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Aim and Scope

The aim of the research Journal is to provide venue for the publication of research studies of the various units of the Davao Medical School Foundation, Inc. It responds to the need for a venue to publish on a frequent basis and reach a wider readership particularly for the dissemination of research findings.

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Blood Lead Levels Among Welders in Davao City

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ABSTRACT: Lead toxicity remains to be a significant public health problem particularly in developing countries like the Philippines. Among welders, lead toxicity can be acquired through inhalation. To date, no local study on blood lead levels among welders has been published. This study sought to determine the blood lead levels of thirty volunteer male welders aged 18 to 49 years old from two construction firms in Davao City. By means of Atomic Absorption Spectrometry (AAS), serum blood lead levels (BLL) were determined for toxicity categorized into mild, moderate, and severe. *Results reveal that sixteen (53.33%) showed detectable lead levels in their blood ranging from 4.52ug/dL to 93.44ug/dL, with seven of them having severe blood lead levels between 42.73ug/dL to 93.44ug/dL. These were higher than the recommended level set by OSHA at 40ug/dL. However, no significant relationship was found between BLL and work duration as welder.*

KEYWORDS: Physiology, Lead, Blood Lead Levels, Lead Toxicity, Welders, Toxicity Categories, Davao City

INTRODUCTION

Lead toxicity remains to be a significant public health problem particularly in developing countries. Global statistics revealed that in 2013, 853,000 deaths were attributed to lead toxicity and it is believed to be responsible for 0.6 percent of the disease burden in the world. Lead toxicity is more common in the developing countries and affects mostly the poor population.¹

Lead toxicity can be acquired through ingestion, inhalation or occasionally through skin contact. For occupational exposure, the inhalation route is more common as machine operations can generate lead dust and fumes.² Most of those overly exposed to lead have been found in trades such as plumbing, welding, and painting.³ Due to the nature of their work, welders are mostly exposed to the metal fumes

that they inhale during their work and more than 90 percent of lead particles deposited in the respiratory tract are absorbed in the systemic circulation.⁴ Once in the body, lead can substitute for zinc and calcium which can result to enzymatic dysfunction and neurologic damage.⁵

Better screening and lead monitoring initiatives in other countries have led to decreasing lead exposures. However, in the Philippines, lead toxicity is still persistent especially among occupational workers who are unaware of its ill-effects.⁶ This is a growing concern as the infrastructure industry in the Philippines is booming.⁷ Although occupational lead exposure remains a public health problem, it is not given much concern since the greatest public health issue related to lead at present

is exposure of young children to decaying fragments of leaded paint.⁸ In fact, extensive literature search by the authors revealed no research study or report on blood lead levels among welders in the Philippines.

This study sought to generate information on the amount of lead exposure among Filipino welders by measuring their blood lead levels and correlating these with the amount of time they had been working as welders. The study is intended to help medical practitioners better understand the occupational risks of lead exposure towards renewed emphasis on safety protocols in welding.

METHODS

This pilot study employed a descriptive cross-sectional design that sought to gather information on the amount of lead exposure among welders by measuring their serum blood lead levels (BLL) in the selected research locale. This study described the blood lead levels of welders and characterized their demographic variables and levels of exposure whether mild, moderate or severe based on the standards of the California Department of Public Health.⁵

Participants

Thirty male individuals 18 to 49 years old who had at least one month full-time employment as welders were recruited from two construction companies in Davao City to volunteer as participants in this study. Prior to data gathering, they were subjected to a physical examination to establish their health status and were asked to sign an informed consent form. Excluded from the study were female welders, and younger or older than the age range established for the study, those who had been employed less than a month as a welder, and those who were sick or unwilling to take part.

Procedure

The researchers sought the approval of the Research Ethics Committee of the institution before the conduct of the study. The permission of the owners of the two construction firms where the potential participants worked was also obtained. The construction firms had been chosen through convenience sampling.

Informed consent was sought from potential participants before screening was started. Screening was done by means of personal interview with the potential participants using a guide questionnaire. Demographic data were obtained and inclusion and exclusion criteria were utilized to determine the study participants. General physical examination was also performed to all study participants by a licensed physician to see to it that no participant was sick or symptomatic of any condition or disease. Those who fulfilled the inclusion criteria were asked to undergo blood extraction for the determination of serum blood lead levels. Their blood lead levels were determined for toxicity using an Atomic Absorption Spectrometry (AAS). The results were categorized as none detected, mild, moderate or severe toxicity following the California Department of Public Health Medical Guidelines for the Lead-Exposed Worker (2009).

Statistical Treatment

Descriptive statistics were utilized to analyze the data. These included frequencies, range and percentages. Serum blood lead levels in ug/dL were correlated with duration at work in years using simple linear regression.

Ethical Consideration

Informed consent was sought from all potential participants of this study. All participants were oriented with the nature

of the study, its purpose, benefits, risks and inconveniences, and all other details each participant should know. This was done in the vernacular for ease of understanding. Participation was fully voluntary.

Physical examination was done by a male licensed physician as all participants were males. Blood extraction was done by a licensed medical technologist and or a nurse phlebotomist on the median cubital vein of one arm. During the course of blood extraction, any participant who refused blood extraction was not forced to do so with no negative consequence. In case any participant was found ill, he was referred to his chosen physician for further evaluation at the expense of the researchers. The participants were informed of the results of their blood analysis through their respective head engineers. All information related to the participants remained confidential all throughout the study. These were kept in a secure server and will be deleted one year after the completion of the study.

RESULTS

All thirty participants were males aged 18 to 49 years old. Sixteen (53.33%) of the thirty participants showed detectable lead levels in their blood ranging from 4.52ug/dL to 93.44ug/dL. Of those who tested positive for blood lead levels, there were seven who had lead levels between 42.73ug/dL to 93.44ug/dL, falling within the severe category of lead exposure as per 2009 Medical Guidelines followed by the Occupational Lead Poisoning Prevention Program of the California Department Public of Health.⁵

Table 1. Frequency and Percentage of blood lead levels by Category*.

Category	Frequency n=30	Percentage (%)
None Detected	14	46.67
Mild (5-29ug/dL)	8	26.67
Moderate (30-39ug/dL)	1	3.33
Severe (40ug/dL and above)	7	23.33
Total	30	100

*Source: Medical Guidelines for the Lead-Exposed Worker, Occupational Lead Poisoning Prevention Program, California Department Public of Health (April 2009)

Linear regression results indicate no correlation between blood lead levels and work duration among the participants.

DISCUSSION

It is disturbing to know that about half (53.33%) of the participants in this study had lead levels detected in their blood, with nearly half among them having blood lead levels higher than the acceptable level of 40ug/dL for OSHA5. Welding as a profession poses a great risk of lead exposure through inhalation to its workers. As much as 70 percent of the lead dust or fumes that one breathes is absorbed in the body compared to 30 percent if lead is ingested.¹

It is also interesting to note that when blood lead levels were correlated with work duration as welder, no association was noted. This implies that other factors may have contributed to the increase in blood lead levels other than work duration. Some factors mentioned in literatures include failure to use preventive gears like protective masks or respirators, safety clothing and shield. In addition, absence of proper

aeration, particularly the lack of local exhaust ventilation which is supposed to remove fumes and gases, also increases the risk of lead exposure.⁹ It is important to recognize that exposure to lead is a significant occupational health hazard which is preventable thus, measures to avoid exposure to lead in the workplace must be fully implemented and strengthened.

CONCLUSION

In summary, among thirty volunteer welders working for two construction companies, 53.33 percent had mild to severe categories of lead levels detected in their blood serum, with of almost a quarter (23.33%) of them indicated to have BLL at a severe category, much higher than the allowable limit of 40ug/dL. However, blood lead levels were not correlated with duration of work as welders, which seem to indicate that other factors may be at play. The relatively high prevalence of severe BLL among this research sample however calls for strict implementation of occupational safety measures for these two construction companies.

RECOMMENDATIONS

The researchers recommend that employers through their chief engineers should recommend medical intervention and health education to those participants who tested positive for lead in their blood serum, especially for those among them who registered to have severe BLL.

The researchers also recommend that employers of different work sectors such as construction, manufacturing, and cosmetic industries where most of their employees are exposed to lead, must be provided with adequate ventilation in their workplace as well as safety protection such as masks and thick clothes to minimize the hazards caused by lead exposure.

The results of this study should be disseminated to policy making bodies, Department of Health, and other concerned agencies so that proper safety standards will be strengthened and fully implemented in the workplace.

This study also recommends that since this is a pilot study, future similar studies be done with higher sample size and explore others variables which may influence lead exposure levels.

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Where Are They Now? A Tracer Study of the Medical Graduates of Davao Medical School Foundation, Inc. (1981 – 2000)

Rodriguez-Ababon, E. N., MD, FPOGS, MHPed

ABSTRACT. The National Higher Education Research Agenda 2 (NHERA 2) for 2009-2018 issued by the Commission on Higher Education (CHED) encourages higher education institutions (HEIs) to conduct graduate tracer studies to obtain a measure of relevance and responsiveness of course offerings. Thus, this study was conducted to describe the career patterns of the 1981 to 2000 graduates of the College of Medicine of the Davao Medical School Foundation, Inc. (DMFSI) primarily as a means to evaluate this curricular program for information that could be used to improve it. Out of the 1,193 alumni, only 592 could be reached for an invitation to participate in the survey. However, only 187 (males – 105; females – 82) among them were able to return the survey forms in time for inclusion in this study. Most of them were based in Mindanao, about 70 percent of them in the Davao city. The majority (64.7%) were employed in clinical practice, research, or academe. Findings reveal that as a group, the career path of the alumni after earning their MD degree did not significantly diverged from their prior intent to go into clinical practice. Furthermore, most of them expressed the intention to continue on their current career pathway for the next five years. Of the 187 respondents, there were 29 who had completed their studies under the Nellie Kellog Van Schaik (NKVS) Scholarship Program. Most (69%) NKVS scholars report their compliance of their return service obligation to the DMFSI. Moreover, results show that 41.4 percent of the former NKVS scholars went into clinical practice to serve the economically challenged and marginalized sectors in Mindanao, especially in the Davao region. This study also found that the respondents considered most useful and relevant the following core competencies: knowledge of the basic sciences, knowledge of the organ systems, ability to apply clinical skills in the care of the patient, and the promotion of health care and commitment to professionalization.

KEYWORDS: Medicine, health professions education, medical training, career pathways, core competencies, tracer study

INTRODUCTION

Mindanao is known as the land of promise but it cannot be denied that it is also a region of neglect in terms of healthcare delivery and social justice concerns. Avellanosa-Valle noted that in the 1970's, 37 percent of the total number of physicians registered in the Philippines practiced their profession in the Greater Manila region, while only 7.1 percent practiced their profession in Southern Mindanao.¹ There were only 934 doctors in Southern Mindanao, giving a physician-population ratio of 1:5,300, which was lower than the national average of 1:2,800.² In Davao City, in particular, the population was observed to be more rapidly growing - that is, from 392,473 in 1970 to 484,678 in 1975.³ The growing population would compound the gloomy prospects for health care delivery situation in the region.

Anticipating this, the Davao Medical School Foundation Inc. (DMSFI) was established in 1976 to produce medical graduates who will serve the health needs of Davao City in particular and of Mindanao in general. Until the DMSFI was opened, doctors working in government and private hospitals, medical clinics, and health centers obtained their medical education outside Mindanao.

In 1975, Adolfo Miguel, a post-graduate student of Ateneo de Davao University at that time, wrote a thesis on the feasibility of establishing a medical school in Mindanao that would address the health care delivery situation. He presented his findings to several people including the administrator then of San Pedro Hospital, Sr. Florida Manzano, OP. Discussions coming after that presentation translated to moves to fast-track the establishment of

a medical school in Mindanao. A group of advocates and pioneering doctors of the city met and decided to open the first medical school in Mindanao in 1976. They envisioned it to serve the health needs of Mindanao, specifically in rural and underprivileged urban communities. Thus, it was expected that the DMSFI graduates would embrace the vision of its founders and translate this into reality.

By 2011, the school had already produced 1,863 graduates. Majority of them came from the different regions of Mindanao, while a few came from Luzon, Visayas and, later, from other countries. Where these DMSFI alumni are now and what they are doing are not well known and therefore the researcher is interested to track down and document their location, their career paths and at the same time acquire feedback from them on how the MD curriculum of DMSFI helped them in their current occupation.

The National Higher Education Research Agenda 2 (NHERA 2: 2009-2018) of the Commission on Higher Education (CHED) encourages institutions of higher learning to conduct graduate tracer studies to obtain a measure of relevance and responsiveness in course offerings. Through this tracer study, a description of the career patterns of DMSFI graduates could be known.⁴ This tracer study can also be used as a yardstick to evaluate the curricular programs of DMSFI, with the goal of improving it.

This article aims to:

1. Describe the demographic profile of DMSFI medical graduates and the alumni of the Nellie Kellog Van Schaick (NKVS) scholarship program, in terms of age, sex, marital status, religion and present location.

2. Provide the DMSFI Alumni Office a directory of the DMSFI medical Graduates and the alumni of the Nellie Kellog Van Schaick (NKVS) scholarship program;
3. Determine the current occupation of DMSFI medical graduates including their employment status and area of work;
4. Determine the significant difference between the chosen career paths the DMSFI medical graduates prior to and after graduation;
5. Determine the perceived relevance of the curricular program of the College of Medicine to the current occupation of DMSFI medical graduates;
6. Determine the involvement of the DMSFI medical graduates to community health care; and
7. Identify the future plans of DMSFI medical graduates five years hence.

METHODS

The study followed a descriptive quantitative research design, with the required data derived through the use of a researcher-formulated survey questionnaire. The research included all medical graduates of DMSFI who graduated in the year 1981 to 2000. Those who graduated from 2001 to 2011 were not included in the study since most of them were still undergoing post-graduate studies and/or training. Also not included in the study were graduates who could not be located (no known address, inaccessible thru any means of communication, or are presumed dead). Of the 1,193 graduates from 1981 to 2000, only 187 or 32 percent of the alumni responded and returned the questionnaires.

This study lasted for 12 to 18 months starting with planning, then formulation of questionnaire, establishment of contact details, distribution of questionnaires and collection of data, consolidation, analysis and interpretation of data, and lastly finalization, presentation and defense of the paper.

The study was done in the following manner: Step A: The researcher obtained the records from the DMSFI Registrar's Office and the Alumni Office of the College of Medicine to obtain all possible data available on the graduates of the Medical Program from 1981 to 2000. From these records, a list of graduates, to include their addresses, the year they graduated, sex, and age as of last birthday was made. Step B: Attempts were made to validate the last known addresses of the alumni through information sought from their batch mates, acquaintances, parents, and relatives. Step C: Contact with as many on the alumni list was initiated through all means of communication - like cellular phones, e-mails, landline and regular mail, radio programs and the World Wide Web to confirm their address was made. Step D: For those who could be located, the self-administered questionnaires were then sent through e-mail or by post. Postal transmittal included self-addressed return envelopes and with instructions to accomplish and return the survey five after receipt of the same. Step E: The same self-administered questionnaire was also posted in the medical alumni section of the schools' website along with a request for all alumni were requested to update their profile. Step F: A second batch of survey questionnaires was sent to all the respondents who could be located to ascertain high return rate.

To build networks and increase the number of participants in this study, the snowball sampling technique was used. This technique is a method used in obtaining research and knowledge from extended associations and previous acquaintances. It is particularly appropriate in tracer studies.

The instrument used in collecting the primary quantitative data in this study was the self-administered questionnaire that was distributed to all the graduates. The questionnaire was adapted from the Handbook for Graduate Tracer Studies.⁵ There were three main sets of questions in the questionnaire in line with the objectives of the study. The first set contained questions regarding the graduates' personal information. The second set contained questions on the graduates' professional background, and the last set contained questions regarding the DMSFI MD program.

A Likert scale was used to describe the respondents' perceived relevance of the learned core competencies in DMSFI on their current occupation.⁶ A Likert scale, as defined by the Business Dictionary, is a method of ascribing a quantitative value to qualitative data making it amenable to statistical analysis.

Data collected were analyzed using descriptive statistics, such as measures of central tendency, i.e. mean, frequency and percentage using the Statistical Package for the Social Sciences (SPSS) software. This was supported with graphical representations like tables for better understanding.

The significant difference between the career pathways chosen by the respondents prior to and after obtaining the MD degree was determined using the chi square test and p-value of 0.05 level of significance.

RESULTS

Although the intention of this study was to cover all the graduates of the College of Medicine from 1981 to 2000, present contact addresses were only established for 60 percent

(712 out of 1,193 graduates). However, after the initial contact with the graduates, there were only 592 or 49.6 percent who could be reached and provided with questionnaires. Of that, only 187 or 31.6 percent of the total 1,193 graduates accomplished and returned the questionnaires for data that could be used in this study. There was difficulty contacting the target respondents for participation because of the failure of the alumni to update their contact information regularly, as had been similarly found in other tracer studies.⁷

Presented below is the respondents' profile according to age, sex, marital status, religious affiliations, employment status and their current location:

Age Distribution—The most number of the respondents (25.6%) belonged to the 39-42 years old bracket, while the least number (4.3%) of respondents belonged to the 55-59 years old bracket. This finding is consistent with the study by the European Commission Education and Training, Erasmus Mundus Programme in 2010, which stated that low response rates are caused by the lower responsiveness of alumni from older cohorts and who tend not to update their contact information on a regular basis.⁷

Sex Distribution—Majority (56.1%) of the respondents were males, while the females made up 43.9 percent of the group, as shown in Table 1. The sex distribution of the respondents in this tracer study is similar with that in the tracer study done by Woodward and Ferrier (1982) where more men (73%) than women (27%) responded to the survey.⁸

Of the 592 graduates who were provided with a questionnaire, 258 were males and 334 were females. Among the males, 105 (40.7%) returned the questionnaires while 82 (24.6%) of the females sent back the accomplished survey for a total of 187 respondents. This data is in contrast to most tracer studies where women were more likely to respond to questionnaire surveys than men.^{9,10}

Table 1. Sex Distribution of the Respondents: Medical Graduates of DMSFI from 1981 to 2000, n=187

Sex	Frequency	Percentage (%)
Female	82	43.9
Male	105	56.1
TOTAL	187	100

Marital Status—On the other hand, most (79.7%) of the respondents were married, followed by those who remained single (14.3%) and the rest of them were widowed (3.0%) and separated (3.0%).

Religious Affiliations—The respondents in this study belonged to varied religious affiliations. The majority (84.5%) of the respondents were Roman Catholics. On the other hand, some of the respondents were Protestants (2.3%), Muslims (0.5%), or had other religious affiliation (2.7%).

Current Location—Most of the DMSFI graduates in the past 30 years had remained in Mindanao. About 70 percent of the graduates were distributed in the city of Davao. On the other hand, around 14 percent of them were located in the nearby Davao Region (excluding Davao City). Though there were around 2.7 percent who had left Mindanao for Luzon and 2.1 percent who had migrated outside the Philippines in search of greener pastures, the rest of the respondents (11.2%) were well-distributed in the different places in Mindanao outside of the Davao region.

Employment Status—The respondents in this study have different employment statuses (Table 2). Most of them (41.7%) were employed

on a regular basis, while others were employed part-time (23%). The rest of the respondents (19.3%) were self-employed. About 16 percent did not provide data on their employment status.

Table 2. Distribution of the Employment Status of the Respondents, n= 187 -

Employment Status	Frequency	Percentage (%)
Employed	121	64.7
Regular basis	78	41.7
Part-time basis	43	23.0
Self-employed	36	19.3
Not Applicable	30	16.0
TOTAL	187	100

The Nellie Kellog Van Schaick (NKVS) Scholars of the College of Medicine

Of the 187 respondents of this tracer study, NKVS scholars comprised 15.5% (29 out of 187) of the medical graduates from 1981 to 2000. Of the 29 NKVS scholars, twenty (69%) were able to serve their return obligations to DMSFI, while the remaining nine or 31 percent were not yet done serving their return obligations. Of those who were able to serve, twelve (41.4%) served in the community as government physicians, either as Provincial Health Officers, District Health Officers, on the Doctors to the Barrio programs, or as government hospital physicians. Some served with non-government organizations catering the marginalized people of Mindanao.

On the other hand, the remaining eight (27.6%) of those NKVS scholars in this study who already served are in the academe, are serving their return obligations, or are teaching in the College of Medicine in this institution (Table 3).

Table 3. Number of NKVS Scholars among the Respondents, n=187

Return Obligations To DMSFI	Number of NKVS Scholars	Percentage (%)
Community service	12	41.4
Provincial Health Officer, District Health Officer or Physicians of Government Hospitals	10	
Non-government Organization	2	
Academe / teaching	8	27.6
Has not rendered return obligations	9	31.0
TOTAL	29	100

CAREER PATHS OF THE RESPONDENTS

Career Paths Prior to Obtaining MD Degree. Of the three career paths prior to their graduation in the medical education program, 153 (82%) of the respondents answered that they intended to pursue the practice of their profession (i.e. clinical practice). Of the 153 respondents who wanted to pursue the practice of their profession, 40 (26.1%) wanted to work in government hospitals, 58 (37.9%) wanted to be involved in private hospitals and 55 (36%) wanted to work in the community, either as a general practitioner (private practice) or in the employ of various government health offices. About 19 (10.1%) thought of becoming academicians and teaching in a medical school and other universities or colleges and only seven

(3.7%) had wanted to become researchers. There were eight (4.2%) who planned on career paths outside of the health professions, such as farming, entrepreneurship, or other field of interests (Table 4).

Career Paths after Obtaining MD Degree. As regards to the different career paths pursued by the respondents after they had obtained an MD degree, around 84.5 percent or 158 wanted to pursue the practice of their profession. Of the above, 38 (24.1%) opted for work in government hospitals while 55 (34.8%) went into private practice in the various private hospitals. The other 65 (41.2%) preferred to practice their profession in the community, either as a general practitioner in private practice or in the employ of various government health offices. On the other hand, 14 (7.5%) intended to become academicians and only eight (4.3%) wanted to venture into research. There were seven (3.7%) who desired to pursue career paths other than the above three, like going into business, another field of study, or farming, etc. (Table 4).

Career Paths Prior to and After Obtaining MD Degree. Analyzing both the data on the career paths of the 187 respondents of this study, namely: (1) clinical practice of profession, (2) research and (3) academe as well as that of the other career paths like entrepreneurship, farming, or another field of study, etc. (Table 4), it was determined that there was no significant difference ($p > 0.05$) in the career paths of the respondents prior to and after obtaining their MD degree. It means that the career paths of the respondents prior to obtaining the MD degree were just the same career paths after obtaining it (Table 4).

Table 4. Comparison of Career Paths of Respondents

Career Paths of Respondents
Clinical Practice of Profession
In Government Hospitals
Private Hospitals
In the Community
Research
Academe
Others
TOTAL

Current Career Paths. Of the 187 respondents, 157 or 83.4% went into clinical practice. Of the above, 38 or 24.1% went to their career paths in government hospitals prior to and after obtaining an MD degree. Compared to those who went into private practice and after obtaining an MD degree, 55 (34.8%) who became general practitioners devoted much of their time in the DMSFI College of Medicine and Health Sciences administrative and academic work.

On the other hand, 65 or 41.2% of the respondents went into the community. This finding is similar to that of the respondents who went into the community where the reason is the desire to be successful and happy, to be close to their mentors, who are always in the community.¹¹ The rest of the respondents decided to pursue other career paths, like entrepreneurship, farming, or another field of study.

Although there was no significant difference between the career paths of the respondents prior to and after obtaining their MD degree, it was found that around half of them (50%) went into the clinical practice of their profession. Of the people who are currently working in the community here in the DMSFI College of Medicine and Health Sciences, 45 (58.4%) are currently working in government hospitals, 55 (71.4%) are currently working in private hospitals, and 65 (84.5%) are currently working in the community here in the DMSFI College of Medicine and Health Sciences.

Table 4. Comparison of Career Paths of the Respondents (prior to and after Obtaining MD degree), n=187

Career Paths of Physicians	Prior to Graduation n, (%)	After Graduation n, (%)	p-value
Clinical Practice of Profession	153, (82)	158, (84.5)	0.489
In Government Hospitals	40, (26.1)	38, (24.1)	0.670
Private Hospitals	58, (37.9)	55, (34.8)	0.570
In the Community	55, (36.0)	65, (41.2)	0.347
Research	7, (3.7)	8, (4.3)	0.792
Academic	19, (10.1)	14, (7.5)	0.362
Others	8, (4.2)	7, (3.7)	0.792
TOTAL	187, (100)	187, (100)	

Current Career Paths. Of the 187 respondents, 157 or about 83.9 percent went into clinical practice. This finding is similar to their career paths regarding the practice of profession prior to and after obtaining their MD degree. Compared to their career paths prior to and after obtaining an MD degree, there were 23 (12.3%) who became academicians and devoted much of their time as full time faculty in the DMSFI College of Medicine handling both administrative and academic positions.

On the other hand, none from the 187 respondents went into full time research. This finding is similar to the study of Schafer, where the reason is the diminishing numbers of successful and happy researcher role models and mentors, who are always needed to sustain one's career.¹¹ The rest of the respondents (7 or 3.7%) decided to pursue other career paths from the above three, like entrepreneurship, farming, or other field of study.

Although there were more graduates who went into the clinical practice (157 or 83.9%), around half of them (77 or 49%) chose to serve the people who are economically challenged. Of the above 77 respondents, 32 (41.6%) are currently connected with the different government hospitals, either in the city or in their own provinces in Mindanao, and the remaining 45 (58.4%) are currently serving the community here in the city of Davao or in their own hometown in Mindanao.

Respondents Who Changed Career Paths. Of the 45 respondents who were in the community, 17 (37.8%) had their residency training in the different specialty fields such as Internal Medicine, Surgery, Pediatrics, Obstetrics and Gynecology, Pathology, and Radiology. They initially practiced their clinical profession in the different fields of specialty after their training in the different private hospitals; however, they changed their career path afterwards and are currently employed in the different government health units (urban or rural health centers/clinics) as general practitioners. They gave varied reasons for the shift in their career plans. One of the reasons behind the shift of career path was the narrow field of practice confined to one specialty. Another reason was the shift of interest to the other field, which offered less hours of work and more time for the family.

Those reasons resonated with the findings of Woodward and Ferrier where the lack of satisfaction with their first choice was attributed to new doctors finding out that it offered: (1) too narrow a field of specialty, (2) training not intellectually challenging, and (3) too little time with patients.⁸ Woodward and Ferrier also found that shifting from the first choice was influenced by the limitation it imposed on the respondents' lifestyle, such as too many hours of work, not enough time for their spouses and family, and not enough variety.⁸ Men and women tended to reply in the same way – 31 percent

and 29 percent. Those who shifted to general practitioners connected with the government health units (37.8%) consisted of nine females and eight males.

The influence of the learning experiences of the graduates during their stay in the DMSFI also played a major role in their chosen career paths. Among the major departments in the MD curriculum of DMSFI, the department of Community Medicine is the largest which encompasses the four years of the curriculum, exposing the respondents to the different PHC and government programs in the community as well as opening up an opportunity for them to see the bigger picture of what a physician can be outside the walls of the hospitals.¹² The remaining 28 (62.2%) of those in the community are in private practice as general practitioners.

Additional Career Paths. Although most of the respondents in this study went into the practice of their profession (157 or 83.9%); around 69 or 44 percent broadened their career paths. There were 53 (77%) who serve as part time faculty in the College of Medicine. Sixteen (23%) do clinical or social research in their respective specialty.

RELEVANCE OF THE DMSFI MD CURRICULAR PROGRAMS

Table 5 shows the perceived relevance of the medical curriculum in the current occupation of the respondents. Of the 187 respondents, 172 (92%) signified that the DMSFI curricular program helped them choose their current career paths. Four (2.1%) opined that it did not help them at all.

Table 5. Perceived Relevance of the Medical Curriculum in the Current Occupation of the Respondents, n=187

Perceived Relevance	Frequency	Percentage (%)
Has Relevance	172	92
No Relevance	4	2.1
No Answer	11	5.9
TOTAL	187	100

Table 6. Perceived Usefulness of the Core Competencies in the Current Occupation of the Respondents, n=187

Core Competencies	Weighted Mean	Description
Knowledge of the Basic Sciences	3.54	Very Useful
Knowledge of the Organ Systems	3.53	Very Useful
Ability to Apply Clinical Skills in the Care of Patients	3.52	Very Useful
Promotion of Health Care	3.48	Useful
Knowledge of the Foundations of the Population	3.19	Useful
Knowledge of Evidence-Based Medicine	3.12	Useful
Commitment to Ethics	3.35	Useful
Commitment to Professionalism	3.45	Useful
Commitment to Personal Development	3.33	Useful
Commitment to Professional Development	3.31	Useful
Commitment to Area of Scientific and/or Clinical Inquiry	3.07	Useful

Table 5. Perceived Relevance of the Medical Curriculum

The perceived relevance of the DMSFI curriculum to the current occupation of the respondents is presented in Table 5. Of the 187 respondents, 172 (92%) considered the curriculum useful by the respondents. The curriculum of the basic sciences, organ systems, and ability to apply clinical skills in the care of the patient were considered to be very useful to what they do.

Furthermore, Table 6 shows the usefulness of the core competencies in the current occupation of the respondents. Those who were in the practice of their profession found the knowledge of the basic sciences, knowledge of the organ systems, and ability to apply clinical skills in the care of patients very useful. The weighted mean of 3.54 for knowledge of the basic sciences, 3.53 for knowledge of the organ systems, and 3.52 for ability to apply clinical skills in the care of patients were found very useful with the understanding of the structure and function of the human body, its major organ systems, and biochemical and cellular processes are important in understanding human health. On the other hand, the competency on the ability to apply clinical skills in the care of patients in the 3rd and 4th year of the DMSFI was also found very useful in the clinical practice. The understanding of the pathogenesis of diseases of different organs, their pathogenesis, prevention, and their continuing education in medical sciences.¹³

Another core competency was the competency on the promotion of health care that appropriately responds to the health system where care is delivered.¹⁴ This was emphasized during the

The perceived usefulness of the core competencies of the DMSFI medical curriculum to the current occupation of the respondents is presented in Table 6. It appears that all the 11 core competencies were perceived to be useful by the respondents. Of the seven core competencies, the competencies on knowledge of the basic sciences, knowledge of the organ systems, and ability to apply clinical skills in the care of the patients were the ones perceived to be very useful to what they are doing at present.

Furthermore, Table 6A shows the perceived usefulness of the core competencies in relation to the actual career paths of the respondents. Those who were in the clinical practice of their profession found the core competency on knowledge of the basic sciences and knowledge of the organ systems integrated in the first two years of the DMSFI MD curriculum very useful (weighted mean of 3.90 and 3.58, respectively) in their current occupation. It provided students with the understanding of the normal structure and function of the human body and each of its major organ systems, including its molecular, biochemical and cellular mechanisms that are important in maintaining the body's homeostasis.¹² On the other hand, the core competency on the ability to apply clinical skills in the care of patients, integrated in the 3rd and 4th year of the DMSFI MD curriculum, was also found very useful by those who were in the clinical practice. This course provides an understanding of the principles and concepts of diseases of different clinical specialties, their pathogenesis, prevention, diagnosis, treatment, and their continuing correlation with basic medical sciences.¹²

Another core competency found very useful by those who went into the clinical practice was the competency on the promotion of health care that appropriately responds to social, cultural, and health system contexts within which the care is delivered.¹³ This core competency is emphasized during the entire four years of

exposure of the students to the subject of Community Medicine.¹² Community Medicine trains the DMSFI graduate to demonstrate the following: commitment to advocate at all times for the interests of one's patients over one's own interests; an understanding of the manner in which people of diverse cultures and belief systems perceive health and illness and respond to various symptoms, diseases, and treatments; respect for the roles of other health care professionals and a willingness/commitment to collaborate with others in caring for individual patients and in promoting the health of defined populations; and commitment to provide care to patients who are unable to pay and to advocate for access to health care for members of traditionally underserved populations. In addition, the graduate should understand and work within existing healthcare systems, including the public health system, to provide optimal care for patients and communities, and know the various approaches to the organization, financing and delivery of health care.¹³

Lastly, those respondents who went into clinical practice also found the core competency on commitment to professionalism very useful in their occupation. This competency expects the graduates to demonstrate compassionate treatment of patients, and respect for their privacy and dignity; serve with honesty and integrity in all interactions with patients' families, colleagues, and others with whom physicians must interact in their professional lives; and understand the positive and negative consequences resulting from the involvement of corporations in health care delivery, scientific research, and medical products.¹³ This core competency is emphasized during the clinical years of the students in the MD curriculum of DMSFI, specifically on their 4th year of clinical exposure, when students interacted with varied patients encountered in the clinics and the community.¹²

Table 6-A. Core Competencies perceived to be useful in the Current Occupation of the Respondents According to their Career Paths

Competencies	Clinical Practice, n=157	Full Time Research, n=0	Academe n=23	Others n=7
Knowledge of the basic sciences	3.90	-	3.57	3.86
Knowledge of the organ systems	3.58	-	3.61	3.71
Ability to apply clinical skills in the care of patients	3.57	-	3.61	3.57
Promotion of health care	3.52	-	3.61	3.71
Knowledge of the foundations of the population	3.22	-	3.48	3.29
Knowledge of evidence-based medicine	3.14	-	3.30	2.57
Commitment to ethics	3.42	-	3.96	3.14
Commitment to Professionalism	3.52	-	3.61	3.14
Commitment to personal development	3.38	-	3.61	3.14
Commitment to professional development	3.36	-	3.52	3.14
Commitment to area of scientific and/or clinical inquiry	3.10	-	3.22	3.28

On the other hand, the core competencies on commitment to ethics and professionalism and commitment to personal and professional development were the ones found to be very useful by the respondents who chose academe as their career paths. They also rated the core competencies on knowledge of the basic sciences and organ systems, ability to apply clinical skills in the care of patients and promotion of health care very useful in their current occupation.

INVOLVEMENT OF THE RESPONDENTS TO COMMUNITY HEALTH CARE

Of the 187 respondents in this tracer study about a third are practicing clinicians serving as general practitioners in the government health system. Whether in the national level or local unit, those general practitioners in the government are currently involved as implementers or evaluators of the various health

programs mandated by Department of Health and World Health Organization (WHO) to address the Millennium Development Goals (MDG).¹⁴

There are alumni also working with various non-government organizations for community health care. In particular, many of them are engaged in the promotion of Sexual and Reproductive Health and Rights to further address the Millennium Development Goals 4 and 5.¹⁴

Future Plans—The future plans of the graduates five years hence are shown in Table 7. Of the 187 respondents, 41 (22%) said that they would continue their clinical practice as specialists. Most of the graduates chose the career path of clinical practice. Around 26 (13.9%) of the respondents on the other hand, indicated that they wanted to continue serving the community, either as private individuals in the non-government organizations or as employees in government offices. There were 32 (17%) who wanted to continue teaching in the DMSFI College of Medicine in DMSF. On the other hand, there were 17 (9%) who wanted drastic shifts in their career path by venturing into business. Among those in their fifties, 13 (7%) were contemplating retirement from medical practice in the next five years.

However, of those who are currently into clinical practice as either a specialist or a general practitioner, 15 (8%) wanted to pursue graduate studies in health professions education, public health, clinical epidemiology and clinical nutrition. Twelve (6.4%) planned to pursue subspecialty trainings in areas such as developmental pediatrics, minimally-invasive surgery, laparoscopy and ultrasound. One (0.5%) wanted to join politics.

DISCUSSION

There is indeed a difference in the chosen paths of the DMSFI medical graduates prior to and after graduation. The DMSFI has already produced 1,863 graduates from the time it accepted its first batch of students (1976) up to 2011. This study, however, limited the target respondents to the 1,193 who graduated from 1981 to 2000, of which 187 or 32 percent provided information for this tracer study. More than half of the respondents were male. Close to three quarters were between the ages 39 to 50 years old and married at the time of the survey. More than 80 percent were Roman Catholics.

Of the 187 respondents of this tracer study, majority (70%) of the graduates are

Table 7. Future Plans of the Respondents five (5) Years from the Time of this Study

Future Plans	Frequency	Percentage (%)
Continue clinical practice (specialist)	41	22
Continue serving the community	26	13.9
Teach in DMSF	32	17
Venture into business	17	9
Retire from medical practice	13	7
Take up graduate studies	15	8
Pursue subspecialty trainings	12	6.4
Join politics	1	0.5
None	9	5
No Answer	21	11.2
TOTAL	187	100

currently located in the city of Davao catering to the health needs of Davaoños. On the other hand, around 14 percent are located in the nearby Davao region, working mostly in the government institutions or engaged in private practice. In addition, 11.2 percent are located in different places in Mindanao outside of the Davao region.

The study showed that there were 29 NKVS Scholars among the 187 respondents and about twenty (69%) had indicated to have served their return obligations to DMSFI already. The remaining nine (31%) are not yet done with their return obligations.

This study showed the chosen career paths of the medical graduates of the Davao Medical School Foundation, Inc. (DMSFI) from 1981 to 2000. Among the respondents, the majority (83.9%) went into clinical practice, apparently pursuing the same career path they had prior to and after obtaining their MD degree. Only 12.3 percent of the respondents became academicians and devoted much of their time as full time faculty in the College of Medicine of DMSFI. On the other hand, none of the 187 respondents went into full time research. The rest of the respondents (3.7%) decided to take other career paths and are currently engaged in entrepreneurship, agriculture, or other field of study.

This study finds that there are more graduates who went into clinical practice (83.9%). Around half of them (49%) chose to serve the people who are economically challenged: some are currently connected with the different government hospitals (either in the city or in their own provinces in Mindanao) while others are serving the communities of Davao City or in their own hometown in Mindanao.

Furthermore, this study showed that although most (83.9%) of the respondents went into clinical practice, 44 percent broadened their career paths at present. Of the 69 respondents, 53 serve as part time faculty in the College of Medicine teaching in the basic sciences of the MD curriculum, and/or either as clinical preceptors in the clinical sciences or

government physicians (general practitioners) supervising the urban and rural community exposure of medical students during their clinical years in the MD program. On the other hand, 16 of the 69 respondents continue to be involved in clinical or social researches in their respective specialty as part of their contribution to the improvement of the medical science through evidence-based researches.

Of the eleven core competencies that the respondents learned during their study in the DMSFI, the most relevant and useful in their present occupation are the core competencies on knowledge of the basic sciences and knowledge of the organ systems, ability to apply clinical skills in the care of the patient, and the promotion of health care and commitment to professionalism.

The results show that there are indeed differences among the chosen paths before and after graduation. Though most wanted to become MDs in the duration of their studies in DMSFI, not all became medical doctors after graduating. Some became researchers while others become medical professors. Most of the graduates chose the career path of clinical practice. But even though the respondents' career paths diverged, they all seemed to reap career successes and professional satisfaction.

CONCLUSION

The Davao Medical School Foundation Inc. was established in 1976 with the main purpose of producing medical graduates that will serve the health needs of Davao City in particular and of Mindanao in general. It was envisioned that the graduates would serve the health needs of Mindanao, specifically the rural and underprivileged urban communities, and would embrace the vision of its founders and translate it into reality, which indeed happened based on this study.

The study showed that there was no significant difference between the career paths of the respondents prior to and after obtaining MD Degree from the DMSFI College of Medicine. Most of them became clinical

practitioners, while a few or did research. The relevance of the DMSFI on their present career path based core competencies to those in the clinical core competencies were academicians in addition skills-based competencies study showed that the helped the graduates in career paths and provided necessary core competencies of profession and culture.

RECOMMENDATION

The recommendation is twofold. The first addresses issues while the second addresses the findings.

In tracing the alumni study was hampered by and valid directory of Thus, it would be better section or a contact person an accurate student directory it easier for the institution graduates, enhance their in the DMSFI contact for news and school where alumni most appreciated.

This study shows graduates had ventured research. If the institution an ample amount of research and open up these graduates, this could open a deeper and more informed about the health situation would make DMSFI more concerns in the region. To no rationalize the research to meet the CHED

practitioners, while a few joined the academe or did research. They reported a perceived relevance of the DMSFI curricular programs on their present career paths. While knowledge-based core competencies were highly relevant to those in the clinical practice, values-based core competencies were highly rated by the academicians in addition to knowledge- and skills-based competencies. Furthermore, the study showed that the curriculum of DMSFI helped the graduates in choosing their present career paths and provided them with the necessary core competencies needed in their line of profession and current occupation.

RECOMMENDATIONS

The recommendations of this study are twofold. The first addresses methodological issues while the second addresses the implications of the findings:

In tracing the alumni, the conduct of this study was hampered by the lack of a reliable and valid directory of the DMSFI graduates. Thus, it would be better for every unit to have a section or a contact person who would maintain an accurate student directory. This would make it easier for the institution to follow up on its graduates, enhance their sense of connectedness in the DMSFI community, and maintain contact for news and developments in the school where alumni participation would be most appreciated.

This study shows that no one among the graduates had ventured full time into health research. If the institution (DMSFI) could offer an ample amount of budget and support for research and open up these opportunities to their graduates, this could significantly contribute to a deeper and more informed body of knowledge about the health situation in Mindanao, such as would make DMSFI more responsive to health concerns in the region. There is a need therefore to rationalize the research thrusts of the school to meet the CHED research requirement for

higher educational institutions and to utilize its graduates as researchers.

To add, it is highly recommended that the DMSFI continue to widen its support for graduate studies, especially in the field of health professions education and remuneration to all faculty members who are willing to extend extra time to educate the future physicians of our country.

It is also recommended that the administration evaluate the curricular programs of the school based on the results of its relevance to the present career paths of the alumni.

Lastly, it is highly recommended that a tracer study of the graduates of the other units of DMSFI should also be done to strengthen the result of this study using the CHED's criteria for tracer studies.

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The Effect (Crescentia Blood Sugar Individuals

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Abstract: Pre-diabetes is a condition that can lead to insulin resistance. If nothing is done, it can determine the effect of blood sugar levels of pre-diabetes on the screening criteria for diabetes. They were randomly assigned to a group. The dose for Glucose was determined at baseline, 10, and 14. Results showed that demographics and baseline for both Control and Treatment variance (ANOVA) showed a significant difference post. Thus, intake of Calabash studies are needed to reduce

Keywords: Pharmacology
randomized controlled trial

The Effect of ED₉₀ Dose of Calabash (*Crescentia cujete*) Decoction on Blood Sugar Levels of Pre-Diabetic Individuals

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ABSTRACT: Pre-diabetes is a condition where body cells begin to show resistance to the effects of insulin. If nothing is done, progression to type 2 *Diabetes mellitus* is a possibility. This study sought to determine the effect of ED₉₀ dose of Calabash fruit (*Crescentia cujete*) decoction on the fasting blood sugar levels of pre-diabetic individuals. A total of twenty participants living in Davao City passed the screening criteria for pre-diabetes as well as the inclusion and exclusion criteria of the study. They were randomly assigned to either the Control (placebo) or Treatment (Calabash decoction) group. The dose for Calabash decoction was based on the ED₉₀ dose (13.5mg/kg) derived from a previous study on animals. All participants were informed about the ideal diet and exercise regimen for prediabetics. Demographic data such as age, weight, height, and body mass index (BMI) were determined at baseline. Fasting Blood Sugar (FBS) levels were measured on Days 0 (baseline), 7 and 14. Results showed that the two groups were comparable ($p>0.05$) at the outset in terms of demographics and baseline FBS. Mean FBS levels on days 0, 7 and 14 showed a decreasing trend for both Control and Treatment groups. When examined statistically using repeated measures analysis of variance (ANOVA), the means in the Control group showed no significant difference ($p>0.05$) while a significant difference ($p<0.05$) was noted in the Treatment group. No side effects were reported. Thus, intake of Calabash decoction could potentially decrease fasting blood sugar levels. Further studies are needed to validate this finding.

KEYWORDS: Pharmacology, blood sugar, pre-diabetes, calabash, fruit decoction, double blind randomized controlled trial

INTRODUCTION

Background of the Study

Prediabetes is a condition where blood sugar level is higher than normal but not yet high enough to be classified as type 2 Diabetes. There is the presence of impaired fasting glucose (IFG) and/or impaired glucose tolerance (IGT) that has not yet reached the thresholds for diagnosable type 2 Diabetes mellitus (T2DM).¹ Globally, the number of people with IGT is estimated at 280 million, and is projected to go up to 398 million by 2030.²

In prediabetes, the body's cells begin to show resistance to insulin. Glucose circulates in the blood instead of being used by the cells for energy. The fasting blood sugar (FBS) level of patients with prediabetes ranges between 100 and 125mg/dl. FBS below 100 is normal while 126mg/dl or above is abnormal and can be considered a diabetic condition.²

A number of laboratory tests can be utilized to diagnose pre-diabetes. Among these include an oral glucose tolerance test (OGTT) and a glycosylated hemoglobin (A1C) test. An OGTT with a 2-hour post-prandial blood glucose level between 140 to 199mg/dl can be considered pre-diabetes. A1C, on the other hand, is a blood test that gives the average amount of glucose in the blood over the past 3-4 months. An A1C of 5.6% or below is normal. In pre-diabetes, A1C levels range between 5.7%-6.4%, and if the A1C is 6.5% or above, a person has diabetes.³

The currently accepted definition of prediabetes is an impaired fasting glucose (100-125 mg/dL), an impaired glucose tolerance (a 2-hour post-glucose load of 140-199 mg/dL), or both.² This study only utilized FBS to screen for prediabetics.

This condition (prediabetes) typically has no signs or symptoms. With healthy lifestyle changes such as diet modification and daily physical activity, blood sugar level can be

controlled.⁴ However, without prompt and appropriate intervention, prediabetes is likely to develop into type 2 Diabetes in ten years or less. Prediabetes raises short-term absolute risk of T2DM by 3- to 10-fold. It is estimated that up to seventy percent of people with prediabetes may develop T2DM during their lifetimes.^{2,5} Studies showed that about six to eleven percent of people with prediabetes may develop T2DM each year with as high as sixty-five percent cumulative incidence in six years compared to five percent among those with normal glucose levels at baseline.^{1,2}

Progression to type 2 Diabetes mellitus may not be inevitable for those with prediabetes. Thus, aside from diet and exercise, alternative treatments are currently being explored and ongoing trials are made to prevent individuals from developing diabetes. Calabash (*Crescentia cujete*) has been an important source of folk medicine for years now. Its indication includes diabetes. The phytochemical composition of *Crescentia cujete* includes cyanhydric acid, alkaloids, iridoids, pectins, tartaric acid, citric acid, sterols, essential oil (allicine, nerolidol), malic acid, peptides (insulin), proteins (bixine) and triterpenes which are all believed to possess anti-diabetic properties. In particular, cynhindric acid was found to stimulate insulin release while the alkaloids of Calabash were noted to be involved in glycogenesis.⁶ In addition, iridoids were noted to reverse high glucose and obesity-induced beta cell dysfunction in the pancreas⁷ and can also stimulate insulin secretion.⁸ Pectin was shown to increase the activity of glycogen synthase, increase hepatic glycogen and decrease blood sugar level.^{9,10} Furthermore, citrate from citric acid is known to inhibit phosphofructokinase which helps regulate glycolysis and eventually, the citric acid cycle.¹¹

A local study on calabash using its decoction resulted in significant lowering of FBS levels in alloxan-induced diabetic rats.¹² Acute and subacute toxicity testing of the decoction proved

that it is safe.^{12,13} Reproductive animals did not produce any adverse effects. These studies were done using the authors' knowledge of the safety of calabash using human subjects. Considering all these, this pilot study aims to determine the effect of the fruit decoction (*Crescentia cujete*) on the blood sugar levels of prediabetic individuals. This study will further explore and validate the blood glucose lowering effect of the decoction.

METHODS

Study Design

This study utilized a randomized controlled trial.

Participants of the Study

Research protocol was approved by the Research Ethics Committee. Proponents identified Barangay Agdao, Davao City to be the site of the study. Necessary permit was secured from the barangay captain and barangay health officer to conduct the study. From the barangay, 20 adult volunteers from a single barangay who fulfilled the criteria, namely; aged 18 to 70 years, no chronic diseases, vital signs and fasting blood sugar level between 100-125mg/dL. Excluded were pregnant, lactating women, those with chronic diseases, those on hypoglycemic medication. Consent was sought from all participants before the screening. The participants were randomly assigned to two groups: placebo or experimental group. The participants, outcome assessors were blinded to the groupings. The determination of the results was done in an independent laboratory.

that it is safe.^{12,13} Reproductive toxicity in animals did not produce any abnormality.¹⁴ All these studies were done using animal subjects. To the authors' knowledge, studies on the calabash using human subjects have yet to be done. Considering all these information about calabash, this pilot study among humans sought to determine the effect of ED₉₀ dose of calabash fruit decoction (*Crescentia cujete*) on the blood sugar levels of prediabetic individuals. This study will further explore and validate the potential blood glucose lowering effect of calabash.

METHODS

Study Design

This study utilized a double-blind randomized controlled trial.

Participants of the Study

Research protocol was approved by the Research Ethics Committee of the institution. Proponents identified Barangay Lapu-Lapu in Agdao, Davao City to be the research locale. Necessary permit was secured from the barangay captain and barangay health worker for the conduct of the study. Participants included 20 adult volunteers from the aforementioned barangay who fulfilled the inclusion criteria namely; aged 18 to 70 years old, with normal vital signs and fasting blood sugar levels between 100-125mg/dL. Excluded were pregnant and lactating women, those with co-morbidities and those on hypoglycemic medications. Informed consent was sought from each volunteer before the screening. The participants who fulfilled the criteria were considered Prediabetics. They were randomly assigned to either the control (placebo) or experimental (calabash decoction) group. The participants, data collectors and outcome assessors were blinded about the groupings. The determination of FBS was done in an independent laboratory.

Research Procedure

Ripe calabash fruits were used and cut open with the pulp taken out and the seeds removed. The pulp was cooked, strained, placed in tight sealed glass containers, and stored in the refrigerator.¹¹ A sample of the Calabash fruit pulp decoction was subjected to microbiological testing with acceptable results.

A total of twenty participants (Prediabetics) enrolled in this pilot study. They were randomly assigned to either the control (10) or experimental group (10). The control group received placebo in the form of starch solution with food coloring to mimic the color of calabash decoction. The dose in ml of the placebo was similar to the computed dose in ml of the Calabash. The treatment group on the other hand received calabash decoction computed using the ED90 dose derived from the study of Amilhasan et al.¹¹ determined by Probit algebraic method at 13.5mg/kg. The placebo or calabash dose was given orally once a day for 14 days. To enhance compliance to the intervention, a wife, husband or another family member served as treatment partners. All participants were informed about the ideal diet and exercise regimen for prediabetics but compliance to the recommended diet and exercise were not measured.

Baseline demographic data including age, sex, height, weight and body mass index (BMI) were recorded. Intervention was given to each participant once daily for two weeks. FBS levels were measured on days 0 (baseline), day 7 and day 14. Any side effects were also noted.

Statistical Treatment

Data were recorded and means were analyzed using independent t-test to compare the demographic data between the control and treatment groups. Repeated measures analysis of variance (ANOVA) was utilized to see if there

was a change in the mean FBS over time in each group and Tukey Post-hoc testing was further used to examine the differences between groups.

Ethical Consideration

Informed consent was obtained from each participant before screening. Participants were informed of the results of the study and necessary advice was given. Those needing referrals were advised to consult a specialist. All records were kept confidential.

RESULTS

Demographic data is presented in Table 1 which revealed that the control and treatment groups were comparable at the beginning of the study with independent t-test showing p-values >0.05 for each variable. Likewise comparison of baseline FBS between the two groups showed that the figures were also comparable ($p>0.05$).

Table 1. Presentation and comparison of demographic data and baseline FBS of the control and treatment groups

Variable	Control n=10 (Mean \pm SD)	Treatment n=10 (Mean \pm SD)	p-value
Age (yrs)	51.00 \pm 11.16	47.20 \pm 8.19	0.397
Weight (kg)	60.20 \pm 4.26	64.60 \pm 10.68	0.242
Height (cm)	152.80 \pm 4.16	154.40 \pm 6.19	0.506
BMI	25.78 \pm 1.71	26.99 \pm 2.30	0.198
Baseline FBS	106.50 \pm 7.20	109.80 \pm 8.19	0.359

The mean FBS levels on days 0, 7 and 14 of both control and treatment groups showed a general decreasing trend over time (Table 2). When compared statistically using repeated measures ANOVA, the means in the control group did not show a significant difference ($p>0.05$), while a significant difference was noted in the treatment group ($p<0.05$). Overall,

the mean measures between the Treatment and the Control were significantly different ($p<0.05$). Upon further evaluation of the results in the treatment group using Tukey Post-Hoc test, it was found that the significant difference existed between day 0 and day 7 and between day 0 and day 14 ($p<0.05$). The means between day 7 and day 14 did not differ significantly ($p>0.05$).

Table 2. Comparison of the FBS levels between control and treatment groups over time

Groups	Treatment Day	Mean (n=10) FBS \pm SD	F value	p-value
Control	0	106.50 \pm 7.20	3.9240	0.053
	7	95.91 \pm 13.57		
	14	95.34 \pm 2.85		
Treatment	0	109.80 \pm 8.19	2040.99	<0.001
	7	90.02 \pm 8.01		
	14	82.69 \pm 7.73		
Between groups			320.535	0.047

Table 3. Tukey Post-hoc testing (Treatment) Group

Day of Treatment	Baseline (Day 0) & Day 7	Baseline (Day 0) & Day 14	Day 7 & Day 14
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DISCUSSION

The goal of this study was to evaluate the effect of calabash leaves on blood sugar levels of non-diabetic individuals. We predicted that intake of calabash leaves would result to significant lowering of blood sugar levels. In this study, the results showed that participants in the treatment group were indeed significantly lower than the control group. This finding is consistent with a number of pre-clinical studies showing the glucose-lowering effect of calabash leaves can be explained by a number of compounds in calabash with potential hypoglycemic action namely: cyanidin, quercetin, flavonoids,^{7,8} pectin,^{9,10} and others.

It was further found that the hypoglycemic effect was significantly lower on the seventh day of intervention up to the 14th day while still continuing. This implies that the hypoglycemic effect can be expected to persist post treatment and would be maintained up to the 14th day of intervention.

Furthermore, the above findings supported the results of other studies in preclinical settings.^{12,13,14}

CONCLUSION

In conclusion, calabash leaves have the potential to decrease fasting blood sugar levels which makes it a promising natural product in the treatment of prediabetes. Further studies should be conducted to evaluate its potential.

Table 3. Tukey Post-hoc testing: Comparison of mean FBS levels between days of treatment in the Calabash (Treatment) Group

Day of Treatment	FBS Mean difference	p-value
Baseline (Day 0) & Day 7	15.1875	<0.001
Baseline (Day 0) & Day 14	19.1330	<0.001
Day 7 & Day 14	3.9455	0.426

DISCUSSION

The goal of this study was to determine the effect of calabash decoction on the fasting blood sugar levels of prediabetic individuals. We predicted that intake of calabash decoction would result to significant lowering of FBS levels. In this study, the mean FBS levels of participants in the treatment (Calabash) group were indeed significantly lower than that in the control group. This finding is consistent with a number of pre-clinical trials showing potential glucose \pm ng effect of calabash.^{6,7,12} This result can be explained by a number of constituents in calabash with potential glucose lowering action namely: cyanhindric acid and alkaloids⁶, terpenoids,^{7,8} pectin,^{9,10} and citric acid.¹¹

It was further found out that the glucose lowering effect was significantly seen on the seventh day of intervention which leveled off up to the 14th day while treatment was ongoing. This implies that the effect of calabash decoction can be expected as early as one week post treatment and would be consistent or maintained up to the 14th day.

Furthermore, the absence of any side effect supported the results of safety studies done in preclinical settings.^{12,13,14}

CONCLUSION

In conclusion, calabash decoction could potentially decrease fasting blood sugar levels which makes it a promising herbal alternative in the treatment of prediabetes and diabetes. Further studies should be done to explore this potential.

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Community Davao Medical School of Dentistry and Stakeholders

Example: E. A. DMSFI

INTRODUCTION

The College of Dentistry was established in 1980 as a unit of the Davao Medical School Foundation, Inc. (DMSFI) long felt need to provide training for effective service to the communities. The College was given power by the then Ministry of Health (MECS) to open an education program. The College of Dentistry is "the center of education, research, patient service for the people of Davao and has consistently maintained quality dental education of the top dental schools in the Philippines."

This study was conducted in March 2009 to assess the program, the stakeholders and views on the College. Community Immersion, the DMSFI College of Dentistry interviews and group discussion were conducted with respondents who were part of the DMSFI community and at New Corella, Davao del Norte. Records Abstraction Guide

Community Immersion Program of the Davao Medical School Foundation College of Dentistry: Program History, Processes, and Stakeholders' Views and Experiences

Estorgio, E. S., DMD, MCH

INTRODUCTION

The College of Dentistry was established in 1980 as a unit of the Davao Medical School Foundation, Inc. (DMSFI) in response to a long felt need to provide dental education and training for effective service to both rural and urban communities. In June 17, 1985, the College was given government recognition by the then Ministry of Education, Culture and Sports (MECS) to operate a four-year dental education program. The DMSFI College of Dentistry is "the cornerstone for dental education, research, patient care and community service for the people of Southern Mindanao and has consistently maintained a high standard of quality dental education - being ranked as one of the top dental schools in the country".¹

This study was conducted from February to March 2009 to describe the history of the program, the stakeholders' experiences, and views on the Community Dentistry 3 Community Immersion Program (CIP) of the DMSFI College of Dentistry. Five key informant interviews and four sessions of focus group discussion were conducted on a total of 40 respondents who were purposively selected from the DMSFI community and among the residents of New Corella, Davao del Norte. Accomplished Records Abstraction Guides were also reviewed.

Community immersion is one of the components of Community Dentistry 3, a required course in the prescribed Doctor of Dental Medicine curriculum. The CIP was conceptualized based on the Commission on Higher Education (CHED) suggestions and was first implemented in 1986 as a fieldwork activity in the San Pedro Health Center where the dentistry students served as health care providers for one semester. In 1996, however, the San Pedro Health Center closed down. The CIP was replaced by a condensed two-week community immersion program.

The Community Dentistry 3 CIP as it is now was established in 1996 in New Corella, Davao del Norte. Its intended purpose was to complement the curriculum of the Community Dentistry course, and was implemented as a response to the academic thrust of the school to provide community service to the underserved communities in remote rural areas. For a period of two weeks, students immersed in New Corella and worked with their local health services counterparts. The first week was dedicated to preliminary data gathering and community diagnosis; in the second week, the students implemented the oral health program. The local community provided them accommodation, as well as monitored and assisted the conduct of their community work.

The community stakeholders had an overwhelmingly positive response to the CIP. It was seen as a beneficial exchange, with the students making dental services accessible to the residents and the community in turn providing the students a venue to further hone their skills. For the students, the immersion experience was both an academic venture - a venue for learning - and a life-changing experience which augmented their opportunities to practice the principles of community dentistry. The exposure provided them experiences that changed and developed their attitude and personal and social values. The prevailing harmonious interpersonal relationship among the CIP stakeholders was among their most cited good experiences.

For ten years, New Corella served as the immersion site of the College of Dentistry's community service program. The CIP is considered a pioneer healthcare program, and the DMSFI is the only dental school in the Philippines that engages in stay-in community immersion for the completion of the course. Other dental schools require only six hours weekly of community service fieldwork.

Through twelve years of CIP implementation in two exposure sites, no attempts had been made to document and assess the program. As a result, there is paucity of documents regarding the program's history, implementation, and long-term effects to the community. The lack of baseline data impairs attempts to assess or evaluate program effectiveness and efficiency. The absence of such data makes it difficult to answer questions about the beginnings of the program, its current condition, the program dynamics, its losses and gains, practices, and future direction. Compounding the urgency for proper program documentation is the impending transfer of the immersion site from New Corella to Marilog, Davao City effective December 2009.

The immersion activity in May 2008 was to be the last in New Corella. As the results of this study cannot be generalized and applied to

the immersion program in Marilog, lack of data from the predecessor program puts the proposed Marilog program at risk of inadvertently repeating its mistakes and shortcomings, thereby rendering the entire community immersion undertaking of the DMSFI College of Dentistry short of its utmost potential - holding it back from the full advantage of the opportunities and squandering the time, effort, and resources of all stakeholders.

In response to the need to account and document the program, this study looked into its history, processes and mechanisms involved in the implementation, and the views and experiences of its stakeholders from the immersion site. The findings will be beneficial largely to the DMSFI which is the major resource and the financial provider of the Community Dentistry 3 CIP. Likewise, the study is of interest to the DMSFI College of Dentistry, the program's main implementing body. The study also invited the faculty and students of the DMSFI College of Dentistry to revisit the program implementation in the light of its relevance to its partner community. All these input could be used by the new immersion program in Marilog, Davao City.

METHODS

The study employed a non-probability sampling procedure, and as such the findings have limited generalizability. The qualitative nature of this study draws information mainly through interviews and focus group discussion such that some findings are subject to different interpretations. It thus required triangulation through some quantitative data from the CIP. Interviews and FGDs were conducted in DMSFI and in New Corella, particularly in Barangay New Bohol and Barangay San Jose (the two immersion sites of the Community Dentistry 3's program).

The respondents were the stakeholders, program planners, representatives of partner

institutions, and the community members who were beneficiaries of the community immersion program. In DMSFI, these include members of the Community Dentistry 3 course and some former students involved in the immersion program. In New Corella, the informants included barangay officials, personnel, health workers, and the adult population.

Presented in Table 1 is the distribution of the study population.

Table 1. Distribution of Respondents

Respondents
Faculty
Former Students
Community Recipients
Barangay Health Workers
Barangay Captains
Municipal Dentist
Total

The study employed the data gathering techniques and document reviews using a Research Guide, Key-informant interviews using an In-depth Interview Guide, and Focus group discussion using a Focus Group Discussion guide. To ensure the collection process was conducted in a Summary of Data Collection Schedule chart was constructed. The summary chart was the data to be gathered and for which the sources, the instruments to be used, and other details connected with the data collection process.²

Outlined below are the steps in the study in the conduct of In-depth

- Identification of informants following qualifiers: knowledge of research topic; and willingness to participate in the study.

institutions, and the community residents who were beneficiaries of the community immersion program. In DMSFI, these included the faculty members of the Community Dentistry 3 CIP course and some former students who were involved in the immersion program. In New Corella, the informants included the municipal and barangay officials, personnel and barangay health workers, and the adult residents.

Presented in Table 1 is the distribution of the study population.

Table 1. Distribution of Respondents

Respondents	Frequency
Faculty	2
Former Students	14
Community Recipients	13
Barangay Health Workers	8
Barangay Captains	2
Municipal Dentist	1
Total	40

The study employed the following data gathering techniques and instruments: document reviews using a Records Abstraction Guide, Key-informant interviews/in-depth interviews using an In-depth Interview Guide, and Focus group discussion using a Focus Group Discussion guide. To ensure that the data collection process was conducted systematically, a Summary of Data Collection Scheme or SDCS chart was constructed. The SDCS chart "lists the data to be gathered and for what purpose, the sources, the instruments to be used, and other details connected with the data collection process".²

Outlined below are the steps undertaken in the study in the conduct of In-depth interviews:

- Identification of informants using the following qualifiers: knowledge about the research topic; and willingness to participate in the study.

- Identification of schedule and venue of the interview.
- Conduct of interview.
- Noting of the respondent's profile.
- Re-informing the respondent about the objectives of the study.
- Asking for the respondent's permission to record the whole interview for data retrieval and analysis.
- Asking of questions (as well as probing questions).
- Concluding the interview and expression of appreciation for the respondent's participation.

Outlined below are the steps undertaken in the study in the conduct of FGDs:

- Identification of informants using the following qualifiers: knowledge about the research topic and willingness to participate in the study.
- Identification of schedule and venue of the FGD session.
- Conduct of FGD.
- Noting of the respondents' profile.
- Re-informing the respondents about the objectives of the study.
- Asking for the respondents' permission to record the whole interview for data retrieval and analysis.
- Setting ground rules for effective FGD.
- Each takes turn to answer question(s); Refrain from interrupting other participants while they are talking/answering.
- Raise one's hand if one wants to react or share something in relation to others' answers or opinions.
- Asking of questions (as well as probing questions).
- Concluding the interview and expression of appreciation for the respondents' participation.

Since the study used different data gathering techniques, data were encoded and analyzed in different manners. Outlined below are the different data sets and the corresponding ways by which these were encoded and analyzed.

Thematic analysis or 'trending' was used in the analysis of qualitative data particularly

in descriptive or exploratory studies. This was done by reviewing respondents' narratives (or actual answers/responses) on the different interview questions to identify converging and diverging themes. The noted themes were then presented and analyzed in the light of the study's objectives.

Table 2. Data Treatment Procedures

Data Category according to Data Gathering Technique	Data Encoding Process	Data Analysis Method
Key-informant interview/In-depth interview	Mechanically recorded Transcribed manually	Thematic Analysis
Focus Group Discussion	Mechanically recorded Transcribed manually	Thematic Analysis
Document Review	Noting of pertinent secondary data from documents	Secondary Data Analysis

FINDINGS AND DISCUSSION

History of the CIP and Processes for Implementation. It was in 1980 when the DMSFI College of Dentistry was established and Dr. Pedro M. Morales was appointed its first Dean. The College opened with only two dental chairs that were bought from Japan. According to the 2008 DMSFI Student Handbook, it was in June 17, 1985 when the Ministry of Education, Culture and Sports (MECS) gave the College government recognition to operate a four-year dental education program. A Department of Community Dentistry was created and a curriculum with twelve units of Community Dentistry courses and a two-semester exposure program in the fourth year level of dentistry proper was approved for implementation.

To promote community dentistry, the San Pedro Health Center, a community-based dental clinic located in R. Castillo Street, Agdao, Davao City, was opened in 1986 with a PhP20,000.00 grant from the Mission Assistance Fund of the Canadian Government. The center served as a venue for fieldwork and exposure for the Community Dentistry students. The students put in duty hours conducting field surveys and

performing dental services and treatment at the center.

In 1989, the standardization of the dental curriculum reduced to two the Community Dentistry subjects, with only a semester for community practice or fieldwork.³ At the DMSFI, however, the fieldwork concept was retained until 1998.

Dr. Rodolfo Mariano II (personal interview, March 5, 2009), a faculty of Community Dentistry, recalled that the San Pedro Health Center closed in 1996. Subsequently, the community practice component of the Community Dentistry course became dormant. It was around that time however that the students of Community Medicine 3 course of the DMSF College of Medicine had been doing community immersion in the Davao del Norte municipality of New Corella. The Community Dentistry Department contemplated on replicating the concept of Community Medicine for its Community Dentistry course. Thus, from a simpler fieldwork community activity, the CIP evolved into a complete community immersion program.

During the first couple of years of the CIP in New Corella, the intent of its activities was to

get the students acquainted with the community. The CIP required the students to spend weekends in New Corella. This was considered a risk for the students, with the added expense for travel. Thus, the Community Dentistry Department decided to move the Community Medicine students' month community immersion to New Corella. "This was the best so far," noted Dr. Mariano, personal interview.

That was the only simultaneous Dentistry-Community Medicine immersion in New Corella however as the Community Medicine immersion from November to December disrupted the schedule of Community Dentistry students, thereby undermining the completion of their clinical training. This led to the development of a separate community immersion in the fourth year for the dentistry program. The Community Medicine immersion moved from the fourth year to the second semester to the third year summer so as to allow the dentistry students to retain the benefits of a longer community immersion without taking a clinical period. However, due to the students' lack of clinical experience, only one semester training was allowed.

To make up for the lack of clinical experience, the College of Dentistry in later years include a one-week Exposure program as part of the Community Dentistry immersion. The City Health Office allowed them much practice, especially at handling extractions. The students were cautioned to be as gentle as possible during CIP. The lack of facilities in the immersion site required the pre-deployment preparation to include a three-day Red Cross training for the students with basic first aid.

Since 1996, then, New Corella has been the immersion site for the Community Dentistry students.

This was the first time that the students were acquainted with the concepts used for Community Medicine. In 1996, the CIP required the students to spend fourteen weekends in New Corella. However, it was noted that the weekend-immersion bore too much risk for the students, with much of their time eaten up for travel. Thus in the following year, the Community Dentistry students joined the Community Medicine students for their two-month community immersion program. "And it was the best so far," noted one of its instructors (Mariano, personal interview, March 5, 2009).

That was the only simultaneous Community Dentistry-Community Medicine immersion in New Corella however as the two-month long immersion from November to December 1997 disrupted the schedule of Clinical Dentistry, thereby undermining the dental students' completion of their clinical requirements. This led to the development of the two-week community immersion in the summer, solely for the dentistry program. The course was moved from the fourth year program in the second semester to the third year program in the summer so as to allow the immersion program to retain the benefits of a long engagement with the community without taking time from the clinical period. However, this also meant that the students came into the CIP with a relative lack of clinical experience, having completed only one semester training in oral surgery.

To make up for this lack of clinical experience, the College of Dentistry would in later years include a one-week City Health Exposure program as part of their preparation for immersion. The City Health Exposure program allowed them much practice at oral surgery, especially at handling extraction cases. Still, the students were cautioned to avoid extraction as much as possible during CIP because of the lack of facilities in the immersion site. Much later, the pre-deployment preparations would also include a three-day Red Cross training to equip the students with basic first aid skills.

Since 1996, then, New Corella had been the immersion site for the Community Dentistry 3

CIP. However, there were a few years when the immersion expanded to the neighboring town of Carmen upon the request of its local chief executive. This expansion did not last long due to the declining College of Dentistry enrolment rate. Fewer groupings of students underwent community immersion, thus rendering impractical the maintenance of two exposure sites. The enthusiastic welcome – especially by its resident dentists – was the decisive factor for the College to decide on New Corella over Carmen.

Other support factors also facilitated the entry of the CIP into New Corella. First, the Community Medicine and the Institute of Primary Health Care (IPHC) were already operating in the municipality when the Community Dentistry 3 CIP was introduced there. Since the DMSFI's partnership with the local government and health unit had already been established, The Community Dentistry 3 did not have a difficult time getting local support, participation, and commitment. Second, through the efforts of some students, Marsman Drysdale, a banana company operating in Barangay Limbaan, provided some dental equipment for the CIP's use.

In 2008, the Community Dentistry 3 CIP marked its twelfth year in New Corella. That year, the program only fielded a group of four students in Barangay New Bohol.

The Community Immersion Program. The course syllabus states that objective of Community Dentistry 3 is for the student to acquire the knowledge, attitudes, and skills in planning, implementing and evaluating community oral health programs.⁴ Specifically, the students are expected to:

1. Integrate with the community;
2. Conduct community diagnosis (regarding present dental health problems, resources and requirements) through oral health surveys and existing health data;
3. Determine interplay of ecological factors and the oral health status of the community;

4. Criticize design of existing local oral health programs in implementation and management;
5. Develop oral healthcare programs for the community through the principles of planning, implementation, evaluation, and the concepts of primary healthcare, team approach and total patient care; and
6. Diagnose and manage patients by (a) performing preventive and curative (ART) services, (b) applying promotion schemes suited to the target population, (c), establishing referrals.

The course requires students to stay in the area for a period of two weeks. During this period, they are expected to coordinate and work with the local health workers, to give an oral presentation and written report on Community Diagnosis and Community Dental Program, and finally, to submit a Reflection Paper on their experiences.

Pre-deployment Activities. The pre-immersion activities included a one-week lecture to prepare students. Meanwhile, Dr. Mariano, the CIP coordinator, communicates with the local health unit of New Corella for the selection of the immersion site/s for the program. This is preferably a barangay with a high population and a history of a good patient turnout. The local health unit played an active role in finding the site, monitoring the students, and looking after their welfare. The LGU also decided on the foster family that would host the students.

After the selection of the site, the respective LGU/s of the chosen barangay/s is notified, so that the local government can prepare for the accommodation of the students. They may be billeted in the barangay health centers or in foster homes as part of the community's counterpart.

The Conduct of the CIP. The community immersion begins with the students paying a courtesy visit to the Municipal Health Office where they will secure an endorsement to the local

health units and the barangay government units where they will be assigned. At the immersion site, they are received by local government officials and barangay health workers (BHWs) who shall introduce them at their designated billets. This part usually proceeds smoothly, except for one time when the students were not welcomed by the barangay captain and were instead harassed by some inebriated locals. This location was henceforth disqualified as an immersion site.

The first week of the program is dedicated to data gathering for community diagnosis and situational analysis. The BHWs accompany the students to each Purok to get the needed data. The students then return to Davao City to process the data using Epi-info. Armed with the results of their Community Diagnosis, they then develop a Dental Health Program and prepare the materials and armamentarium needed for its implementation.

The second week begins with the students presenting their findings and proposed program to an audience composed of the Dental Health Program instructors, the municipal dentist, the barangay officials, and the BHWs. Along with their proposed activities, the projected cost and service fees are also presented to the barangay officials. Upon the approval of the barangay officials, the proposed Dental Health Program is implemented beginning the second day.

Students on immersion are given the freedom to determine the schedules, strategies, and methods towards achieving the desired output of the Dental Health Program they are implementing. There is no set patient quota. Instead, the students are encouraged to be flexible and creative. They are admonished to be responsible, particularly during situational setbacks and incidents. Should they need to perform oral surgery, however, it is required that they could only do this under a program administrator's supervision, especially if it involves extraction.

The course operates on a policy. The inclusion of the students during the presentation of the Dental Health Program is to allow the students to invite the community stakeholders to share the costs. Funding for the Dental Health Program is the responsibility of the community. Dr. Mariano, the municipal dentist, provides restorative services. The students usually provide the dental services to at least offer dental materials.

As often as every other day of the week, the course instructors visit the immersion site and monitor safety, and overall well-being. The providers and government units are monitoring the students and their concerns, even ensuring that they are accompanied by an official during their deployment.

Activities after Immersion. After the completion of their program, the students submit project developments and accounts to the barangay officials, the municipal dentist, and the course faculty. The program is not based on the quantity of their dental services. There is no requirement that the students do not meet their targets. Underachievement is supposedly a learning experience. The faculty is aware of the fact that "No dole out policy" is a must for patient participation and affect dental services.

Stakeholders' Views and Experiences. Presented in the next section are the views and experiences of CIP of the community residents, local government, and DMSFI administration.

Former Students. The students' satisfaction from their CIP experience is one of the reasons they gave for

The course operates on a No Dole Out Policy. The inclusion of the budget proposal during the presentation of the proposed Dental Health Program is an opportunity for the students to invite the LGU and other community stakeholders to commit to cover certain costs. Funding for the implementation of the Dental Health Program is a shared responsibility. Dr. Madera, the municipal dentist, provides restorative materials. The students usually provide the dental materials. Thus they are encouraged to charge for their dental services to at least offset the cost of the dental materials.

As often as every other day or at least twice a week, the course instructors visit the students at the immersion site and monitor their progress, safety, and overall well-being. The local health providers and government units also play a role in monitoring the students and attending to their concerns, even ensuring that the students are accompanied by an official or a BHW on their deployment.

Activities after Immersion. Upon completion of their program, the students present their project developments and accomplishments to the barangay officials, the municipal dentist, the BHWs and the course faculty. The evaluation is not based on the quantity or coverage of their dental services. There is no sanction if the students do not meet their targeted output. Underachievement is supposedly part of the learning experience. The faculty is cognizant of the fact that "No dole out policy" may discourage patient participation and affect coverage of the dental services.

Stakeholders' Views and Experiences. Presented in the next section are the views on and experiences of CIP of former students, community residents, local partners and the DMSFI administration.

Former Students. The students report much satisfaction from their CIP experience. Foremost among the reasons they gave was their experience

of good interpersonal and intrapersonal dynamics with the community, receiving hospitality in many aspects - from shelter, food, transportation, and other forms of assistance. They felt respected and appreciated much the cooperation afforded by the beneficiaries of their services. There was also much support from the resident BHWs, many of whom addressed them as doctors and occasionally deferred to their expertise despite the fact that they were still students. The trust afforded to them by the resident dentists motivated them to perform at CIP.

The CIP experience was also a good opportunity for the students to personal and clinical service experience and be exposed to the local community dynamics and way of life. For those students that were not put up in health centers, their time with their foster families provided a more complete immersion experience.

The conduct of the CIP in New Corella was not without its setbacks and inconveniences to the students, however. The absence and lack of proper facilities compromised their adherence to the sterilization protocol, frustrating those who were more used to working in complete infirmaries with autoclave machines. The compliance to aseptic technique was reportedly weak, indicated to be underreported by the students. This is especially alarming to the program administrators, as it posed the risk of spreading infection and communicable diseases in the community.

Deployment to rural areas yielded problems of physical discomfort. The students cited the lack of clean drinking or bathing water, unavailability or unpredictability of public transport, and seemingly no reprieve from biting mosquitoes among the problems they had to deal with.

Also, the CIP operated on a strict "No Dole Out Policy," made necessary by the fact that the College of Dentistry provided little to no funding. This was noted to be one of the

hindrances that kept the target clientele from availing of the program services. Many patients argued that the services should be free of charge as the students were unlicensed, even though they delivered services under supervision.

The implementation of the Dental Health Program sometimes yielded a low turnout of patients. Those who showed up expected to be treated immediately, and were quite annoyed with having to undergo the required examination. The low turnout led students to employ a variety of strategies to attract patients - from going house-to-house to making their work schedules public so that patients could set appointments. Other students organized film-showings so that patients would gather and be available for examination.

On the other hand, other groups had to deal with a high patient turnout. In Barangay Limbaan, it was reported that the students could hardly accommodate the number of patients, such that they would sometimes enlist the help of their classmates on immersion in other barangays. This visible statistical disparity between patient turnout in the barangays would have made for an interesting variability in the views and experiences of the students. Unfortunately, the study was unable to include Barangay Limbaan.

Community Residents. The community members saw the CIP as beneficial to them, citing the access it provided to dental treatments such as tooth extraction and oral prophylaxis. For some, it was the first time to have access to professional dental services and medicine. Community recipients pointed out the students' work ethics and good patient rapport as their good experiences of the CIP. They admired the students for not being picky and for treating all patients equally, finishing cases despite the difficulty of a procedure, and even displaying initiative when situations required it.

Many recipient respondents considered it a valuable experience to be lectured by the

students on good oral hygiene. They were taught how to brush their teeth properly and learned that toothbrushes must be replaced every three months. Detrimental oral hygienic beliefs and practices were corrected.

At the FGD with community residents, it was surfaced that they encountered no problems in engaging CIP services. They were especially favourable towards the oral prophylaxis services provided by the students. However, two respondents related incidents where they experienced pain or felt as if the procedures took too long in an extraction. Another reported that she participated only once as she was discouraged by the fee of the dental services and was ashamed of the edentulous state of her mouth.

Local Health Partners. The BHWs involved in the CIP recalled that the lectures on oral health were a good experience for the community. They were impressed by the students' initiatives and expertise, even lauded their strategies such as the nightly lecture sessions on teeth cleaning and their demonstration to children on the proper way of toothbrushing. They even gave away free toothbrushes. They appreciated the free dental services, medicine, tooth extraction, and oral prophylaxis procedures that the students performed for the BHWs and their dependents. They were indeed very thankful to the CIP. They also noted that the idea of being able to take home a tooth brush after they had their teeth cleaned was particularly good. They also appreciated the students' strategy of conducting their dental services by *purok*, as it ensured that more people benefited. They were also impressed by the behavior and attitude of the students. The effort of the students to be a part of the community went over very well with the BHWs. They noted that the students even went as far as to host programs and serve food.

The Barangay Captains, on the other hand, could not report any bad experiences with the students. They considered the students well behaved, and could only find disappointment

in the level of participation in the community. According to one of rural dwellers to be about those they regarded as rich. They warmed up to the students, and effort of the students to mingle with the community.

The Municipal Dentist was also in the CIP, as they were the primary providers of the community dental services. They enlisted to supervise the dental services by the students. They found that the students were receptive to input.

The DMSFI Stakeholders. The faculty could only report some points out that lazy attitude of the community, thereby was an opportunity. Some found the attitude of barangay officials during exit conferences troubling. This negatively influenced the community in the program, noting that some faculty were where the students' safety and were potentially compromised. The insurgency problem in New situation was handled properly, were pre-emptively pulled out of the local government units, and stakeholders reacted responsibly. This is a factor to be considered in future immersion sites.

CONCLUSION

After twelve years of fielding Community Dentistry in New DMSFI College of Dentistry in the immersion site to the Marikina City. This paper was one of the efforts to assess the effect of the New Corella immersion program.

the level of participation of their own community. According to one, it was the nature of rural dwellers to be aloof in particular those they regarded as rich. However, they later warmed up to the students, crediting this to the effort of the students to mingle and be a part of the community.

The Municipal Dentists were a key part of the CIP, as they were the permanent healthcare providers of the communities and had been enlisted to supervise the delivery of clinical services by the students. They felt that the immersion program eased their workload, and found that the students were well-behaved and responsive to input.

The DMSFI Stakeholders. The program faculty could only report some problems: some pointed out that lazy attitude of the students led to underperforming, thereby wasting their CIP opportunity. Some found the poor attendance of barangay officials during presentation and exit conferences troubling. They felt that it negatively influenced the participation of the community in the program. It is worth noting that some faculty recalled incidents where the students' safety and security on field were potentially compromised by an existing emergency problem in New Corella. The situation was handled properly, the students were pre-emptively pulled out from the area by the local government units, and the community stakeholders reacted responsibly. This situation was a factor to be considered in the selection of future immersion sites.

CONCLUSION

After twelve years of fielding students for Community Dentistry in New Corella, the DMSFI College of Dentistry decided to move the immersion site to the Marilog District in Iloilo City. This paper was undertaken as part of the efforts to assess the effectiveness of the New Corella immersion program and in the

hope to contribute to the considerations in the design of the Marilog immersion program.

Data show that the New Corella immersion program was able to meet its objective to give Community Dentistry 3 students the opportunity to acquire the knowledge, attitudes, and skills in planning, implementing and evaluating community oral health programs. Over the years, the two-week immersion period was rationalized to include activities that maximized learning opportunities for the students. It was also indicated that the program managers learned from the experience of every batch, introducing new requirements, pre-deployment protocols, and other changes in the program to adjust to both curricular and community conditions that emerged. At the end of the twelve years, however, the stakeholders saw a need for closer collaboration to address recurring challenges in CIP implementation, including aspects such as the financing for the dental services, accommodation of the students, and community ownership of the program.

The CIP's two-week schedule unfolded in a prescribed way. It was observed that when implemented a second or third time in a particular barangay in New Corella, some of these activities would indeed appear redundant and repetitive. Also, the two-week period does not include the component of community organizing, as the barangays selected for immersion had already been organized by the IPHC. Thus, the students do not experience firsthand how community organizing is done.

Most of the students agreed that the two-week immersion period was just right. For the community stakeholders, however, there were varied suggestions on timing the immersion. BHWs and community residents felt that the students ought to stay for a longer time so that more residents could be served. There was also a suggestion to move the immersion from the summer to cover class days so that school children could also be served.

As it was, the CIP was able to build much social capital in New Corella, as evidenced

by the glowing comments of the Municipal Dentists, barangay officials, BHWs, and community residents. In implementing their Dental Health Plans, the students were able to raise the awareness of the rural population on the importance of good oral hygiene practices. The community stakeholders among the FGD participants recalled the following concepts and practices that were introduced by the CIP students: the proper way of toothbrushing, oral prophylaxis, tooth extraction, and distribution of toothbrushes.

However, it should be realized that the ultimate objective of a Dental Health Program is to sustain the gains of improving the population's knowledge, skills and attitudes towards proper oral hygiene practices. One student strongly believed that the local government unit must continue the work started by the students. In particular, dental health education was seen as a service that could be managed by the local governance even after the CIP's exit. This theme was also picked up in the FGD with the faculty where a proposal for the IPHC to train BHWs on dental health and oral hygiene education was raised.

There were cases when problems of coordination and monitoring cropped up, but these were few and far between. Overall, it is indicated that the CIP proceeded smoothly, with safeguards in place to assure the safety and security of the students on deployment in the barangays of New Corella.

RECOMMENDATIONS

Based on the findings of the study, the following recommendations were discussed:

On the Dental Health Plan. Problems of sustainability and low patient turnout may be addressed through intensified and sustained dental education. BHWs may be trained to disseminate in their respective communities information on oral health. A person who is informed on the importance of dental health

are empowered to take upon themselves the responsibility of taking care of their own oral health and are able to establish healthy habits, thus minimizing the risk of oral diseases.

In handling Dental Health Education in the immersion sites, students are encouraged to be more creative and to make the dental education lectures appealing to both children and adult listeners. Participants to these sessions should include adults, especially the mothers. Students can explore the use of Information and Communication Technology (ICT) on topics such as caries formation as ICTs are best used in non-literate communities.⁵

Furthermore, dental education must go beyond the lecture on and demonstration of tooth brushing technique. A module on Information and Dental Education Campaign may be developed procured by the Community Dentistry 3 course to standardize the content of the dental education. The barangay health center can be provided with a copy for their use and the barangay health workers as the custodians of the module. They can further be trained by IPHC to deliver dental health education following this module.

The Health Belief Model is proposed as the theoretical frame in developing oral health education modules. According to this model, behaviors are directed by a person's perceptions and beliefs.⁶ Whether or not a person engages in preventive health actions depends on his belief of his susceptibility to disease, the degree of impact on his life, and his control over preventing or minimizing the risk of contracting the disease. He also has to be convinced that the benefits of taking the recommended action exceed any difficulties that might be encountered.

On the No Dole Out Policy. The fees for the dental services deterred potential clients from participating in the CIP activities. Students found that participation was more likely when they waived the fee and made the dental services free. In hindsight, the policy was enforced in

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Faculty could only report some. It pointed out that lazy attitude of some underperforming, thereby was opportunity. Some found the presence of barangay officials during pre-exit conferences troubling. This negatively influenced the perception of the community in the program, noting that some faculty members where the students' safety and were potentially compromised by insurgency problem in New situation was handled properly. They were pre-emptively pulled out from the local government units, and the stakeholders reacted responsibly. This is a factor to be considered in the future immersion sites.

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Complete Blood Sodium Level in A Local B

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ABSTRACT: As it is recognized that the use of stored blood by the general population. Changes in the use of stored blood are therefore of great interest in its effective utilization. The purpose of this study was to monitor on a weekly basis the quality of stored blood. Blood was randomly drawn from stored blood bags. Whole blood units were analyzed and were confirmed negative. Blood was stored at 2-4°C. Samples were collected at intervals for five weeks from the day of storage. Parameters were plotted on a line graph showing hemoglobin, hematocrit, and pH. The changes were still within normal limits. Day 7 showed a high percent hemoglobin. Day 35. In contrast, total white blood cell count decreased over time. With the biochemical analysis, while an increase in the mean packed cell volume and biochemical changes were observed. A variable based on the duration of storage can still be used for blood quality assessment. This will allow efficient utilization of stored blood based on the clear indicators.

Keywords: Physiology, Stored Blood, Blood Bank

Complete Blood Count, Potassium and Sodium Levels of Stored Whole Blood in A Local Blood Bank in Davao City

By: J. C., Nobleza, G. G., MD, Aquino, M.A. M., Ching, J.F. I., Elevazo, J. E., Fong, L.H. O., Leyva, E.L. G., Monday, J.M. P., Pasaylo, R.R. I., Sepulveda, M. B., Roldan, L. R., Tinagan, J.F. E., Wong, J. P.

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ABSTRACT: As it is recognized that the need and demand for blood worldwide is great, it is important that the use of stored blood be done efficiently so as to maximize its potential to cater to the general population. Changes in the blood's cellular and biochemical composition during storage are therefore of great interest in transfusion medicine as this has implication on its viability and on its effective utilization. The purpose of this study was to record the changes that occur in stored blood as monitored on a weekly basis from the date of extraction until the day of expiration. Blood (450 ml) was randomly drawn from ten healthy volunteer donors into CPDA-1 anticoagulant containing blood bags. Whole blood units were screened for HCV, HBsAg, Syphilis, HIV 1 and 2, and Malaria and were confirmed negative. Blood bags were placed in the blood bank refrigerator maintained at 2-4°C. Samples were collected and tested for hematologic and biochemical parameters on a weekly basis for five weeks from the day of extraction (Day 0) until Day 35. The mean levels of the different parameters were plotted on a linear graph. Results show increasing values can be observed with the hemoglobin, hematocrit, and RBC levels, and, a decreasing value for the platelet count - although the changes were still within normal range in vivo. Percent hemolysis yielded variable results although Day 7 showed a high percent hemolysis. Lymphocyte count was noted to increase from Day 0 to Day 35. In contrast, total white blood Cell and neutrophil levels were observed to have decreased over time. With the biochemical parameters, a decrease in mean serum sodium level was observed while an increase in the mean potassium level was clearly observed on Day 7. The results showed that cellular and biochemical changes do occur with stored blood, and, changes on these parameters were variable based on the duration of storage. The data still show that stored blood from Day 0 to day 35 can still be used for blood transfusion. Knowing the changes that occur during storage of blood will allow efficient utilization of stored blood and may be used to guide clinicians in requesting for blood based on the clear indications for transfusion therapy, rather than on its duration of storage.

Keywords: Physiology, Stored Whole Blood, Potassium Levels, Sodium Levels, Percent Hemolysis, Blood Bank

INTRODUCTION

The demand for blood has been increasing in all parts of the world. World Health Organization (WHO) statistics revealed that 81 million units of blood are collected globally every year. 80% of the world's population live in developing countries, and in this population only 20% has access to safe blood supply - even if up to 50% of the transfusions are deemed necessary.^{1,2} The Philippine Red Cross approximately supplies one-fourth of the country's national blood requirements with almost 10,000 requests for blood being processed by local blood banks per year.³

Although there are basic guidelines and principles in blood transfusion, physicians and laboratory technicians still apply some modifications and adjustments to these standards. While there have been several procedures presented by modern blood banking and transfusion practice worldwide, there has been no recognizable rule on the most appropriate age of stored blood for transfusion therapy. Therefore, it is based on the approval of the Food and Drug Administration that blood can be stored and still be used for 35 to 42 days depending on the anticoagulant used. Overall, data from clinical studies show that red blood cells stored even for 42 days in different anti-coagulants demonstrated a mean 24-hour post infusion survival of greater than 75%, the minimum for satisfactory red cell survival.

During blood storage, various changes occur within both the red blood cells and storage media during *ex vivo* preservation that has been collectively termed as Red blood cell storage lesion.⁴ It includes metabolic, biochemical and molecular changes. Conflicting results were noted in different studies with one stating that trauma patients receiving blood older than two weeks had an increased risk of mortality and another study by Bartfield in 2010 noticed that blood products stored for less than 21 days were not superior to those stored for longer duration.^{5,6}

Observed association on transfusion of relatively older blood units to mortality and/or morbidity may actually be a reflection of residual effect on the total blood volume transfused based on volume loss computation rather than the blood storage age.^{5,6}

Nowadays, the practice for blood transfusion is greatly dependent on the discretion of the requesting physician. Doctors customarily demand for fresh whole blood or packed red blood cells 10 days old or less. For instance, neonatologists often prefer blood less than 7 days old for neonatal transfusion.⁷

Hence, it is important to determine the cellular and biochemical changes during the duration of blood storage as there is no recognizable rule on the most appropriate age of stored blood to be used for blood transfusion. This can guide medical practitioners to maximize the availability of stored blood, reducing wastage and modify their practice in requesting for blood units based on storage duration. This study sought to determine the cellular and biochemical changes of stored whole blood in a local blood bank, from the date of extraction with samples taken weekly for thirty-five (35) days.

General Objectives:

The researchers aimed to determine the changes in complete blood count, potassium and sodium levels of stored whole blood in a local blood bank in Davao City.

Specifically, this study sought to answer the following sub-problems:

1. Determine baseline data on the day of extraction (Day 0) as to changes in:
 - 1.1 Complete Blood Count
 - 1.1.1 Hemoglobin level
 - 1.1.2 Hematocrit
 - 1.1.3 Red blood cell Count
 - 1.1.4 White blood cell Count
 - 1.1.5 Differential White blood cell Count
 - 1.1.5.1 Neutrophils
 - 1.1.5.2 Lymphocyte
 - 1.1.5.3 Monocyte

- 1.1.5.4 Platelets
- 1.1.6 Potassium
- 1.1.7 Sodium
- 1.1.8 Hemolysis
- 1.1.9 Hemolysis on Day 7, Day 14, Day 21, Day 28 and Day 35.

METHODS

Study Design

This study follows a descriptive design to measure weekly changes in blood count, potassium and sodium levels of stored whole blood.

Sampling Method

Purposive sampling was used in determining the units of blood to be used in the study.

Procedure

The study utilized 10 units of blood from 10 recruited donors (7 males and 3 females). Data included complete blood count, potassium levels, sodium levels, and hemolysis of stored whole blood in a local blood bank in Davao City on the day of extraction. The blood bags were then stored in a refrigerator at a constant temperature of 4 degrees Celsius. Blood samples were taken on a weekly basis from Day 0 to Day 35 and sent to a tertiary laboratory to standardize results.

Blood donors underwent a screening procedure to determine eligibility to donate. This included a physical examination for interview and venipuncture. Routine screening tests for blood were then carried out to ensure that the blood is cleared for storage. During storage, culture and sensitivity was also performed.

- 1.1.5.4 Eosinophils
- 1.1.6 Platelet Count
- 1.1.7 Percent Hemolysis
- 1.1.8 Potassium levels
- 1.1.9 Sodium levels

- 2. Determine changes in Complete Blood Count, Potassium and Sodium levels, Percent Hemolysis on Day 7, Day 14, Day 21, Day 28 and Day 35.

METHODS

Study Design

This study follows a descriptive research design to measure weekly changes in complete blood count, potassium and sodium and percent hemolysis levels of stored whole blood.

Sampling Method

Purposive sampling was utilized in determining the units of blood to be used for the study.

Procedure

The study utilized 10 units of blood from 10 recruited donors (7 males and 3 females). Gathered data included complete blood count, sodium levels, potassium levels and percent hemolysis of stored whole blood in a local blood bank in Davao City on the day of extraction. The blood bags were then stored in the blood refrigerator at a constant temperature range of 2 to 4 degrees Celsius. Blood samples from the blood bags were taken on a weekly basis from Day 7 to Day 35 and sent to a tertiary laboratory to determine results.

Blood donors underwent the standard screening procedure to determine if they are eligible to donate. This included asking for consent for interview and eventual blood extraction. Routine screening tests for donated blood were then carried out to ensure that blood was cleared for storage. During the initial screening, culture and sensitivity was also done to

have a baseline data for bacterial contamination. This was re-examined on the last day of data gathering (day 35) to determine if there was any bacterial contamination of the blood that may affect the results of the tests. Blood tests which included Complete Blood Count (CBC) and chemistry tests including potassium and sodium levels were done on the day of extraction. Percent hemolysis was calculated by measuring the total hemoglobin content, hematocrit, and supernatant hemoglobin content of the whole blood units. Results of tests done on Day of extraction were recorded. Every week thereafter (Day 7, 14, 21, 28, and Day 35), samples of stored blood were sent to an accredited laboratory facility to test and continually monitor complete blood count, sodium levels, potassium levels, as well as percent hemolysis. Tests results were recorded then subjected to interpretation and discussion.

Statistical Treatment

In this study, means were utilized as a descriptive method for measurement that facilitated the discussion of the changes in complete blood count, potassium and sodium levels, and percent hemolysis of stored whole blood.

Ethical Consideration

The research proposal was approved by the Research Ethics Committee of the institution. Permission from head of a local blood bank and informed consent of the donors were asked prior to the conduct of the interview and blood extraction process. Formal letters for permission were sent to DMSFI's Department of Physiology Chairman and the Blood bank's administrator and Physician. A letter of consent was also forwarded to the Chief Medical Technologist of the Laboratory. After permission was granted, donor screening and extraction commenced. All information gathered throughout the study was kept confidential.

RESULTS

A total of 10 units of blood were used for the study extracted from qualified donors. Complete blood count and biochemical parameters which included sodium and potassium were taken on the date of extraction. Subsequently

percentage hemolysis, complete blood count and biochemical parameters were checked on every seven (7) day interval until Day thirty-five (35). The succeeding figures shows the summary of all measurements from every interval day, as well as its minimum and maximum normal values denoted in red and green, respectively.

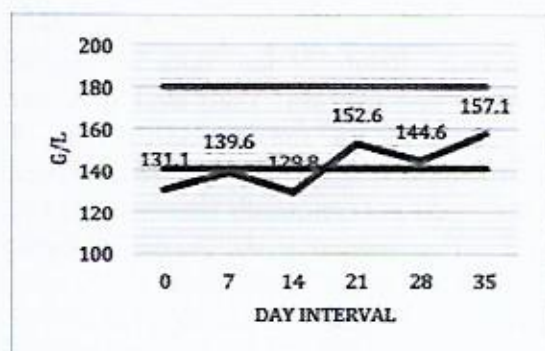


Fig. 1. Changes in Hemoglobin level from Day 0 to Day 35.

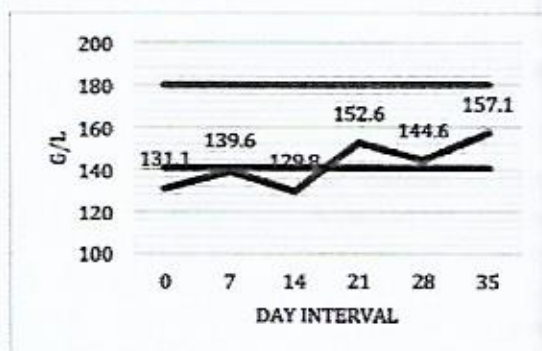


Fig. 2. Changes in Hematocrit level from Day 0 to Day 35.

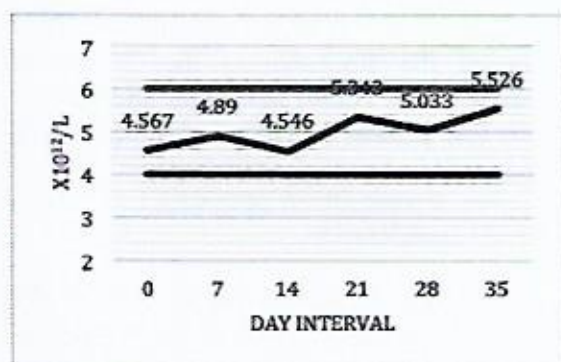


Fig. 3. Changes in Red blood cell count from Day 0 to Day 35.

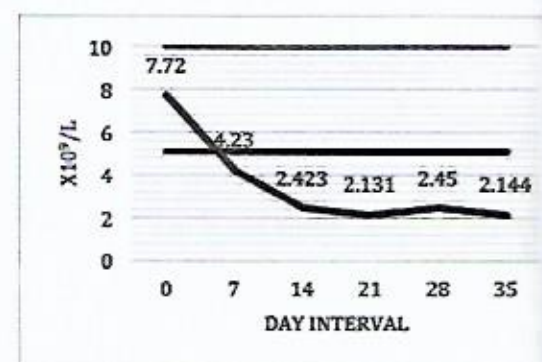


Fig. 4. Changes in White blood cell count from Day 0 to Day 35.

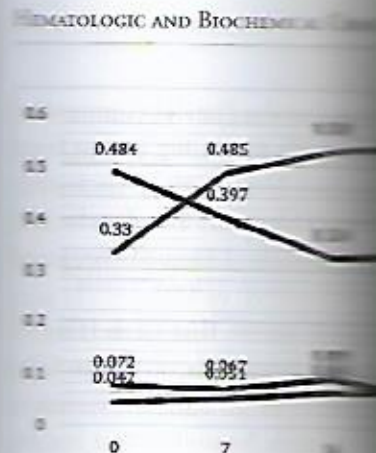


Fig. 5. Changes in differential white blood cell count from Day 0 to Day 35.

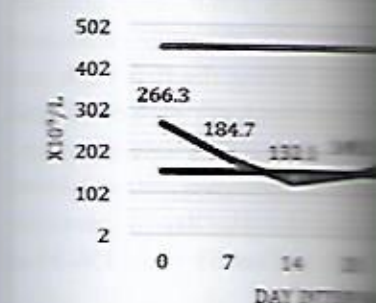


Fig. 6. Changes in platelets count from Day 0 to Day 35.



Fig. 8. Changes in Potassium level from Day 0 to Day 35.

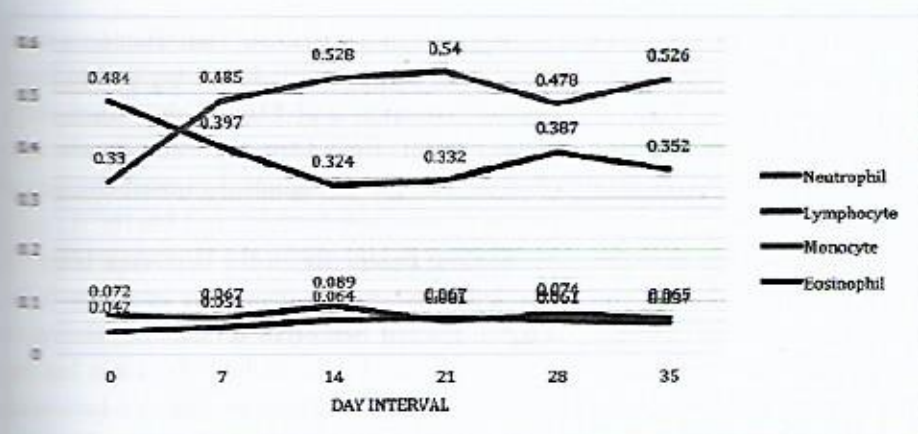


Fig. 5. Changes in differential white blood count from Day 0 to Day 35.

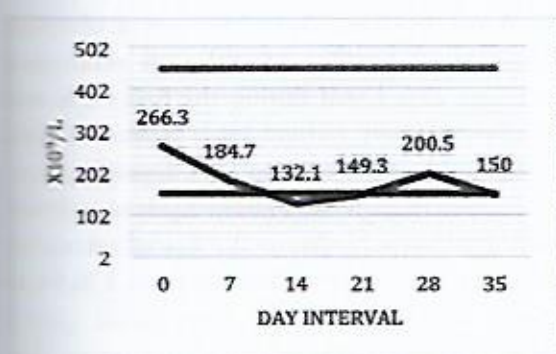


Fig. 6. Changes in platelet count from Day 0 to Day 35.

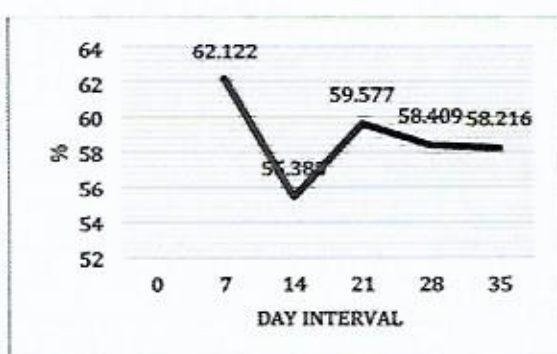


Fig. 7. Changes in percent hemolysis from Day 0 to Day 35.

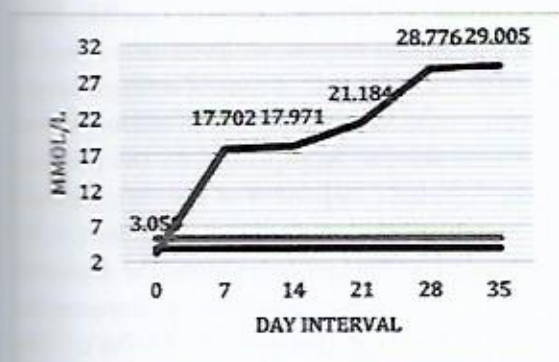


Fig. 8. Changes in Potassium levels from Day 0 to Day 35.

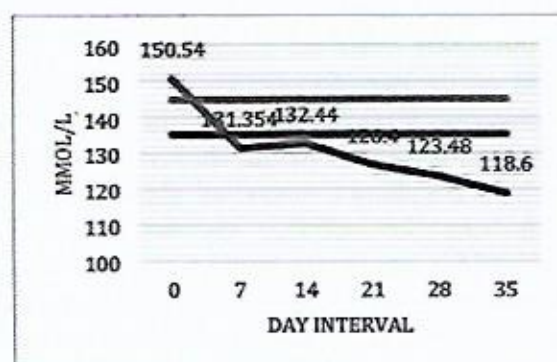


Fig. 9. Changes in Sodium levels from Day 0 to Day 35.

Results show an initial increase of hemoglobin levels from the day of extraction to Day 7, but was followed by a decrease by Day 14. Increasing hemoglobin levels were then recorded by Days 21, Day 28 and Day 35. From extraction until Day 35, hemoglobin count increased from 131.10 g/L to 157.10g/L. This shows that the level of hemoglobin can change during the duration of its storage; nonetheless the increase was acceptable as it was within the normal range. Variable change on the Hematocrit levels were recorded during the first 14 days of storage. Then a consistent increase was observed from Day 21 until Day 35. The hematocrit values however were all within normal range.

Figure 3 shows an increasing level of red blood cell count from Day 0 to Day 35. Although Day 14 and Day 28 showed lowered levels compared to the sample taken a week before, all levels are still within normal limits. Results show a continual decrease in the white blood cell levels from Day 0 to Day 35. Changes in WBC count were recorded, and were found to be below normal in all succeeding measures by Day 7 (Figure 4).

Figure 5 shows the differential WBC from Day 0 to Day 35. Neutrophil count was noted to decrease on Day 7 and Day 14. Day 28 and Day 35 have shown increasing levels but still remain lower than the baseline mean levels taken on the day of extraction. All neutrophil counts were lower compared to the count on the day of extraction. Results showed increasing levels of lymphocyte count, all above normal from extraction until Day 35. A decrease of the lymphocyte count was observed on Day 28 compared to the previous week. However, overall trend still showed increasing levels as storage duration increased when compared to lymphocyte count on the day of extraction. Furthermore, eosinophil counts were found to be increasing from Day 7 to Day 21, and then regressed until Day 35. Nonetheless, each eosinophil level increased compared to the day of extraction (Day 0).

Figure 6 shows that the Platelet counts were noted to be variable with decreasing counts from day of extraction and Day 7, then Increasing platelet counts from Day 21 to 28. By the end of week five, platelet count decreased compared to Day 0 from $266.3 \times 10^{12}/L$ to $150 \times 10^{12}/L$.

Percent hemolysis on the first week (Day 7) revealed a percentage hemolysis of about 55% – 62%. Percent hemolysis on date of extraction was not included. Percent hemolysis was less on Day 14 when compared to Day 7. Increased levels were then observed on Day 21 to Day 35, although all were lower when compared to Day 7.

Increasing potassium levels were observed from Day 0 to Day 35 although prominent increases were noted during the first week and by Day 28. Lastly, sodium levels showed variable change in the first fourteen (14) days of storage. Ultimately though, all sodium levels were lower than the level recorded at the day of extraction – ending at 118.60 by Day 35 from 150.54 at Day 0.

DISCUSSION

Monitoring of blood parameters, electrolyte content and percent hemolysis revealed changes in measured levels from Day 0 to Day 35. Both hemoglobin and hematocrit levels were noted to increase as with length of time of storage. Levels however, were noted to be within normal limits. This outcome can be explained by the presence of the Adenine component of the anticoagulant used, the CPDA-1, provides a substrate for the synthesis of ATP which helps lessen the depletion rate of the red blood cells, hence prolonging the shelf life of stored blood up to 35 days. The changes in the levels of red blood cell are minimal and may still be capable of normal functioning maintaining its blood oxygen-carrying ability.⁸

The decrease in white blood cell count signifies that the white blood cells may have a short life span. The changes observed are most likely due to the sum of effects of the loss of

individual cell characteristics and degeneration that is evident. Ahmed, et al. posited that prolonged storage of blood since it would make granulocytes phagocytic and bactericidal.⁹ Neutrophil count was in this study although was observed with the lymphocyte count - with the trend showing from Day 0 to Day 35 for the study done by Russel in 1980 noted to decrease in stored blood levels were compared on Day 0 although platelet count remained levels.⁹

The results revealed various below normal values for the study done by Russel in 1980 noted to decrease in stored blood levels were compared on Day 0 although platelet count remained levels.⁹

Red Blood Cell hemolysis of the blood samples overtime. In this study is that Day 0 test for was not done. As hemolysis is during blood collection, processing and storage of blood, initial percentage hemolysis can vary which succeeding percentage compared to. Hemolysis can be capture of whole cells or loss from surface membrane of a shown in the results that hemolysis approximately 55% – 62% of a greater than percentage of blood cells in additive solution occurring between 0.2-0.4% of storage.¹⁰ As initial data collected, a comparative, level of hemolysis to duration of storage is clearly established. Literature that when red cells are stored in blood, the albumin and, to a globulin in plasma, exert an balances that of hemoglobin cell. With protein poor concentration is opposed leading to concentration and these may

counts were individual cell characteristics specifically cell counts from regeneration that is evident as the cell ages.⁴ In Increasing et al. posited that the clinical benefit of prolonged storage of blood at 4°C may be since it would make granulocytes lose their phagocytic and bactericidal functions after 24 hours.⁸ Neutrophil count was noted to decrease about 55% in this study although variable results were observed with the lymphocyte and eosinophil count - with the trend showing increasing levels from Day 0 to Day 35 for these two variables.

The results revealed variations from normal below normal values for the platelet count. In a study done by Russel in 1989, platelets were found to decrease in stored blood when platelet levels were compared on Day 1 and Day 3 although platelet count remained within normal levels.⁹

Red Blood Cell hemolysis were observed in the blood samples overtime. One limitation of this study is that Day 0 test for Red cell hemolysis was not done. As hemolysis is known to occur during blood collection, processing, handling and storage of blood, initial measurement of percentage hemolysis can serve as a baseline to which succeeding percentage hemolysis can be compared to. Hemolysis can be in the form of rupture of whole cells or loss of micro vesicles from surface membrane of intact cells. It was shown in the results that hemolysis occurred at approximately 55% - 62% of the blood which is greater than percentage hemolysis of red blood cells in additive solution with hemolysis occurring between 0.2-0.4% after 5-6 weeks of storage.¹⁰ As initial data on Day 0 was not collected, a comparative, increase in the pattern of hemolysis to duration of storage may not be clearly established. Literature states however that when red cells are stored in plasma as whole blood, the albumin and, to a lesser extent, the globulin in plasma, exert osmotic pressure that balances that of hemoglobin within the red cell. With protein poor media, the osmotic pressure is opposed leading to differences in ion concentration and these may gradually be lost

when N-K ATPase pumps is not functioning at cold storage temperatures hence hemolysis can occur. However, the extent of swelling during storage tend to be very modest and therefore is insufficient to account for hemolysis.^{11,12}

Changes in stored blood were recorded by Hod which included a reduction in red cell deformability, altered red blood cell adhesiveness and aggregability. Bioactive substances including histamine, lipids, cytokines and fragments of cellular membranes and soluble human leucocyte class I antigens- many of which are at least in part white blood cell-derived and with pro-inflammatory effects, may also accumulate in storage medium.¹³ Storage lesions may reduce tissue oxygen availability, and have pro-inflammatory and immunomodulatory effects. However, they also found out that leucoreduction may improve the quality of stored red blood cells.¹⁴

As for electrolyte levels in stored blood, specifically potassium and sodium, it was shown that potassium levels have increased compared to its concentration right after extraction. During blood storage, there is a slow constant leakage of potassium from cells into the surrounding plasma as a result of the Na-K ATPase pump failure, the plasma level of potassium may increase by 0.5-1mmol/L per day during refrigerator storage.¹⁵ The sodium level in stored whole blood samples decreased over time. These alterations in the sodium level is supported by the statement of Delobel, et al. that there are really changes in intracellular sodium through storage. Although there was a progressive decrease in the levels of sodium from Day 0 to Day 35, there was no significant adverse effects on the clinical outcome of transfusion of whole blood that had been stored for a long period of time.^{15,16}

The results of the study showed that there are cellular and biochemical changes that can occur in stored whole blood over time. Cellular changes observed were within the normal limits and most likely will not affect cellular viability during transfusion therapy. Biochemical changes

were observed specifically on potassium levels which are important to know in the initiation of transfusion therapy for specific subsets of patients. Although storage time has a negative impact on the biochemical composition of red blood cells, there is currently no sufficient evidence to advocate shorter storage times for blood. Evaluated publications of clinical outcomes related to red cell transfusion reported that the clinical outcomes yielded contradictory results regarding the effect of storage on mortality, length of intensive and hospital stay, infections, organ failure and composite adverse effects. There is no concrete evidence that transfusing older red cells would be harmful than younger red cells.¹⁷ Jeremiah mentioned in the study that during storage of blood, cells undergo progressive structural and functional changes that may reduce red cell function and viability after transfusion.¹⁸ Because older blood develops morphologic and biochemical changes during storage, there has been a growing apprehension that receiving older blood might have poor outcomes as compared receiving fresh blood. Earlier studies however done by Bartfield in 2010 noted that blood products stored for less than 21 days were not superior to those stored for longer durations.⁶ As Van der Watering concluded, no justification could be found for use of a particular maximum storage time for blood transfusion.¹⁹ Although storage time of whole blood, as observed in this study, may have variable effects on cellular composition and electrolyte levels, as also observed in other previous researches done, there is still no currently sufficient evidence to advocate for shorter storage times for red blood cells.²⁰

SUMMARY

As the results indicated, changes in cellular and biochemical composition of stored blood will occur over time. The values of the cellular

changes were variable although it was observed that red blood cell changes, platelet and white blood cells were still within the range of the normal value of the blood in vivo. The trend observed was that WBC and sodium levels tend to decrease while lymphocytes and potassium levels increase over time of storage. A prominent increase on potassium levels was observed from Day 0 to Day 7.

RECOMMENDATIONS

Given the number of blood units tested it is recommended that future studies would have a greater number of blood units to be tested to yield a more comprehensive result. Further research can also be done using specific component preparations such as packed red blood cells, platelet or plasma. Future researches may also include other biochemical parameters such as Calcium and Magnesium, Blood pH, 2,3-DPG, lactose and glucose may also be included for a more comprehensive analysis of whole blood changes. It is also recommended that closer monitoring of cellular changes and biochemical composition be done and tests be conducted on a daily basis from day of extraction until Day 35 to identify when the changes specifically occur.

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The Effect of Factors Affecting the Implementation of RA 19152 on Immunizable Diseases among Children Under Five Years Old in Purok 8, 19-B Poblacion District, Davao City

AB. S.J.A. B., RM, Montero, J.K. C., RM, Pablo, J. N., RM

ABSTRACT: Immunization is one of the main health care programs of the government to prevent childhood morbidity and mortality, but it can only be effective when the children receive the full course of the recommended immunization doses. A descriptive correlational research design was employed from the results of a Likert-scale survey of 150 mothers in Purok 8, Barangay 19-B, Poblacion District, Davao City who have children below five years old. The study examined the factors of Availability of Vaccine, Culture and Beliefs, Education and Health Knowledge, Location, and Financial Capability and the effects of these on the implementation of RA 19152. Results showed that the respondents were mostly young mothers who have small families as yet and who earn an average monthly household income of PhP5,000. Findings show that all factors to the implementation of RA 19152 were rated very high (mean = 4.4), with Availability of Vaccine and Culture and Beliefs rated highest at means of 4.5 and 4.9, respectively. Results yielded no significant difference on all factors against the respondents' age, number of children, and economic status. The study also found that the occurrence of poliomyelitis is significantly affected by the age of the mother. On the other hand, the occurrence of Hepatitis-B is significantly affected by the number of children in the family.

KEYWORDS: Midwifery, immunization program, immunizable diseases, children under 5

In Vitro and In Vivo Comparison of the Antibacterial Activity of *Persea americana* Mill. (Avocado) Seed Extract and Mupirocin against Methicillin-sensitive *Staphylococcus aureus* (MSSA)

Lacang, J.B. A., Homez, M. R., Ignacio, E. J., Jamiana, N. M., Kasilag, A. K., Khan, R., Kho, N. A., Kintanar, A., Leonardia, A., Leyson-Azuela, J., Leyva, J. M., Libago, M. R., Lim, J., Monteverde, E. T., Ng, L. M., Vellaisamy, A.

ABSTRACT: *Persea americana* Mill. (Avocado) has potential antibacterial activity against different bacterial strains including *Staphylococcus aureus*. The seed extract of Avocado was found to contain flavonoids which could possibly explain its antibacterial effect. In this study, the researchers determined the in vitro and in vivo comparison between the antibacterial activities of *Persea americana* mill. (Avocado) seed extract and Mupirocin against *Methicillin-Sensitive Staphylococcus aureus* (MSSA). The zones of inhibition of *Persea americana* Mill. (Avocado) seed extract and Mupirocin ointment against *Staphylococcus aureus* were determined using the Kirby-Bauer method. The Minimum Inhibitory Concentration (MIC) of the Avocado seed extract was then determined using Broth Dilution method. The Avocado seed extract was suitably formulated into an ointment preparation. Subsequently, 15 female White Albino mice (*Mus musculus*) were randomly divided into three groups: experimental group (Avocado seed extract), positive control group (Mupirocin) and negative control group. All test animals were superficially inoculated with MSSA in their shaven dorsum and were treated once daily for a week according to their respective groups. Qualitative bacterial colony scores were taken before inoculation of MSSA, after inoculation, and post-treatment. Results show that the mean diameter of inhibition zones (mm) and reduction of bacterial colony scores produced by the three groups were significantly different ($p=0.000$), with Mupirocin having superior antibacterial activity against MSSA than that of Avocado seed extracts. Nevertheless, the Avocado seed extract still possesses potential antibacterial activity against MSSA which should be further explored.

KEYWORDS: Pharmacology, *Persea americana*, Avocado, MSSA, antibacterial, preclinical

Footprints of

Forster, G.M. E., Ibalio, Z.M.

ABSTRACT: Nursing is considered a noble profession. While every nursing graduate is expected to have gained experiences of the Davao Medical College, the November 2015 Philippine Nursing Board exam was a pleasant surprise. It sustained her to prepare for the exam, her academics seriously because of her future career as a nurse. The purpose of this study was also about internalizing the hard work.

KEYWORDS: Nursing, board exam

Footprints of a Topnotcher

Forner, G.M. F., Ibalio, Z.M. D., Lajera, M.L. J. L., Madrid, W. G. L., Ramos, A. R.

ABSTRACT: Nursing is considered a noble profession, and many refer to it as a calling and a passion. While every nursing graduate aspires to pass the licensure examination, there would be someone among them who would excel. Following a qualitative case study design, this study explores the experiences of the Davao Medical School Foundation, Inc. (DMSF) alumna who topped the November 2015 Philippine Nurse Licensure Examination. The findings revealed that topping the exam was a pleasant surprise to her. On hindsight, she believes that perseverance and faith in God sustained her to prepare for exam. She had been a good and competent student in college. She took her academics seriously because she believed that she could use the knowledge and training in her future career as a nurse. The participant mentioned that was not just about studying or memorizing, it was also about internalizing these lessons. She believes that the training and skills learned in school should not be forgotten because it will surely help a lot in the future. She emphasizes the value of hard work.

Keywords: Nursing, board topnotcher, qualitative case study, Davao City

Effect of Raw Cocoa (*Theobroma cacao*) on Lipid Profile among Low-Risk Hyperlipidemic Adults

Sevilla, J.C. D., Acdog, M.C. I., Barbas, M.A. D., Bautista, R.F. F., Caballo, C. M., Cali, S.A. I., Calunsag, A. H., Castro, D.L. U., Conemino L.M. V., Embradura, K. R., Estrada, T.A. M., Ferrazzini, M.K. T., Gabilagon, V.C. B., Galampate, C.J.R. P., Gaviola, T.J. G., Herrero, R.P. P., Johannis, C.A. R., Libre I.C. G., Lim, J.B. I., Panucla, G.S. P., Quinonero, J.P. C., Sunga, J.P.B., Uy, A.C. B.

ABSTRACT: Hyperlipidemia is a family of disorders that are characterized by abnormally high levels of lipids (fats) in the blood, and is one of the risk factors of cardiovascular disease (CVD) among Filipinos. Raw cocoa (*Theobroma cacao*) is rich in flavonoids, a powerful antioxidant that prevents LDL from oxidation. It can also increase HDL. Cocoa is affordable, especially for the minimum-wage earners, and hence a potential and cost-efficient healthy alternative for lowering lipid levels. Following an experimental research design, this study aims to determine the effect of raw cocoa (*Theobroma cacao*) on lipid levels among low-risk to hyperlipidemic adult volunteers in North and Central Talomo District, Davao City. An 8-gram powderized 85% raw cocoa was prepared in a ready drink cup. Pre- and post-intervention lipid profile was obtained. The experimental and control groups had 17 subjects each, but only 25 (10 men, 15 women) completed the study. Comparison of pre- and post-intervention lipid profile revealed that (1) there were significant decrease of TC, LDL and HDL among the control and experimental group; (2) there were significant decrease of TC, TG and HDL among the experimental group; (3) there were no significant percentage change in comparing the control and experimental group in terms of TC, TG, LDL and HDL. In individuals with low-risk hyperlipidemia, the consumption of the 85% dark chocolate/*tableya* (8 g) is associated with improvements in lipid profile.

KEYWORDS: Physiology, hyperlipidemia, cacao, *Theobroma cacao*, lipid profile, experimental study

Manganese Levels in Children with and without Attention Deficit Hyperactivity Disorder in Davao City: A Pilot Study

Alonso K.N. D., Calumpia, C. B., Espela, H.J. B., Homez, G.A. E., Makamad, K.A. A., Paulino, C.A. B.

ABSTRACT: Attention-Deficit Hyperactivity Disorder (ADHD) is a neurodevelopmental condition characterized by inattention, impulsivity and behavioral problems. High levels of manganese exposure can decrease dopamine levels in the brain, which is associated with hyperactivity behavior. In this study, the proponents of this study investigated the levels of manganese exposure from birth to present, and smoking status of children ranging from 4-12 years old. The study was conducted in Davao City. The levels of manganese exposure from birth to present, and smoking status were measured (ICP-MS) with the use of a manganese level. Nine out of 10 children had levels which were higher than the mean level of manganese for the ADHD group. The mean level of manganese is 0.27 mg/L. For the manganese, the means were 0.27 mg/L.

KEYWORDS: Physiology, attention deficit hyperactivity disorder, analysis

cao) Manganese Level in Children with and without Attention Deficit Hyperactivity Disorder (ADHD) in Davao City Using Hair Analysis: A Pilot Study

Uy, A.C. B.

Sanzo K.N. D., Calumpit, C.E.M. M., Concepcion, W. M., Derequito, J.B. G., Equina, A. D., Lapela, H.J. B., Homez, G.A. E., Laurencio, J.R.J. A., Llemit, A. B., Ma, K.A. Y., Maravillosa, K.R. E., Mohammad, K.A. A., Paulino, C.S. B., Pelayo, R.A. I., Sanchez P.L. R., Taruc, A.J. G., Villa-Agustin, K.A. G.

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ABSTRACT: Attention-Deficit Hyperactivity Disorder (ADHD) is a common childhood neurodevelopment condition caused by a variety of potential etiologies and is characterized by impulsivity and behavioral problems. The review of related literature revealed that high manganese levels can decrease dopaminergic activity in the brain, thus, creating neurofunctional alterations such as hyperactivity behavior. In launching a foundational study using a descriptive research design, the proponents of this study focused on gathering data on the manganese level of participants, age ranging from 4-12 years old. The results of this study showed that both groups had the same amount of manganese exposure from environmental risk factors such as source of drinking water, diet (from birth to present), and smoking exposure. Inductively Coupled Plasma Mass Spectrophotometry was used to measure (ICP-MS) with a reference range of 0.010 to 0.130mg/100g of hair specifically for manganese levels. Nine out of 14 ADHD participants and all participants from the control group had levels which were higher than the normal reference range. The results showed that the mean level of manganese for the ADHD group is 0.340 mg/100g with SD of 0.54. For the control group, the mean level of manganese is 0.27 mg/100g with SD of 0.13. Based on the accepted reference range for manganese, the means were found to be high.

Keywords: Physiology, attention deficit hyperactivity disorder, ADHD, manganese level, children, hair analysis

Submission Guidelines

The manuscript submitted should be double-spaced all throughout, left-justified, with 1-inch margin on every side, and printed using Arial 12 points on 8 1/2 x 11 inch bond paper.

The Research Journal of the Davao Medical School Foundation generally adheres to the specifications of the National Library of Medicine (NLM) style.

Every research article must have all the following four major parts: (1) Title Page, (2) Abstract, (3) Body of the Report, and (4) References. Each part begins on a new page.

TITLE PAGE

The one-page title page contains the following:

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- The title of the article in <12 words, mentioning the major variables or concepts of the research, centered on the line;
- The author(s) and affiliation(s), centered on the line.

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The one-page Abstract should contain <300 words in a single unindented paragraph, must mention the research problem, sample, method, findings, and conclusion (or even implication).

KEY WORDS

Three to ten key words that reflect the content of the manuscript should be provided.

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The Body of the Report, which starts at page 3, should have all the following four sections: (1) Introduction, (2) Methods, (3) Results, and (4) Discussion. The entire text of the Body of the Report is written out continuously from beginning to end, double-spaced, with only the respective section titles, centered on the line and serving as centerheads, marking the transitions.

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• The Discussion section presents an evaluation and interpretation (or alternative interpretation) of the research outcomes, including those for extreme and unexpected findings. It explicates the statistical interactions and main effects, and acknowledges their (internal and external) validity limitations. Where appropriate, it revisits the literature and relates studies in light of the new findings. Finally, it articulates vital implications and recommendations that ensue from the findings.

REFERENCES

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OTHERS

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