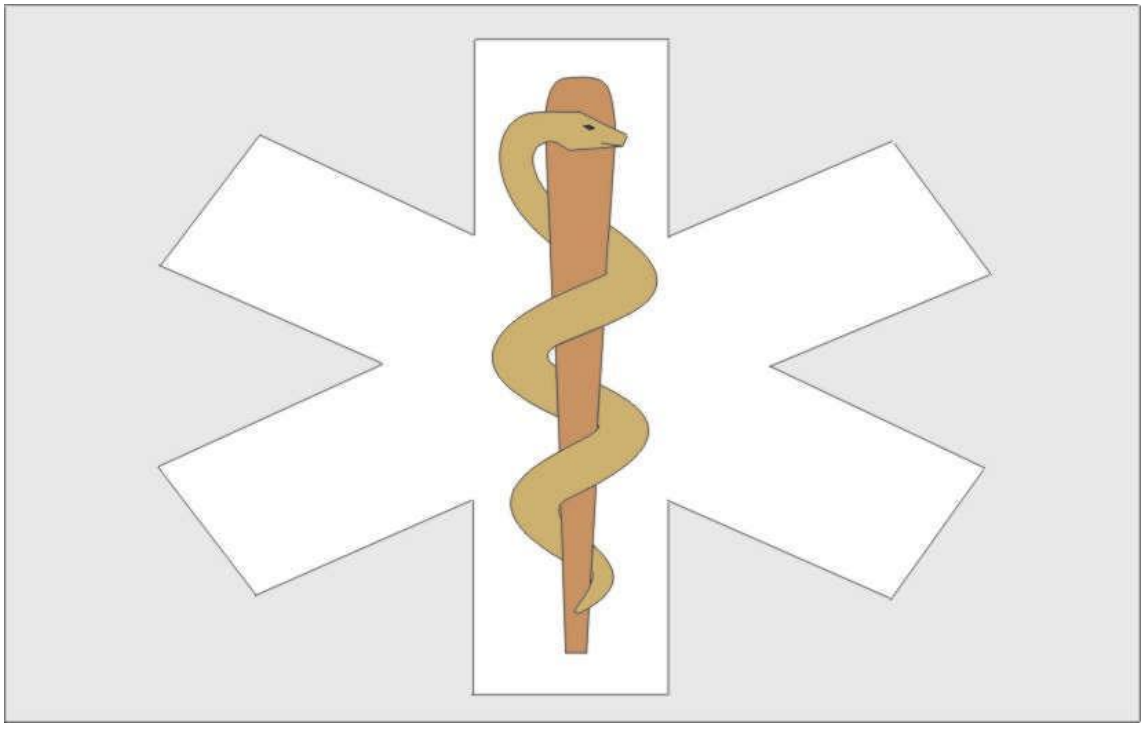
Med. Sci. Bull. **ISSN 1991 – 5101**

Medical Sciences

BULLETIN

SCHOOL OF MEDICINE AND HEALTH SCIENCES
UNIVERSITY OF PAPUA NEW GUINEA



Divisions of Basic Medical and Health Sciences

Volume 2: 2004

MEDICAL SCIENCES BULLETIN: Volume 2, 2004

Joint publication of the Divisions of Basic Medical Sciences and Health Sciences,
School of Medicine and Health Sciences, University of Papua New Guinea

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5. References in text should be numbered according to the Vancouver style of referencing. Example – **Cardiac pacemaker cells exhibit the property of automatic regeneration of electrical currents[1].**

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MEDICAL SCIENCES BULLETIN

Divisions of Basic Medical Sciences and Health Sciences,

School of Medicine and Health Sciences, University of Papua New Guinea

November 2004, Volume 2

Contents

FORWARD

I am delighted to see the publication of the second issue of the *Medical Science Bulletin*. I am equally impressed that this publication which saw its first issue in 2003 has continued in 2004, with even greater level of enthusiasm. It demonstrates the growth of research activities at the School of Medicine & Health Sciences, particularly the Divisions of Basic Medical Sciences and Health Sciences.

The School recognizes the importance of research and technology in the overall academic activities of the University. This bulletin enables the exchange of scientific information amongst colleagues and those interested in medical science research and its applications.

The Bulletin should not be limited to the exchange of scientific information data within the University and the community at large, but should ultimately be directed to foster the exchange of scientific information within the country and internationally and more importantly relate basic medical research to evidence-based medicine and medical practice.

I therefore look forward to further growth of *Medical Science Bulletin* to substantive publication that accept manuscripts from other Institutions within Papua New Guinea, and eventually gain national and international recognition.

Andrew Masta, PhD
Senior Lecturer – Molecular Genetics
Director – Medical Science Research Centre
Deputy Executive Dean

Message From The Managing Editor

On behalf of the new Editorial Board of the Medical Sciences Bulletin let me first offer our deep appreciation to the readership and subscribers of this journal. The journal has a relatively young, but vibrant history with group of academicians in the Divisions of Basic Medical Sciences and Health Sciences pioneering this effort. It has already been recognized as a viable tool for the dissemination of scientific information within Papua New Guinea in particular and the world in general. I will use my position to see to its effective production.

The production of this issue is supported by the International Co-operative Biodiversity Groups (ICBG) Project, a University of Papua New Guinea and University of Utah joint research group. This group will also see to the growth of the bulletin.

It is our belief that this Bulletin, which was born in and reflects a Papua New Guinea melting pot of International science, will attract the submission of outstanding scientific manuscripts and that those who read this Bulletin will choose to subscribe to it. We expect the bulletin to be a focal and rallying point for basic medical scientists in Papua New Guinea and the Pacific region in general who may now use this initiative to strengthen their various researches and forge closer ties. We therefore look forward to the emergence in future to the formation of the Pacific Society of Biomedical Society.

Dr. Teatulohi Matainaho
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ASSESSING THE NUTRITIONAL STATUS OF CHILDREN IN HELLA REGION, SOUTHERN HIGHLAND PRONVINCE, PNG

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INTRODUCTION:

The height and weight of a child is dependent on several factors including, nutritional, health, genetic, social and environmental. Anthropometric indices such as weight, length, stature (standing height), head circumferences and skin fold thickness are used to monitor the rate of growth and development of children (1). Changes in some of these parameters can be used to detect nutrition related health problems in an individual and in affected community (2).

Underweight (low weight for age) status denotes low body mass relative to age. Thus it is influenced by both the height and weight of the child and is a composite indicator of stunting and wasting (1). Body Mass Index (BMI) is a parameter, based on height and weight that is used to determine underweight and overweight in adolescents and adults (1,2). Unlike adults, BMI changes substantially as children grow (1,3). BMI is age and gender specific for infants and adolescences and nutritional status is identified based on percentiles (1,3,4).

In May 2000 the Center for Disease Control and Prevention (CDC) released the CDC Growth Charts for male and female children 2 to 20 years of age (3,4). The CDC growth charts are the revised versions of the growth charts developed by the National Center for Health Statistics (NCHS) IN 1977 and the addition of the new BMI-for- Age charts (3,5). Because of a number of inconsistencies, the CDC strongly recommend that the BMI-for-Age charts be used for children 2 to 20 years of age in place of the Weight-for-Stature charts developed in 1977 (3).

The parameters in the different CDC charts for children age 2 – 20 years are as follows (3): BMI-for-Age (BMI/A): The weight and height are combined with age. It is used to classify children and adolescents as underweight, overweight, or at risk of overweight. It can also be used as screening tool that may lead to further assessment to diagnose a specific health condition. Stature-for-Age or Length-for-Age (L/A): It describes linear growth relative to age. It is used to define shortness (stunting) or tallness. Weight-for-Age (W/A): Indicates body weight relative to age and is influenced by recent changes in health or nutritional status. It should not be used to categorize children as underweight or overweight. However, it is important in early infancy for monitoring weight and can help to explain changes in weight-for-length and BMI-for-Age in older children. Weight-for-Length or Weight-for-Stature (W/L): It does not require information about age, thus it compares body weight relative to length or stature. It is used to categorize children as overweight, normal or underweight.

Table 1 shows the Anthropometric index, Percentile Cut-offs and Nutritional Status Indicators for screening children using the CDC-2000 Growth Charts (3).

Table 1: Anthropometric index, Percentile Cut-offs and Nutritional Status Indicators in the CDC-2000 Growth Charts (3)

Anthropometric Index	Percentile Cut-off Value	Nutritional Status Indicator
BMI-for-Age	$\geq 95^{th}$ Percentile	Overweight
BMI-for-Age	$\geq 85^{th}$ to $< 95^{th}$ Percentile	At risk of overweight
BMI-for-Age	$< 5^{th}$ Percentile	Underweight
Stature-for-Age	$< 5^{th}$ Percentile	Short Stature
Weight-for-Stature	$>95^{th}$ Percentile	Overweight
Weight-for-Stature	$< 5^{th}$ Percentile	Underweight

The issue:

Anthropometric data on the nutritional status of children above 5 years of age in PNG are very scanty. Aichler and Schulte (6) reported that 4.9% of school children (age 8 – 16 years) in East New Britain Province were under-nourished and 5.1% were overweight. Report from a recent survey on the nutritional status of school children, age 9 – 17 years, indicated that children in Central Province were taller and thinner than those from the Highlands (7). Children in Madang were lighter than Highlanders and shorter than children in Central Province (7). The report (7) further indicates that more that 10.0% of boys and girls in Central Province were below the 5th Percentile of BMI for their age.

There are no Anthropometric data for school children in this age group in Southern Highland Province (SHP). However, Heywood (8) reported that the growth rate of children in the Tari area is poorer than the growth rate of children in two-thirds of the Highlands districts of Papua New Guinea. According to Heywood (8) the stunted growth of children in Tari was related to low birth weight, malnutrition and disease episodes.

In this study Anthropometric measurements of children (6 – 12 years old) in Hella Region (Tari and Koroba districts) were obtained in an attempt to assess their nutritional status. The major criteria for selecting this age group in this region is based on the recent research report of mild-to-moderate iodine deficiency among the 6 – 12 years old school children in Hella region (9).

The aim of this study was to assess the nutritional status of children age 6 – 12 years in the Hella Region, using the nutritional indicators in the CDC percentile growth charts.

METHODS

The study population consisted of 346 children age 6 – 12 years (181 male and 165 female) selected randomly from 10 of the more than 50 schools in Hella Region (Tari and Koroba districts). Consent was obtained before the Age, Weight and Stature (Standing height) were recorded for each child. Stature was measured to the nearest 0.5 cm using a tap measure. The measuring tap was placed along a firm wooden stand with a flat square base, on which the children stood for their measurements to be taken. The weight was measured to the nearest 0.1kg using a portable scale. The scale was calibrated before use.

For a given child the Weight, Stature and BMI (kg/m^2) were combined with age to obtain the Anthropometric index, weight-for-Age (W/A), Stature-for-age (S/A) and BMI-for-age (BMI/A) respectively.

Using the appropriate CDC growth chart, the W/A, S/A and BMI/A percentiles for each child were determined individually according to their age and sex. Further analysis of data was carried out using the Excel data analysis package.

RESULTS & DISCUSSION:

Tables 2 & 3 show the anthropometric data obtained for the male and female children (age 6 – 12 years) in Hella Region. The anthropometric parameters were then plotted into the appropriate CDC percentile growth charts in order to assess the nutritional status of the children.

Table: 2: Means and 95% Confidence Intervals (CI) for Stature, Weight and BMI of Male children age 6 – 12 years

Male Children							
		Stature (cm)		Weight (kg)		BMI (kg/m^2)	
Age	**N**	**Mean**	**95% CI**	**Mean**	**95% CI**	**Mean**	**95% CI**
6	19	104.3	101.8 – 106.8	17.6	16.4 – 18.9	16.2	15.1 – 17.2
7	24	109.6	106.6 – 112.6	18.6	18.0 – 19.3	15.6	14.9 – 16.4
8	18	115.0	112.0 – 118.0	21.8	19.9 – 23.7	16.4	15.4 – 17.3
9	22	118.3	115.9 – 120.7	23.7	22.6 – 24.8	17.0	16.3 – 17.6
10	29	121.6	119.6 – 123.6	25.0	23.8 – 26.2	16.2	14.9 – 17.4
11	28	126.0	123.2 – 128.8	27.6	26.7 – 28.6	17.7	16.8 – 18.6
12	41	128.8	127.5 – 130.1	27.5	25.9 – 29.1	16.5	15.6 – 17.5

Table: **3**: Means and 95% Confidence Intervals (CI) for Stature, Weight and BMI of Female children age 6 – 12 years

Female Children							
		Stature (cm)		Weight (kg)		BMI (kg/m^2)	
Age	**N**	**Mean**	**95% CI**	**Mean**	**95% CI**	**Mean**	**95% CI**
6	16	107.0	104.3 – 109.7	18.0	16.6 – 19.4	15.7	14.8 – 16.5
7	19	111.0	108.0 – 114.0	20.1	18.8 – 21.4	16.3	15.6 – 17.1
8	31	116.4	114.6 – 118.2	22.2	21.1 – 23.2	16.3	15.8 – 16.9
9	20	119.9	117.5 – 122.3	23.2	21.5 – 24.9	16.1	15.1 – 17.1
10	32	123.0	121.2 – 124.8	24.8	23.8 – 25.9	16.4	15.9 – 17.0
11	14	127.5	125.3 – 129.7	25.9	23.9 – 27.9	15.9	14.8 – 17.0
12	33	131.1	129.1 – 133.1	28.7	27.5 – 30.0	16.7	16.2 – 17.1

Table: **4**: Nutritional status of male and female children (6 - 12 years) according to Stature-for-Age (S/A) and Weight-for-age percentile cut-off value obtained from the appropriate CDC percentile growth charts.

Percentile Cut-off value	**< 5th Percentile**	**≥ 5th Percentile**	**< 5th Percentile**	**≥ 5th Percentile**
Nutritional Status Indicator	**Short Stature**	**Normal**	**Underweight**	**Normal**
Male (N = 181)	148 (81.8%)	33 (18.2%)	88 (48.6 %)	93 (51.4 %)
Female (N = 165)	123 (74.6%)	42 (25.4%)	10 (6.1 %)	155 (93.9 %)
Total (N = 346)	271 (78.3%)	75 (21.7%)	98 (28.3%)	248 (71.7 %)

The nutritional status indicator of 81.8% of the male children and 74.6% of the female children is in the range of short stature. 48.6% of the male and 6.1% of the female children are underweight the difference was statistically significant at $p < 0.05$.

Table: **5:** Nutritional status of male and female children (6 – 12 years) according to the BMI-for-Age (BMI/A) Percentile cut-off value obtained from the appropriate CDC percentile growth charts.

Percentile Cut-off Value	**< 5th Percentile**	**≥ 5th to < 85th Percentile**	**≥ 85th to < 95th Percentile**	**≥ 95th Percentile**
Nutritional Status Indicator	**Underweight**	**Normal**	**At risk of Overweight**	**Overweight**
Male (n = 181)	12.0 (6.6%)	150.0 (82.9%)	13.0 (7.2%)	6.0 (3.3%)
Female (n = 165)	10.0 (6.1%)	143.0 (86.6%)	11.0 (6.6%)	1.0 (0.6%)
Total (n = 346)	22.0 (6.3%)	293.0 (84.7%)	24.0 (6.9%)	7.0 (2.0%)

Assessment of the BMI-for-age using the appropriate CDC percentile charts shows that 6.6% of the male children and 6.1% of the female children are underweight. These values are higher that the 5% recommended by WHO for a given population (1). It is important to note however that the CDC percentile growth charts used in this analysis are based on reference growth standards obtained from children in the USA population, which might be quite different from reference standards prepared using children in the PNG.

Aichler and Schulte (6) correctly noted that it is difficult to use international percentile growth charts for analysis of anthropometric data obtained for adolescences in most developing countries. The ideal option therefore is to use percentile growth charts prepared from reference growth standards obtained for sex and age groups within the study population. It can be agued, however that this should not invalidate the use of International percentile growth charts, such as the CDC percentile growth charts, for assessing the nutritional status of adolescences in developing countries that do not have growth charts. An appropriate limitation that must be considered is that such data can be used only to assess the nutritional status of the population but not for the assessment of the growth rate of individual children. In addition the data obtained in such studies merely ensures that both low and high-risk adolescence children in the nutritional status spectrum have more chances of being identified in a target population.

Nutritional status according to age groups:
In order to carry out a more detailed interpretation and analysis of our data the nutritional status of both male and female children were then analysed according to age groups. The data indicates that the younger children are more at risk than the older children. For the male children in the 6-year age group, about 11.0% are underweight, another 11.0% are at risk of overweight and 21% are overweight. About 11.0% of male children in the 8-year age group are underweight and 22.0% are at risk of overweight. In addition, 53.0% of male children n the 6-year age group, 79.0% of them in the 7-year age group, 72.0% in the 8-year age group and over 85.0% of then in the other age groups have short stature. For the female children in the 6-year age group, 13.0% are underweight and 13.0% are also at risk of overweight. 5.0% of female children in the 7-year age group are underweight and 21.0% are at risk of overweight. 50.0% of female children in the 6-year age group, 68.0% in the 7-year age group, 68.0% in the 8-year age group and over 75.0% in the other age groups have short stature. The female children are relatively heavier than the male children within the same age group. Thus, female children (6 – 12 years) in Hella region are slightly taller and heavier than their male counterpart in the same age group.

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ASSESSMENT OF URINARY IODINE LEVELS IN PREGNANT WOMEN IN NCD, PNG

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INTRODUCTION:
The trace element Iodine is a component part of the thyroid Hormones {Thyroxin (T_4) and Triiodothyronine (T_3)}. Low dietary iodine intake can cause reduction in the biosynthesis and insufficient production of the thyroid hormones and can lead to Iodine deficiency Disorders (IDD). (1,2). Iodine deficiency can lead to diseases and complications such as deaf mutism, defects in central nervous system development, growth retardation, physical sluggishness, increased childhood mortality, goiter, decreased IQ, abortion and miscarriage in some pregnant women (1,2,3). In the world nearly 1.6 billion people are at risk of iodine deficiency and about 300 million suffer from lowered mental ability, 566 million from goitre, 30,000 stillbirths of which 12,000 are cretins (2,4,5).

There are scientific data showing that pregnancy is accompanied by significant changes in the regulation of thyroid function and iodine metabolism (6,7). According to Brander et al (7) increased renal iodine clearance during pregnancy might explain increased urinary iodine (UI) concentration during early gestation. Median UI level in a population is the recommended principal impact indicator for assessing a salt iodization program (1,2). UI is the prime biochemical index of choice for evaluating the degree of iodine deficiency and for developing strategies aimed at eliminating IDD in affected population (1,2).

Table1 shows the Epidemiological criteria for assessing iodine nutrition based on Median Urinary Iodine (UI) concentrations.

Table 1: Epidemiological criteria for assessing iodine nutrition.

Median Urinary Iodine (ug/L)	Iodine Intake	Iodine Nutrition
< 20	Insufficient	Severe Iodine Deficiency
20 – 49	Insufficient	Moderate Iodine Deficiency
50 – 99	Insufficient	Mild Iodine Deficiency
100 – 199	Adequate	Optimal
200 – 299	More than adequate	Risk of Iodine Induced Hyperthyroidism (IIH)
> 300	Excessive	IIH

Adapted from WHO/UNICEF/ICCIDD[1]

Other WHO/UNICEF/ICCIDD (1,2) recommended Indicators for assessing and monitoring progress towards eliminating IDD as a public health Problem are:

- The median UI concentration of the population (i.e. 50th percentile) should be greater than or equal to 100ug/L. In other words the UI concentration in 50% of the population should be greater than or equal 100ug/L.
- The 20th percentile for the UI concentration of the population should be 50ug/L, in other words less than 20% of the population should have UI concentration below 50ug/L.

PNG perspective:
Data on the iodine status of pregnant women in PNG are very scanty. In one study Amoa and Rubiang (8) reported that 15% of pregnant women in Lae city suffer from IDD. Other recent study has focused on the iodine status of children in PNG (9).

This study was prompted by the lack of scientific data on the iodine status of pregnant women and women of childbearing age in National Capital District (NCD) PNG.

Aims and Objectives:
The Aim of this research project was to determine the urinary iodine concentration in women of childbearing age (control group) and pregnant women in NCD, PNG.

The objective of the research was to use the urinary iodine data to assess the iodine status of women in the two groups. This is important for the purpose of assessing the implementation of the USI strategy for the elimination of IDD in NCD, PNG.

Methodology:
Study site: Port Moresby General Hospital (PMGH) and the School of Medicine and Health Sciences (SMHS). Sample collection: 50 - 75mls of casual urine samples were collected randomly from consented participants. A total of 288 urine samples were collected. A total of 76 (26.38%) urine samples were collected from the Control group (Non-pregnant women of childbearing age) and 212 (73.61%) from Pregnant mothers attending antenatal clinic in the PMGH. Urinary Iodine analysis was done using the Sandell-Kolthoff reaction, after digesting the urine with Ammonium Persulfate in water bath at 100^{o}C. Data analysis was by Excel Data Pack.
Ethical clearance for the study was obtained from the SMHS ethical and research grant committee and permission for the study was obtained from the appropriate authorities in PMGH.

Results and Discussions:
The median UI concentration of the control group was 163.0ug/L, the mean UI concentration was 176.61ug/L with a standard deviation (std dev) of 95.98. The 95% confidence interval (95% CI) was 150.91 to 202.31ug/L. The mode was 320.0ug/L. 69.64% of women in the control group have UI concentration greater than 100ug/L and 7.14% have UI concentration less than 50ug/L. The 20th percentile UI concentration was 82.0ug/L, 80th percentile was 302.0ug/L and the 50th percentile was 163.0ug/L.

According to the criteria set by the WHO/UNICEF/ICCIDD expert committee (1,2,3) these results indicate that iodine deficiency is not a significant public health problem in the female student population in the School of Medicine and Health Sciences that constitute the population from which the women in the control group were taken. Additional analysis of the data shows that 7.17% of the women in the control group have UI concentration between 20 – 49ug/L indicating a status of moderate iodine nutrition. 23.21% have UI concentration between 50 – 99ug/L indicating mild status of iodine nutrition. 19.64% of the women have UI concentration between 200 – 299ug/L and 21.43% have UI concentration greater than 300ug/L.

The result indicates prevalence of mild to moderate iodine deficiency. It also indicates that about 40% of the women in the control group are at risk of developing Iodine Induced Hyperthyroidism (IIH).

For the pregnant women the median UI concentration was 180.0ug/L, the mean UI concentration was 188.69ug/L with standard deviation of 96.72. The 95% CI value was between 175.60 – 201.78ug/L. The mode was 320.0ug/L. 77.83% of the pregnant women have UI concentration greater than 100ug/L, 6.60% have UI concentration less than 50ug/L and 2.83% have UI concentration less than 20ug/L. The 20th, 50th and 80th percentiles UI values were 90.0ug/L, 180.0ug/L and 312.4ug/L respectively. According to the criteria set by the WHO/UNICEF/ICCIDD (1,2,3) the median UI concentration of 180.0ug/L for the women in the pregnant group and the less than 7.0% of them with UI concentration below 50ug/L strongly suggests that iodine deficiency is not a public health problem among pregnant women attend the antenatal clinic in the PMGH. Further analysis of the data for the pregnant women shows that 2.83% of them have UI concentrations less than 20ug/L indicating severe status of iodine nutrition. 15.57 % and 3.77% have UI concentration between 50 – 99ug/L and 20 – 49ug/L respectively indicating mild to moderate iodine nutrition. 23.58% of the pregnant women have UI concentration between 200 – 299ug/L, while 20.75% of them have UI concentration greater than 300ug/L, indicating risk of IIH in both cases.

Using the criteria suggested by WHO/UNICEF/ICCIDD and others (1,3,7) for assess the status of iodine nutrition about 2.83% of the pregnant women are in severe status and 19.34% in mild to moderate status of iodine nutrition. These results are similar to the results (15% of pregnant women with iodine deficiency) reported by Amoa and Rubiang for pregnant women in Lae city (8).

The 19.34% of pregnant women with mild to moderate status of iodine nutrition, in the present study should be of concern to the appropriate health authorities because of the adverse effect of iodine deficiency on the developing fetus.

Our result also shows that 44.33% of the pregnant women are at risk of IIH. Since there are no specific cut-off points for UI concentration to be used for assessing iodine status of pregnant women, it is difficult to interpret this result mainly because of the increase renal clearance of iodine during pregnancy (7).

Conclusion:
Women of childbearing age (control group): Iodine deficiency is not a public health problem amongst these group of Women, there is however prevalence of mild (23.21%) to moderate (7.17%) state of iodine nutrition and also 41.07% are at risk of IIH.
Pregnant women: Iodine deficiency is not a public health problem amongst pregnant women attending the antenatal clinic in PMGH. However there is prevalence of mild to moderate state of iodine nutrition in 22.17% of the pregnant women, in addition 44.33% of them are at risk of developing IIH.

Recommendation:
There is an urgent need for a similar study to be carried out in remote areas of PNG.
There is need for advocacy on the awareness and proper use of iodized salt.
Set up a permanent micronutrient laboratory to closely monitor IDD in those people who are still at risk.
There must be: Political, Administrative arrangements, Assessment and monitoring systems to eliminate IDD.

Acknowledgement:
Professor L. Hill, Dr. F. Hombohanje (SMHS Research Committee), Executive Dean SMHS Professor M. Sapuri, BMS technical staff, Technical Staff at the Chemistry and Biology Strands, SNPS, UPNG, Nurses at the O&G & Pediatric Ward, All willing participants: SMHS Students, Pregnant and Lactating mothers at PMGH, Director Medical Services, Dr. S. Mete & Dr. Kiromat; Colleagues: especially Pilly Mapira, (W.Wiai, C.Sikas, Isaac Asa); Joyce Kero

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CHRONIC JOINT DISORDERS IN PATIENTS ATTENDING THE AOPD AND PHYSIOTHERAPY UNIT IN THE NATIONAL CAPITAL DISTRICT AND HIGHLANDS OF PAPUA NEW GUINEA.

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Introduction

Chronic joint disorders are a common presentation in the communities and health care settings around the world, including Papua New Guinea. It appears to be one of the common causes of chronic disabilities and the leading factor for the loss of productive hours in many countries, particularly the developed countries. Much study has been conducted and much is still been conducted in different parts of the world to evaluate the prevalence as well as the graveness of this disorder.

Joint disorders refer to conditions affecting the joints of the human skeletal system. They are considered to be chronic if they persist for more than six weeks and acute if it lasts less than six weeks. However, shoulder dislocation in particular may be defined as chronic if it remains unreduced for more than only three weeks.

Affection of joints fall within the following three broad groups;
Arthritic conditions; Dislocations and subluxations, and Internal derangements

Literature Review

Studies on disorders affecting joints in Papua New Guinea date back to as early as 1967 when Maddocks first undertook a study on Reiter's disease in Port Moresby. Subsequent studies discussed specific joint conditions such as reactive arthritis, ankylosing spodylitis, and specific joint dislocations of which, the only two published were those pertaining to shoulder and elbow respectively. To date however, no study has already been done to determine the extent or the prevalence of chronic joint disorders existing in the communities in Papua New Guinea.

Aims and Objectives

The aim of this study is to describe the picture of chronic joint disorders by sex, age, place of residence and anatomical region in the specified areas of study in Papua New Guinea. In this probe, determination of the most common causes is also important.
It is also hoped that, this study would determine the frequency of patients who sought medical treatment for their joint ailments.

Patients and Methods

This study was a hospital-based study carried out in three major hospitals in Papua New Guinea within a period of 4 months. The different dates in which the hospitals were visited are as follows:

- Port Moresby General Hospital (PMGH) → 5th – 30th April 2004 & → 5th June – 30th July 2004.
- Mt. Hagen General Hospital (MHGH) → 5th – 13th May 2004.
- Goroka Base General Hospital (GBGH) → 17th – 21st May 2004.

A standard questionnaire form similar to Apley's system of orthopedics in the "patient assessment and diagnosis section" were utilized. In this standard questionnaire, the systemic method of the examination of musculoskeletal including joint examination were outlined. The important parameters observed were as follows: Age (only 18-70 years inclusive); Sex; Place of origin and residence (urban or rural lifestyle). Rural population was defined as those practicing subsistence methods of farming. People residing in the settlements and peripheries of the cities utilizing similar means for survival were considered rural. Those of whom who were considered urban were those who had meaningful employment with modern accommodation. The core of the questionnaire was related to the presenting symptoms. Further inquiries following presenting symptoms were pain and its character, stiffness, swelling and its characteristics, deformities, weaknesses, instability and changes in sensibility and loss of sensations. The duration of symptoms, its evolution patterns, onset and the relieving and aggravating factors were some of the fundamental questions used to make the diagnosis. Past relevant history pertaining to the joint disability, family history and medication histories were also recorded to complement the history section. Clinical examination including inspection, palpation and locomotion of the musculoskeletal or joints were the orders of orthopedic examination to asses the joints involved. Weight and height was not able to be recorded for all the patients because these apparatuses were not readily available. In doubtful cases, x-ray imaging were done to validate the diagnosis. Detailed blood investigations were not done in the study due to the nature of the study. Acute cases and congenital disorders were also excluded.

Data was analyzed using Epinfo6 software package at the School of Medicine and Health Sciences (SMHS) in Port Moresby.

Results, Discussions, Conclusions and Recommendations

A total of 115 patients (65 males) were selected randomly for the study. Seventy-two (62.61%) of the patients were found in PMGH, 28 (24.35%) in Mt. Hagen Hospital and 15 (13.04%) in Goroka Base Hospital. All were indigenous Melanesians of the different regions of Papua New Guinea.

The age range was from 18-70 years, with a mode of 40. Mean value was 37.2 ($\pm$ 11.385) years

Results showed axial skeletal disorders 42%, appendicular region 26% and polyarthritis 19% whilst the rest were soft tissues disorders. The most commonly encountered axial condition was low back pain (40.82%) from degenerative processes whilst knee osteoarthritis (20%) was the leading appendicular condition. Regarding the supporting structures, muscle strain was common (31.25%).
Trauma was the commonest underlying predisposing factor (40.87%), followed by job related causes (25.22%) and age related disorders (13.91%). The age range commonly affected was 25-45 years, range 18-70 years, median 37.2 ($\pm$11.385). There was male preponderance in the study (57%) and majority of the patients were of the rural areas (63%). Almost all the patients seen had some form of treatment in the past. The therapeutic methods used included analgesics alone 8%; analgesics with antibiotics 20%; analgesics, antibiotics and physiotherapy 36%; while 5% are neither of the above. Hospital physiotherapy was utilized in 28% while those practicing physiotherapy at home were 30%. This revealed that people had some form of knowledge on the importance of such practice even at the home settings.

The general picture of chronic joint disorders in Papua New Guinea as recorded from the specific areas of study appears to be similar to that observed in other parts of the world including parts of Africa and Great Britain. It is seen that the different regions of the body are affected in almost equal proportion with joint disorders. Nevertheless, The specific musculoskeletal joint problem that seems to be prevalent everywhere, having significant medical and socioeconomic effects is low back pain, which is a result of diversified causes. Encouragingly however, people in the various areas of PNG included in the study were not ignorant regarding joint disorders, as seen from the types of remedial treatment utilized.

The results in this study could be a catalyst for further researches on joint disorders that can cover or represent the actual position of the entire nation in relation to this disorders.

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THE NEED FOR VITAMIN A

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Introduction:
Micronutrient Deficiency (1) now referred to as VMD (Vitamin & Mineral Deficiency) "affect a third of the world's people – debilitating minds, bodies, energies, and the economic prospects of nations" (Carol Bellamy – Executive Director UNICEF, in Global damage assessment report, 2003). According to Joseph Hunt (Health & Nutrition Adviser, Asian Development Bank; UNICEF: in Global damage and assessment report, 2003) "The road to regional health and life long productivity cannot be passed without removing the obstacle of VMD" (1).

The significance of these statements cannot be overemphasized. They bring to focus the significance role of vitamins and minerals in both specific and general metabolic functions in the body. Vitamins and minerals are required in trace amounts but they play major role in most of the biochemical reactions that occur in the body. They are usually the neglected components of our daily diet.

Vitamin A (Retinol) is a member of the fat-soluble group of vitamins. Recent data (1,2,3) on vitamin A deficiency worldwide shows that about 140 million preschool-age children and more than 7 million pregnant women suffer from vitamin A deficiency (VAD) every year. Between 1.2 – 2 million children and significant number of women die unnecessarily from Vitamin A related courses (2,3). In addition, about 4.4 million children and 6.2 million women suffer from Xerophthalmia worldwide (2).

Some major sources of Vitamin A and Vitamin A esters – such as Retinyl palmitate include Liver, Dairy foods, Animal foods, Vitamin A added to fortify foods, e.g. sugar Pharmaceutical preparations, e.g. supplements. Some sources of pro-vitamin A such as the Carotenoids include: Carrots, dark green leafy vegetables, less well absorbed than yellow/orange coloured fruits and vegetables, tomatoes, red palm (4), Pharmaceutical preparations, e.g. supplements.

Transportation of VA in blood:
In blood Vitamin A is transported bound to Retinol Binding Protein (RBP) and Transthyrethrin (TTR) in 1:1:1 molar ratio (5,6). RBP is produced in the liver as Apo-RBP. RBP in circulation with vitamin A is called Holo-RBP. In healthy individuals with normal status of Vitamin A, Apo-RBP is not released in significant amount from the liver unless vitamin A is available to form Holo-RBP (5,6). In well-nourished individuals 85 – 90% of Vitamin A is transported in blood as Holo-RBP (5.6). Lipoproteins contains small amount of Vitamin A as Retinyl-esters (4).

Some biochemical functions of Vitamin A:
One important use of Vitamin A is in the visual cycle. Rhodopsin is formed when 11-cis-retinal binds to the protein Opsin. On exposure to light, 11-cis retinal isomerizes, releasing Opsin. This initiates optic nerve impulse, sending visual images to the brain for processing (4,7). Vitamin A is needed for the biosynthesis of Transferrin, the transport protein for iron in blood. Lack of Vitamin A can cause non-responsive iron deficiency anemia (4). Vitamin A can act like steroid hormone in regulating growth and differentiation (4,7). Vitamin A is essential for biosynthesis of Glycoproteins that are required for normal growth regulation and for mucus secretion (4,7). It is also needed for the biosynthesis of Glycosaminoglycans (GAGs), which are components of mucus secreted by epithelial cells. In normal Vitamin A status, fully differentiated cells in epithelial tissue produce Mucin, however when the vitamin is deficient, differentiation process slows down, keratin producing cells replace Mucin-producing cells in epithelial tissues in the eye, lung and gut (4,6,7). Reduction in mucus secretion leads to drying of epithelial tissues in the eye, lung and gut, excess keratin production causes Keratinization (e.g., in the eye – causing Xerophthalmia (dry eye) which can result in blindness (4,6,7).

Assessment & Control of Vitamin A deficiency:
The Annecy Accords (3): The XX International Vitamin A Consultative Group (IVACG) meeting held in Hanoi in 2001 issued new comprehensive recommendations for the assessment and control of vitamin A deficiency worldwide (3). Known as "The Annecy Accords" – these recommendations include standardized definitions of Vitamin A deficiency (VAD) and Vitamin A deficiency disorders (VADD). The meeting also specifies the Indicators needed for the assessment of VAD & VADD.

The new nomenclatures were standardized to clarify their descriptions (3). Vitamin A deficiency disorders (VADD) was introduced to cover all physiological disturbances caused by low Vitamin A (VA) status, including clinical signs and symptoms. The most vulnerable groups to VADD are infants, young children and pregnant and lactating women.

In old nomenclature: non-ocular, systemic manifestations of VAD were misleadingly referred to as "Subclinical" – It was agreed that conditions such as severe infection, anaemia and death are not Subclinical, thus the need to drop this terminology (3).

According to the Annecy Accords the definitions of terms indicating Vitamin A status and its health effects are as follows (3,5):

- VAD: State of inadequate Vitamin A nutriture.
- VAD begins when Liver stores of Vitamin A falls below 20ug/g (0.07umol/g).
- Serum Retinol (SR) levels may still be within the homeostatically regulated normal range. {By convention in developing countries, SR levels < 20ug/dL (0.7umol/L) are considered deficient. In developed countries with "adequate" stores, average SR levels generally exceed 30ug/dL (1.05umol/L)}.
- VADD: Physiologic disturbances secondary to VAD. It may be sub-clinical (e.g., impaired iron mobilization, disturbed cellular differentiation, depressed immune response) or it may be clinical (increased infectious morbidity and mortality, growth retardation, anemia, Xerophthalmia).
- VADD begins long before the onset of Xerophthalmia, although the prevalence and severity of these disorders increase with the severity of deficiency.
- Xerophthalmia: Clinically evident ocular manifestations of VAD.
  Night blindness (XN), Conjunctival Xerosis (X1A), Bitot's spots (X1B) Corneal Xerosis (X2) and Corneal ulceration and Keratomalacia (X3)

Biochemical Indicators for assessing VAD (5,6):

- Serum Retinol (SR):

SR level reflects the VA status of an individual, particularly when the body stores of VA are limited. SR level is homeostatically controlled and will not drop until body stores are significantly compromised (5,6). SR level can be reduced by factors that affect the release of Holo-RBP from the liver; such factors include infection, protein status, deficiency of other nutrients and liver disease (5,6). According De Pee (5) population with high prevalence of infection are more likely to suffer from VAD.

- Retinol Binding Protein (RBP):

The ratio of SR to RBP is 1:1 (Holo-RBP), thus serum level of RBP reflects SR level therefore RBP is used as an indicator of VA status. RBP is a protein therefore its assessment is easier and less expensive than the assessment of SR (5,6). RBP is more stable than SR with respect to light and temperature. RBP analysis requires 10 – 20ul (finger prick) of serum compared to 100ul (venous blood) required for SR analysis using HPLC (3,5,6).

New Cut-offs to Indicate VADD:

Serum Retinol (3,5,6): SR concentration < 0.7µmol/L (20ug/dl) in ≥ 15% of Preschool age children (6 – 71 months)
{It is important to note that the serum retinol must be measured by HPLC technique (3,6)}

Other parameters (3,5,6):
Liver stores of vitamin A < 0.07umol/g liver
Breast milk retinol < 1.05 µmol/L
Retinol binding protein (RBP) suggestion 0.77 µmol/L {use Radial Immunodiffusion RID}

Indicators of VADD:

Liver stores may be assessed using the Retinol Dose Response (RDR) or the Modified Retinol Dose Response (MRDR) techniques (3,5).

Population Assessment (3,8):

The recommended new criteria that can be use to accurately determine extent and severity of VAD in a population: Maternal night blindness (XN) – woman's history of experiencing night blindness at some point during her last live-birth pregnancy (within last 3 years) is considered more accurate than questioning parents about night blindness in preschool children. Therefore the minimal prevalence criteria of 5% XN in such women is considered an indicator of VAD in the wider population (3,8).

Surrogate Parameters (3,8) – these are associations with VAD but not direct or immediate consequence.

- Populations with under 5 year mortality rate (U5MR) > 50 per 1,000 live births also likely to have significant VAD
- Countries with U5MR of 20 - 50 per 1,000 live births may have VAD and its presence or absence needs to be verified

Intervention Strategies to reduce VAD:

Dietary Diversification: Dietary strategies are the preferred solution to VAD.
It should be noted however that the bioavailability of β-carotene, the primary pro-vitamin A source in plants, is only half that previously assumed (9). Studies (9) from developing countries estimate 21µg β-carotene from a typical mixed plant

diet of vegetables and fruits yield 1.0µg Retinol equivalent (RE). Therefore, unlike adults it is impossible for a young child to consume adequate plant diet to normalize vitamin A status. Women can eat larger quantities of plant food than infants, thus plant diets can be used to normalize Vitamin A status in mothers but not in infants (9). Thus, it is almost impossible to correct widespread VAD by diet alone in developing countries where population dependent on plant-based foods (9). Vitamin A supplementation of mothers and young children remains an essential intervention in VAD populations. Breast milk is the most important source of vitamin A for the infant during the first 1-2 years of life

Fortification:
Fortification of commonly consumed foods is potentially the most cost-effective solution to the problem of VAD. To be successful such programmes often must address political, regulatory and trade barriers. Proper monitoring and evaluation are essential whatever Vitamin A intervention strategies are implemented. Rigorous and repeated evaluation is necessary to ensure that the intervention goal is being achieved (3).

Current situation in PNG:
Data on VMD in PNG is scanty. The UNICEF, IVACG, ICCIDD, WHO and others in consultation with the NDOH have decided to carry out a National Nutrition Survey as the first step towards assessing the status of VMD in PNG. The UNICEF EAPRO, CDC and INMU have agreed to assist PNG with the Survey. The SMHS UPNG will participate in the survey as the focal point for most of the laboratory analysis and will become the center for future monitoring of VMD in PNG.

Acknowledgement:
Facilitators from CDC & INMU, Participants from PNG to VMD workshop Bangkok
Laurence Grummer-Strawn, Ph.D. Branch Chief, Maternal and Child Nutrition Branch, Centers for Disease Control and Prevention (CDC); Rosemary L. Schleicher, Ph.D. Research Chemist (CDC); Katie Tripp, MPH. Micronutrient Specialist (CDC); Jacqueline Knowles, Ph.D. Micronutrient Specialist (CDC); Pattanee Winichagoon, Ph.D. Deputy Director Institute of Nutrition, Mahidol University (INMU); Jintana Yhoung-Aree, Ph.D. INMU; Wantanee Kriengsinyos, Ph.D. INMU; Pongtorn Sungpuag, D.Sc. INMU; Dr. Gilbert Hiawalyer, Ph.D. Director-Monitoring, Research & Evaluation Branch NDOH PNG; Clementine Yaman Nutrition Project Officer, NDOH, PNG; Florence Addo Assistant Project Officer Nutrition, UNICEF, PNG.

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THE IRREPARABLE WOES OF MALNUTRITION

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Introduction
Malnutrition is a condition caused by inadequate intake or inadequate digestion of nutrients and may result from the following conditions:

- Eating an unbalanced diet,
- Digestive problems, or
- Absorption problems.

It generally occurs when nutrients in the diet of individuals do not cover their body's nutrient needs[1] .

Problems of malnutrition are usually compounded with micronutrient deficiencies that exist in many developing countries.

Vitamin A, iodine or iron deficiencies constitute public health problem in developing countries.

Prevalence of Malnutrition

It is estimated that 800 million people in the world do not have access to sufficient food. They are mostly in the developing countries of Africa, Asia and South America. 200 million Children in these countries are malnourished and malnutrition accounts for more than half of the nearly two million under five deaths[1].

Malnutrition in Children continues to be a major health problem in many low income countries.

Assessment of Malnutrition

The following methods are used to assess malnourished children:

- Comparing weight for height – this estimates how thin or ***wasted*** the child is.
- Height for age ratio is a measure of being short compared to age i.e. ***stunted.***
- Weight for age can also be used.
- Clinical symptoms and signs should also be observed.
- Sometimes a malnourished child can be recognized clearly, even without measuring.
- In some vitamin deficiencies there are very specific symptoms that must be observed.

Prevalence of wasted and Stunted Children in the World
The following table shows the prevalence of wasted and stunted children in the world (WHO 2002)

	STUNTED	STUNTED	WASTED	WASTED
	%	Million Children	%	Million Children
Africa	38.6	44.6	7.2	8.3
Asia	47.1	172.8	10.8	39.6
Latin America	22.2	12.1	2.7	1.5
Oceania	41.9	0.4	5.6	0.1
All developing Counties	42.7	229.9	9.2	49.5

The table shows that highest prevalence of wasted people is in South East Asia.

The highest prevalence of stunted people are found in Guatemala 68%, Bangladesh, India and Mauritania 65%

Control of Malnutrition

Prevention of malnutrition is important as it has such a huge impact on the immune system and the whole body. Impaired immune response leads to diseases and high mortality. Numerous Governmental and non-governmental agencies are working to limit the scope of malnutrition in the world.

Prevention strategies include:

- Educating people
- Providing adequate H_2O supplies and sanitation system
- Oral rehydration therapy
- Immunization programmes
- Breast feeding and family planning
- Growth monitoring and supplementary feeding.

The Woes of Malnutrition

- ✓ Malnourished children often suffer from the loss of precious mental capacities.

- ✓ They fall ill more often.
- ✓ If they survive, they may grow up with lasting mental and physical disabilities
- ✓ Mental disabilities are irreparable.

In view of the above, it is necessary to design a diagnostic procedure to assess brain damage in malnourished children.

Using piglets as an animal model, we conducted a study to determine the reaction of the cerebral cortex to asphyxia.

Computerized EEG Analysis of Cerebral reactions to Asphyxia in Normal Weight and Intrauterine Growth Retarded Piglets (IUGR)

The flow chart below shows the course of intrauterine compromise during reduced supply to the fetus[2-6].

Small for gestational age (SGA) is classified into:

- Constitutional – small mother, and
- Intrauterine growth retardation (IUGR) divided into:
  - Symmetrical (type I), and
  - Asymmetrical (type II)

The causes of IUGR include:

- Placental insufficiency (different causes)
- Malnutrition (protein calorie malnutrition)
- Genetic factors
- Fetal infections
- Drugs

In the present study, we focussed our interest on the subgroup of term neonates born small for gestational age with the typical signs of IUGR.

Acute morbidity and mortality is higher in these IUGR newborns compared to normal weight piglets.

Materials and Method

Piglets were divided into for experimental groups as follows:

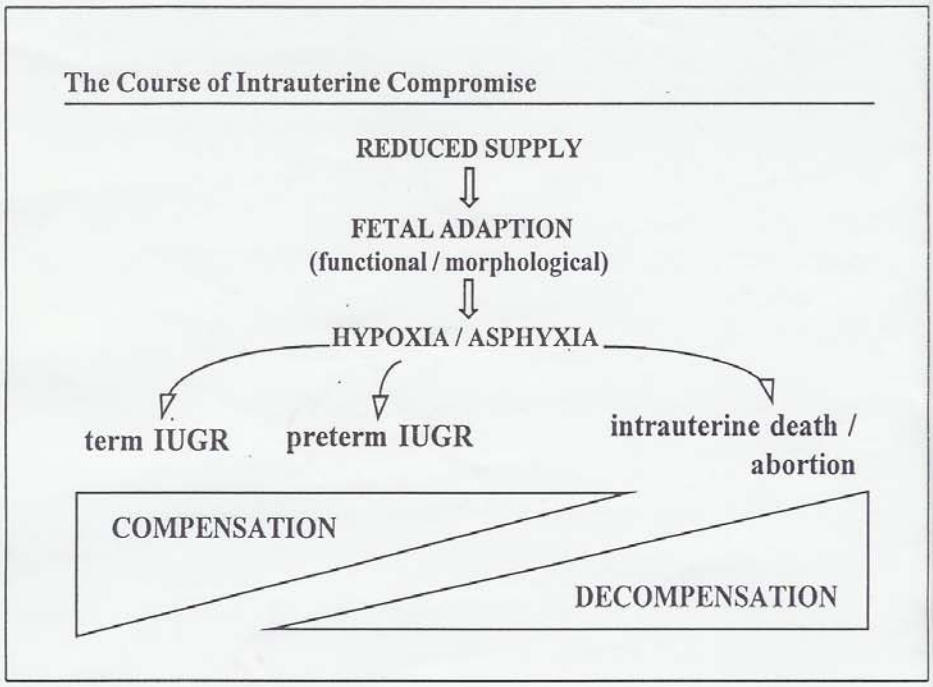
Group	n	Body Weight	Age
• Sham NW	7	1495 ± 115	20 ± 8
• Sham IUGR	7	802 ± 44	17 ± 8
• Asphyxia NW	7	1455 ± 123	20 ± 4
• Asphyxia IUGR	7	789 ± 60	21 ± 5

Piglets were transported at the morning of the experiment to the laboratory and anaesthetized prior to surgical preparation.

4 electrodes were placed above the somatosensory cortex and ECoG was recorded with a sampling rate of 512 Hz. The ECoG was analysed using the WATISA software.

Blood gases, pH, Blood flow, oxygen consumption, plasma glucose level and catecholamine level were also measured using standard procedures.

Results were analysed using the students t- test for paired datas.


The Course of Intrauterine Compromise
REDUCED SUPPLY
FETAL ADAPTION
(functional / morphological)
HYPOXIA / ASPHYXIA
term IUGR
preterm IUGR
intrauterine death / abortion
COMPENSATION
DECOMPENSATION

Results

The results show that the pH value for NW and IUGR were identical.

In early as well as late recovery period, there was reduced cerebral blood flow in the IUGR piglets indicating reduced ability for recovery of cerebral metabolism in that group of piglets.

The ECoG recording show a significant difference at the end of recovery between NW and IUGR piglets.

Conclusion

Using the pig as an experimental model, we found that asphyxia in IUGR piglets leads to compensatory mechanism those results in increased cerebral blood flow. When this compensatory ability was compared with the value in normal piglets, we discovered that the oxygen consumption of IUGR piglets were significantly decreased during late asphyxia and reoxygenation periods. This result shows that IUGR piglets cannot sufficiently turnover the oxygen delivery.

In addition, the IUGR piglets showed signs of reduced plasma glucose, haemorrhagic enterocolitis and increased catecholamine level,

This study and earlier studies are striking considering that the pig is very similar to man in perinatal brain development and metabolism and cardiovascular regulation.

A normal mental development is the most important prerequisite for a successful social life of individuals as well as broader areas of the society. It is therefore necessary to study and evaluate the development of the brain in malnourished children to avert the woes of malnutrition.
The experimental model described above can be used to study the pathophysiology of malnutrition, hypoxia and hypotonia and the morphology and function of the brain during malnutrition.

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TRADITIONAL MEDICINE DATABASE AND ITS POTENTIAL ROLE IN PRIMARY HEALTH CARE IN PAPUA NEW GUINEA

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A Traditional Medicine Database has been established to document, preserve and encourage the continued usage of safe and effective traditional medicine practices and ethno-botanical tradition in Papua New Guinea. Information contained in the database is intended for education, research and information. The database will be instrumental in preserving and promoting indigenous knowledge for treating illnesses and play an important role in improving the primary health care for the majority of the population.

Traditional medicine (TRM) has been practiced and has contributed to human health for centuries. More than half of the world's population relies on traditional systems of medicine for their primary health care. The World Health Organisation (WHO) has recognized traditional medicine as an essential building block for primary health care and launched a traditional medicine working strategy designed to assist countries to meet the public health challenges in terms of policy, safety, efficacy, quality, and rational use of traditional medicines (WHO, 2002). There is a vast store of basic knowledge about plant medical uses in indigenous communities in Papua New Guinea. This knowledge has been built up over hundreds of years of interaction with their environment and must be preserved. Plant-based traditional medicine is widely practiced and accounts for well over half of all health care delivered in Papua New Guinea (Rai, 2003).Traditional medicine continues to be largely oral based knowledge in PNG and evidence exists that valuable information about indigenous uses of herbs is continuously being lost at an ever increasing rate. Traditional Medicine Database (TRM Database) seeks to redress this situation by embarking on maintaining a detailed record of information on local uses of medicinal plants and traditional medicine practices, and by collecting and storing information from the practitioners nationwide to ensure that the knowledge is preserved and properly promoted for the benefit of the community. TRM Database has been developed as a component of the traditional medicine program activities under the auspices of National Department of Health.

Traditional Medicine Database

The TRM database has been designed to provide information concerning local knowledge as well as modern research findings where these exist. The database is the result of information generated from ongoing nationwide survey of medicinal plants and traditional medicine practice in various parts of the country. A standard protocol has been developed, tested and used for survey of medicinal plants. It includes from establishing initial contacts with councillors, village heads, and community leaders to obtaining prior consent from traditional practitioners who participate in the survey. A questionnaire titled "Information sheet on traditional herbal medicines and medicinal plants of Papua New Guinea" is used to document the information on site. Plant specimens are collected for taxonomic identification and preparation of herbarium specimens for future record. Plants are also photographed in their natural habitat. The database is extensive and currently holding records of 600 plants. It is fully referenced and provides historical use fields and published research information. The database is also user friendly with an in-built ease of navigation. It is searchable for herbs by their action and uses, or scientific, common and vernacular names and other search criteria. It is possible to search for a specific field of interest in the database. The criteria for search also include plant family, habitat, chemical constituents, biological activity, medicinal use, herbarium number, and plant identification or reference number assigned to the plant. A plant may be searched via a practitioner also but this option is limited to the administrator only. The database has four major categories: (1) the prescription database, which includes information on preparation, dosage, medical usage and efficacy; (2) a fully referenced chemistry and pharmacology database which includes natural constituents found in the plant as well as biological activities; (3) a photo-image database, which shows full colour images of medicinal plants and herbs with vernacular, common and scientific names; and (4) a practitioners database, which contains a list of all practicing herbalists, their residential address and location of herbal clinics and premises. Data entry is convenient and fast, and provides for addition of any new information at any time. It provides for a number of maintenance screens: plant, as well as practitioner or source of information, dialect, browsing/searching for a plant, etc. The individual plant records are linked and accessible through various menus and pages to enable readers easy searching of the available plant information. The main menus are: plant data entry/maintenance, search plant/enquiry, user maintenance, plant family maintenance, practitioner maintenance, dialect maintenance, and statistical report. It is possible to generate a number of statistical information such as number and name of plants in the database, number of plants added in the database since last report (a specific date), non-plant traditional medicine practices, plant and non-remedies used for specified disease conditions. It is also possible to get a variety of information about practitioners such as types of conditions treated and remedies used by each practitioner as well as the number and names of practitioners on the database by province, district and/or village.

Application of the TRM Database: The primary objective of establishing the database on indigenous traditional medicine has been stated earlier in this paper. Other applications of the TRM database are listed below.

Selection of safe and effective traditional remedies: Information in the database can be examined critically to identify safe and effective remedies and practices for use in public health services at the primary health care level. Effective and safe traditional medicines are valuable contributions to society. In quite a few instances modern scientific research exists that provides scientific evidence of the value of a given plant or herb. It should also be possible to identify and select a group of herbal remedies for promotion and self-use based on the sound evidence of safety, efficacy and cost-effectiveness.

Preparation of herbal list for primary health care: The database will be used to develop a herbal list in following categories:

(i) Herbs for the treatment of gastro-intestinal illness: Gastric ulcer, dyspepsia, diarrhoea, constipation, vomiting, intestinal worm, increase appetite, etc.

(ii) Herbs for treatment of respiratory illnesses.

(iii) Herbs for treatment of illnesses of reproductive and urinary systems.

(iv) Herbs for treatment of skin diseases: Ringworms, burns, abscess, wounds, insect sting, urticaria, etc.

(v) Herbs for treatment of other diseases or illnesses: Insomnia, fever, sprains, snakebite, head lice, etc.

Development of herbal information leaflets: Information contained in the database will be used to develop herbal brochures in English and vernacular languages for promotion in the community as part of home care and self-use. An example is given below:

Health Problem (Cough)

Symptoms: Dry cough causing intense pain in cardiac region, sides, chest and head. There is dryness of the chest, throat and mouth and hoarseness of voice. The person brings out dry cough with difficulty and feels phlegm remaining inside the chest.

Medicine Name:	Ginger, Kawarr (Pidgin)
Ingredients:	*Zingiber officinale* rhizome, 2" long
Form of medicine:	Powder
How to prepare:	Powdered and mixed with sugar
How to take:	Internally
How much:	2 tea spoon twice a day (Adults); half of this dose to children.
When to take:	After food
How long to take:	Three days
Along with:	Nil
Diet and regimens:	Nil
When to refer:	Dry cough persisting more than two weeks with blood in sputum, chronic Cough with weight loss, etc.
Contraindications:	Hyperacidity, mouth ulcers, stomach ulcers, etc.
Remarks:	Well dried ginger rhizome should be crushed to make fine powder sieved with a fine cloth.

Promotion and public awareness: The database would help raise public awareness on traditional medicine and serve as nucleus for continuing advocacy to increase the interest in using traditional medicines as an integral part of health and welfare policy.

Utilization of traditional medicine practitioners (TMPs): The database also serves as a directory of traditional medicine practitioners in the country. TMPs are important human resources for health care in communities throughout the country. Most of the practitioners do not have formal education and lack knowledge of primary health care principles. However, after appropriate training many of these TMPs could be integrated into the formal health system and serve as primary health care providers at the community level. Potential TMPs may be identified for such training from the database.

Protection of consumers' interests: Consumers want safe, efficacious and affordable traditional medicines that are prepared properly and safely. This is difficult to ensure at present since TRM is not regulated in the country. However by providing relevant information consumers' needs and perspectives on TRM will be served to some extent.

Protection of endangered plant species: The database will be useful in identifying some wild-crafted plant species that are excessively used in traditional medicine for conservation and cultivation. Some data generated will provide useful information on biodiversity and pointers for sustainability of endangered plant species.

Scientific research on traditional medicine: The database will provide education, research and information dissemination to public and health professionals; including universities, schools, researchers, ethno-botanists and phytochemists involved in the study and use of medicinal plants and natural products. It will also provide number of useful lead for scientific investigation of medicinal plants.

Conclusion

Plant based traditional medicines are assuming greater importance in the primary health care of individuals and communities. Traditional medicine database provides documentation of medicinal plants and traditional medicine practices. It is hoped that the database will be instrumental in focusing attention on the growing need and importance of preserving and promoting indigenous traditional knowledge for treating illnesses and maintaining health. It will also hopefully play a role in improving the primary health care for the fast growing population of not only PNG but of the South Pacific region as a whole.

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NEUROPHYSIOLOGY OF AGGRESSIVE BEHAVIOUR

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Introduction:

There are two most important behaviours for survival, feeding and sexual for preservation of self and preservation of species respectively. To some extent aggression is essential for survival in both these behaviours. In nature sometimes offence is the best defence. Aggressive behaviour can originate also from fear and insecurity. It could be a protective mechanism to avoid potential danger (5,7,11,12). Violence is the result of both nature and nurture. Nature of an individual is determined by: genes (5,7,10), endocrines like testosterone in male animals (5,7) . Nurture is determined by bad parenting, acute stress in childhood (abuse), poor education, too much exposure to violent movies and video games and growing up in poor neighbourhood with a lot of gang activities and violence (1,2,5,7,9).

Discussion:

Genetic effects on aggressive behaviour:

- Role of extra Y chromosome: in many violent career criminals, there was association of an extra Y chromosome (1,5,10).
- In brain there is decreased production of neurotransmitter serotonin 1,4,5,6,7)
- A decrease production of MAO (mono amino oxidase) in some areas of the brain (1,5,7,13)
- Polymorphism of 5HT receptors: 5HT 2AR, 5HT 2CR, 5HT TPR (4,7)

Experimental proof for brain areas involved in aggression:

Removal of neocortex leads to aggressive behavior in rats, cats and monkeys, which is known as 'Sham rage'(5,7). Also selective lesion of ventromedial nucleus of hypothalamus in normal animals, lead to aggressive behavior as 'sham rage' (5,7). Lesion of septal nuclei with intact cerebral cortices also leads to aggressive behavior (2,5,7). In these aggressive animals, bilateral lesion of amygdaloid nuclei led to placidity. Bilateral amygdalectomy is sometimes done in uncontrollable violent patients, to bring some placidity (2,5,7). However, destruction of ventromedial nuclei of hypothalamus after amygdalectomy led to aggressive behavior again both in animals and human (2,5,7). Stimulation of lateral area of hypothalamus and central grey area of midbrain also cause rage and aggressive behavior (2,5,7) in

animals and human. Antonio Domassio showed that a small lesion in the genu of corpus callosum in the prefrontal lobe leads to anger and aggressive behavior in rats, cats and monkeys (7)

Role of prefrontal cortex in violence and aggressive behaviour (5,7,8,9,14):
It has been observed that damage of prefrontal cortex may lead to violent behaviour trait even in normal persons(2,5,7,14). Most of the violent criminals show decreased activity in their prefrontal cortex (5,7). Very often when a person takes some action in the name of religion, country or some higher causes, no matter how heinous the crime is, he/she develops the justification for his/her actions. In these cases prefrontal cortex learns to send less inhibitory impulses to the mesolimbic system (7, 13).
Prefrontal cortex (PFC) is connected to the N.Accumbens, lateral hypothalamus and amygdala. By fMRI studies, it has been shown that in familial cases of unipolar and bipolar depression, activity in the PFC near the genu of corpus callosum decreases during depression and increase during manic phase (7).

Evidence of the role of neurotransmitters in violence:
- 36 criminals serving jail term for violence and murder showed decreased level of brain serotonin . Some of them when released with low serotonin level became repeat offenders (10).
- **Interesting patient history:** 14 members of a Dutch family showed aggressive behavior in various forms like rape, arson and attempted murder showed mutation of a gene that encodes MAO, which metabolizes serotonin, dopamine and norepinephrine. In these patients there was no decrease in serotonin level but imbalance between these neurotransmitters (7).
- Any imbalance of these neurotransmitters could lead to violent behaviour (1,4,5,7)
- It has been observed that an abused child usually develops into an abusive adult

Brain serotonin level could change with nurture:
Lack of love, confinement, torture and sexual abuse from early childhood leads to decreased serotonin level in the brain (7). Isolation and lack of attention of young animals (monkeys, hamster, rats) in long term experiments showed decreased brain serotonin level (7).

Experimental proof for the role of serotonin in aggression:
- In mice where serotonin 1B receptor had been ablated by targeted deletion, became extremely violent compared to the wild mice with intact receptor (7).
- Destruction of serotonergic neurons in mice, cats, hamster, goldfish and monkeys led to increased aggressive behaviour (2).
- Certain serotonergic agonists, which act on 1B receptor, are used as a treatment to control aggression (1).

Platelet serotonin level could correlate well with brain serotonin level in human:
It has been shown recently that platelet serotonin content correlates inversely with life history of aggression in personality-disordered subjects. It reflects fairly with the brain serotonin level (6).

Other neurotransmitters for aggression:
Genetic deletion of neuronal isoform of NO synthase (nNo synthase) leads to aggressive behaviour in mice (3). Pharmacological blocking of this enzyme by 7Nitroindazole also augments aggression (3). However deletion of endothelial NO synthase (eNOS), decreased aggression of these animals even when the animals became hypertensive (3).

Role of testosterone in aggressive behavior in human being:
It has not been proved that in human testosterone plays any major significant role in aggressive behavior, though in other animals castration leads to placcidity and lack of aggressive behavior

Classification of aggression by Autonomic activities a polyvagal theory (11):
- ***Type I aggressive behavior*:** High risk taking, explosive and intermittent aggression shows increased autonomic activity and reactivity. Polygraph tests for lie detection can show positive result in these cases, because they are dependent on autonomic functions.
- ***Type II aggressive behavior***: Premeditated, cool calculating aggression (Predominantly sociopath) show decreased or normal autonomic activity and reactivity. Lie-detector polygraph tests do not give any significant result in these cases.

How to know whether a child has a violent trend or not?
- Always check and keep an eye on the child, whether he/she is abused sexually or otherwise

- Most of the child abuses take place at home and the perpetrator is one of the most trusted adult in the family
- Any child showing cruelty to animals or bullying tendency towards younger or helpless children or persons (so-called bullies!) might become an aggressive individual in later life. Parents and teachers must take a serious note on these simple behavior traits.

Do parents, teachers and society have a role to play in dealing with a violent child?

- Parents, teachers and society should play major role guiding a violent child in proper direction, by channelizing the aggressive nature into constructive activities
- The aggressive children should not be controlled with strict discipline.
- More tender care and love should be given to him or her.
- Very gently the behavior trait should be corrected by showing better result with gentleness
- A male child should not be brought up with too much stress on male ego.
- Social attitude must change. Instead of bringing up a child to be a 'man', he should be brought up as a good human being and learn to be more caring.

Reasons for the present statistics of increased violence in the world:

- Too much difference between rich and poor in most of the societies leading to frustrations among poor underprivileged
- A lot of global injustice and exploitation by the so-called developed rich nations against not-so-rich developing world
- Instead of proper education, employment and true sense of love for humanity, religious fanatics instigate the inner frustration of youth and lead them to the path of violence.
- Using young people as tools, many ambitious individuals achieve their goals
- Poverty and breaking up of families, leading to lack of loving home base for a child
- Widespread child abuse and abuse of weak and vulnerable
- Decay of social and moral fabric in many advanced societies
- Too much materialism instead of true love in life
- Lack of role model in the family and society
- Wide-spread drug abuse, because drug industry is a multi-billion dollar industry

Summary:
To some extent violence and aggression is a part of life. It is a part of survival strategy in nature. It is normally kept under reasonable control, mainly by the genetic make-up, connections and proper functioning of areas of limbic system of the brain, neurotransmitters like serotonin, dopamine and norepinephrine and their relative balance and the environment in which the person lives and the way a person is brought up. Aggression could be controlled and tamed from an early age of life. However, a world without violence is probably a utopia, which is not possible to achieve. A violent person will always justify his/her actions on some pretext or other. However, the brain functions and the neurotransmitters level also could be altered in violent persons, not as causes, but as results in many cases, seen both experimentally in animals and studies in human, by fMRI.

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BREAST SCREENING MAMMOGRAPHY: IS IT A COST EFFECTIVE METHOD FOR BREAST CANCER DIAGNOSIS AND TREATMENT IN PNG?

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Introduction

Breast cancer is a malignant tumour of the breast, usually a carcinoma. It is unusual in men but is the commonest form of cancer in women, in some cases affecting both breasts. Despite extensive research the cause is not yet known but it may appear to have some familial link. The classic sign of breast cancer is a lump in the breast, which is often noticed after a minor local injury, bleeding or discharge from the nipple may occur infrequently (6). Sometimes the first thing noticeable may be a lump in the armpit, which may be an indication of cancer spread to the drainage lymph nodes. Breast cancer easily metastasises and the common sites for breast cancer spread are the lung, brain, the lymphatics, bone and liver. Breast cancer is very uncommon in women under age 35 and the risks increases over the age 50. The most common type of breast cancer is ductal carcinoma. It begins in the lining of the ducts. Another type, called lobular carcinoma, arises in the lobules. Treatment options following diagnosis and staging include: surgery (mastectomy), radiation therapy, chemotherapy, hormonal therapy or biological therapy, most of which are not available in Papua New Guinea (PNG).

With the increasing prevalence of breast cancer in PNG we review the need for a breast screening by mammography for women in the risk group, ie > 40 years and above. We also review the epidemic status of the breast cancer in PNG in collaboration with PMGH cancer unit to see if it warrants a mammography-screening program. We then look at aspects of implementing a screening mammography program, the cost and benefits and the viability of such a program.

Epidemiology

Breast cancer was initially a very rare disease in PNG. Kuska (1999) (4) in a report published in the Australian Journal of the National Cancer Institute on the incidence of breast cancer in PNG noted that this cancer was rare in the pre and early post-independence. He noted that cancer registry records from 1958 to 1988 showed that the incidence was only 2.4 per 100,000 women as compared to other countries, for instance New South Wales alone has a breast cancer incidence of 64.5 per 100,000. Another study published in the journal *Cancer* by Martin et al. in 1992 also noted that the breast cancer rate remained constant over these 30 years. The incidence was noted to be predominantly premenopausal while in western countries its incidence is predominantly postmenopausal. In those countries, the treatment of menopause by hormone replacement therapy (HRT) has been linked to the development of breast cancer. In PNG, current records have shown that breast cancer is on the rise. Records from the Port Moresby General Hospital cancer unit shows that breast cancer has increased and this increase is significant in the last five years (8). The rise in incidence is thought to be associated with westernised life-style of many women especially with diet and other impacts of modern developments. Nevertheless, it is hypothesized that all women are at risks of developing breast cancer. The risk is less in women below 40 and increases above 50. Currently, breast cancer is the most common cancer in women behind cervical cancer. Most patients with breast cancer are usually diagnosed at an advanced (stage III or IV) stage, rendering any form of treatment potentially difficult (8). The prevalence and distribution is country wide where the risks exists.

Detection and Treatment

The only early breast cancer detection method used in PNG is the Breast Self Examination (BSE) and most women are unaware of this test. With awareness, many are now beginning to know and should consult their local health centre to learn more about the BSE test. They need to know for themselves how to perform the test as most palpable masses can be detected through BSE test and women who suspect lumps or masses in their breast should seek medical advice as soon as possible. Conventionally, the BSE test reveals lumps, which may be either benign or malignant and unfortunately for those that a malignant, the cancer may already be at a metastatic stage rendering treatment very difficult. (Table 1). Like other cancers, the impact of breast cancer on patients can be very devastating on their social and economic lives. Women are usually not the same after breast cancer treatment where one or both breasts can be removed. With surgery and chemotherapy as the only treatment option available to women with breast cancer in PNG, the mortality rate is high and very few women survive longer than five years. Most would certainly succumb to recurrent breast cancer since radiotherapy treatment is unavailable.

It is with this trend that we question the need for a mammography screening program for women who may be at risk of developing breast cancer. The real need lies with the fact that a BSE test cannot detect early breast cancer let alone metastatic cancer. Precancerous micronodules and calcifications are undetected by the BSE test. These however, can

be seen on routine mammography examination. The clinical diagnostic value of mammography cannot be overemphasized. It is the only effective method for the early detection of breast cancer.

Table1. Stages of Breast Cancer

Stage 0	The cancer is non-invasive or called carcinoma in situ. Essentially, the abnormal cells seldom become invasive, or may not spread beyond the ducts to invade the surrounding breast tissue.
Stage I and II	The cancer is in its early stages, and is spreading beyond the lobe and ducts, and has invaded nearby tissues.
Stage III	Is also called locally advanced cancer. In this stage, the tumour in the breast is large (more than two inches across) and the cancer has spread to the underarm lymph nodes; or the cancer is extensive in the underarm lymph nodes, or the cancer has spread to the lymph nodes near the breastbone or to other tissues near the breast.
Stage IV	This is metastatic cancer. The cancer has spread beyond the breast and underarm lymph nodes to other parts of the body.
Recurrent cancer	The disease has come back despite of initial treatment. Even when a tumour in the breast seems to have been completely removed or destroyed, the disease sometimes returns because undetected cancer cells remained somewhere in the body after treatment.

Screening mammography and the triple test

What is mammography?

Mammography is a radiographic examination specially designed for detecting breast pathology. The interest in breast imaging has been fostered by the realization that approximately 1 out of 9 women will develop breast cancer over a life time (a record in the western world).

The aim of screening for breast cancer is to reduce mortality by early detection. In most industrialised countries, national breast screening programs use 2 view mammography alone as the screening method. Trials of early detection using mammography have shown a reduction in breast cancer mortality of approximately 30% in women aged 50-69 years. The mortality reduction is less in women aged 40-49 years. While screening is effective in women aged 70 years or more, the cost effectiveness is less as other causes of death become more common. There is no proven effective method of screening under 40 years of age (5).

Breast cancer screening is performed in two stages. The initial stage is the two view screening mammography. The second stage involves the assessment of the abnormal mammographic findings, as these are not specific for malignancy. Further evaluation requires the use of one or more components of the Triple Test:

1) Further imaging with mammography (including special views and techniques) and US;
2) Clinical assessment of history and examination; and
3) Tissue sampling by FNA or core biopsy

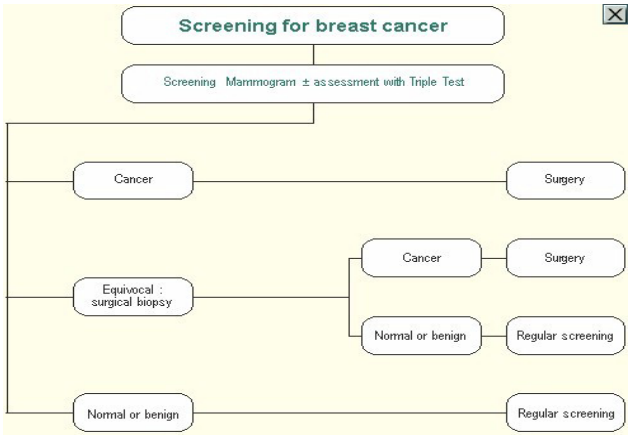
Diagnosis and management strategies are based on the integrated results of the Triple Test components, so that false negatives and false positives can be minimised.

Advances in imaging technology have improved the diagnostic sensitivity of mammography. In comparison, early x-ray mammography was done with nonscreen, direct exposure film. These images exhibited low contrast, required high radiation doses and yielded poor diagnostic quality. In fact, it is thought that the early mammography screening examinations (1950s and 60s) potentially caused more cancers than were detected (1). Mammography by xeroradiographic process came into use in the 1980s but again due to the relatively poor contrast sensitivity and higher radiation dose compared
with the technological advances of film-screen mammographic imaging, that lead to its demise in the late 1980s (1).
Several other modalities used for breast imaging include thermography (infrared imaging), transillumination, diaphanography, ultrasound, and magnetic resonance imaging (MRI). These modalities are however, used more as ancillary procedures to the x-ray mammography examination. Although their role may be small, significant advances, particularly with ultrasound and MRI, may lead to their increased use.

The small x-ray tissue attenuation differences in the breast require the use of equipment specifically designed to optimise breast cancer detection. Because of the risks of ionising radiation, techniques that minimize dose and optimise image quality are essential. These concerns have led to the development and refinement of dedicated x-ray equipment, specialised x-ray tubes, compression devices, and optimised detector systems. Strict quality control procedures and corporation among the technologists, radiologist, and physicist are necessary to ensure that acceptable images are achieved at the lowest possible radiation dose.

Radiology Diagnosis

A clear and specific diagnostic algorithm has to be devised to provide the best possible approach to detecting and confirming presence of breast cancer based on cancer characteristics. The following is a breast cancer screening algorithm adopted from the book *Imaging Guidelines* by Lawrence Lau from the Australia and New Zealand College of Radiologists.



(Adopted from Lau. L, 2001, Imaging Guidelines)

Mammography

At present mammography is the most effective diagnostic method used to detect early breast cancer. It is the primary modality for breast imaging for women > 35 years. It has since been used as a universal breast screening tool in many countries. It shows normal breast tissue and most importantly, it can show microcalcifications. It has a sensitivity of 80-90% but a relatively low specificity. It is specific in a few cases such as absence of malignancy in fatty tissue. Mammographic appearance is a spiculated mass, pleomorphic microcalcifications, focal symmetry, and changes observable compared to previous mammograms are (or may be) indicative of breast cancer (fig.1). Currently, considerable research is being conducted on looking for ways to make mammography more accurate, such as digital mammography and the application of computer assisted diagnosis (CAD). CAD enhances breast cancer detection by applying search algorithms to help radiologist identify micronodules (7).

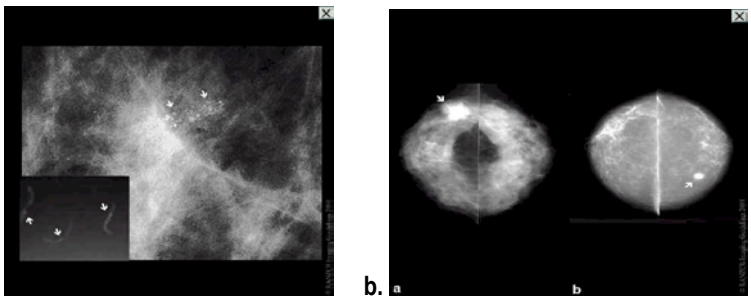


Fig 1: Mammograms (a) carcinoma in situ (b) irregular masses in low density breast in dense (5)

Ultrasound (US) is useful in assessing breast masses to determine whether they are cystic or solid. Usually compatible with patients < 35 years of age. Since breast is mostly compost of fatty tissue US may be able to show ductal carcinoma. Other masses such as those that are highly calcified may be easily visualised since they are more reflective of US pulses. Cystic changes are demonstrable on US and are mostly due to large tumours, necrosis and haemorrhage. Dynamic test in US my be applicable to distinguish benign and cystic appearances since they have similar appearances and Doppler US significantly assess of which increased vascularity indicates are breast tumour. In comparison US has a sensitivity of 53% while mammography is 85% in fatty breast and in dense breast US is 75% while mammography is 55%. Generally, US sensitivity increases as breast density increases (7)

Magnetic Resonance Imaging (MRI) is may be used to stage breast cancer by exploring and demonstrating breast metastases. It is very sensitive and because of its superior soft tissue differentiation it can be used for treatment planning purposes.

Radionuclide Imaging (RNI) may be useful in identifying dense breast tissue, large palpable masses and multifocal masses and breast implants. Apart from that, its main role in breast cancer management is in the detection of metastatic breast cancer.

Cost vs Benefits

- In a country like PNG where government health resources are focused on basic health services with the emphasis on prevention rather than cure, it would be seemingly difficult to initiate such a program as breast screening mammography for women. Critics would argue that the cost in terms of running the program (personnel and logistics) would outweigh the benefits. In all sense of the program, it would seem that a mammographic screening program would be great benefit to many patients. Although the cost would include:
- One off initial equipment and installation cost is reasonable
- Training and personnel cost- though radiographers can easily be trained within a short time to perform mammography
- Supply and Maintenance
- Radiation risk- this is being continually minimised with refinements to mammographic equipment
- Social and mental stress associated with positive findings from mammography
- Immoral to the patient especially when there are no treatment options

Benefits

- More effective than BSE-sensitivity of up to 90% for microcalcifications
- The actual cost of examination is cheap
- Provide early detection and monitoring of breast lesions
- Able to do mass screening
- Provide an option for early treatment for those who could afford treatment overseas
- Availability of essential technical and medical staff

Conclusion

In PNG a screening mammography programme can be seen to be cost effective because it is affordable like any other x-ray examination and that radiologist and technical staff are available to perform and report on the findings. It would be most reliable test to detect early breast pathology which provides for early treatment. Surgery is considered to be the most effective management option, however, because of the fact that usually remnants of cancer cells would still remain after surgery, the application of a combined surgery-radiotherapy treatment proves to be successful and that increases the survival rate to more than five years. Therefore, a mammography screening programme would also be most cost effective and viable with proper treatment options in place such as radiotherapy, surgery and chemotherapy.

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