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Contents

A cross-sectional study on the relationship between quality of life and family function of pediatric leukemia patients in Metro Manila

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Abstract

Introduction Leukemia is one of the most commonly diagnosed hematological malignancies in the Philippines. This study aimed to identify the relationship between quality of life (QoL) and family function among pediatric leukemia patients in Metro Manila.

Methods This was a cross-sectional study involving children 2 to 18 years old with leukemia. The WHOQOL BREF was used to measure quality of life which was classified as positive or negative. Family function was classified as functional or dysfunctional based on the results of the Family APGAR.

Results Fifty children mostly boys, with a mean age of 8.02 years were recruited. Most of the respondents had poor QoL in all four domains. A good quality of life was seen in patients with functional families. All the four quality of life domains had a positive association with a functional family but only the psychological, social and environmental domains were significant.

Conclusion A highly functional family is associated with a good quality of life especially in the psychological, social and environmental domains.

Key words: Quality of life, family function, pediatric leukemia

Leukemia is one of the major childhood cancers and a major cause of cancer-related mortality in children. Over the past 20 years, there has been an increase in the incidence of leukemia among children below 15 years. Nevertheless, there has been a dramatic improvement in the long-term survival of childhood leukemia patients. Due to the increase in cure rates, more attention is focused in reducing toxicity of chemotherapy, improving the quality of life (QoL) during treatment, and lessening the long-term effects of treatment. The treatments leading to increased survival rates of pediatric cancer patients may produce possibly debilitating physical deficits, such as endocrine dysfunction, neuropsychological deficits, or secondary malignancies. Therefore, it is essential to measure not only survival rates but also the quality of life of pediatric leukemia patients. The quality of life reflects the subjective impact of the disease and treatment on the patient's functioning in the physical, psychological and social domains.

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Pediatric researchers have consistently demonstrated that family functioning is a powerful determinant of overall quality of life and well-being in youth with chronic medical conditions such as leukemia. Specifically, adaptive family relationships and parental adjustment have been linked to positive psychological functioning. Christensen showed that family support has a direct effect on a patient's adherence to his treatment regimen; disruptions in family life have been linked to poorer emotional and behavioral functioning and poor adherence to medical regimens.[2] Family functioning in the context of a chronic pediatric condition such as leukemia is thus an important area of research and intervention.

Much research has been devoted to family functioning in pediatric conditions; however findings have been largely mixed. Overall, prior literature highlights variability in family functioning across chronic pediatric conditions and there is a need for research to elucidate our understanding of the impact of chronic conditions such as leukemia on family functioning. Family functioning may be affected variably by specific characteristics of a child's chronic condition. Rolland's psychosocial typology of illness, which continues to be applied to clinical research with families, provides a framework for categorizing pediatric chronic conditions based on key disease characteristics, such as course (e.g., progressive, constant, or relapsing/episodic) and outcome (e.g., fatal, life-shortening, nonfatal), and subsequently making predictions about the impact on family functioning.[3] A family unit, however defined, is highly functional if it is effective at coping with cultural, environmental, psychosocial, and socioeconomic stresses throughout the family life cycle.[4]

The general objective of this study was to determine the relationship between quality of life and family function among pediatric leukemia patients 2 to 18 years old in Metro Manila. Specifically, this study aimed to determine the quality of life of children based on WHOQOL BREF domains, and to determine the prevalence of family dysfunction among pediatric leukemia patients based on family APGAR.

The quality of life of cancer patients presents important information for cancer patients and their doctors when they discuss treatment options, their possible consequences and also the probable rehabilitation requirements. The health-related quality of life assesses important data about the subjective experience of the patient on cancer therapy and on the disease itself.

Methods

This was a cross-sectional study involving Filipino pediatric leukemia patients from Metro Manila and their family caregivers to determine the relationship between quality of life, using the WHOQOL BREF, and family function, using the family APGAR. The study was approved by the Ethics Review Committee.

Filipino children diagnosed with any type of leukemia, 2 to 18 years old, who had been hospitalized at least once, could understand Tagalog or English, were able to communicate with parents, guardians and the interviewer, and were accompanied by a parent or a guardian were considered for inclusion. Those with cognitive or neurological impairment prior to diagnosis, or other complicating conditions (e.g., Down's syndrome) were excluded. A sample size of 50 children was computed based on a 95% confidence interval, a proportion of 0.5 based on the study of Beach in 2006 and a margin of error of 0.1. Those who met the requirements were recruited by convenience sampling.

The World Health Organization Quality of Life-BREF (WHOQOL-BREF) is a 26-item assessment tool using a Likert-type scale covering four domains: physical health, psychological, social relationships and environment. Physical health includes questions on activities of daily living, dependence on medicines and aids, energy and fatigue, mobility, pain and discomfort, sleep and rest, and work capacity. The psychological domain includes questions on bodily image and appearance, negative and positive feelings, self-esteem, spirituality and thinking. Social relationships include questions on personal relationships, social support and sex. The environmental domain includes questions on finances, physical safety and security, access to social and health care, home environment, physical environment, and transport. Domain scores are scaled in a positive direction (i.e., higher scores denote higher quality of life). The mean score of items within each domain is used to calculate the domain score. Mean scores are then multiplied by 4 in order to make domain scores comparable with the scores used in the WHOQOL-100, and subsequently

transformed to a 0-100 scale, using 12.0 as the scale midpoint where QoL is judged to be neither good nor poor.

The Family APGAR questionnaire, with five close-ended questions, is designed as a screening test to give an overview of family function. Family function measures the degree to which a family works as a unit. It indicates the family's ability to cope and adjust to different situations based on 5 components: adaptation, partnership, growth, affection and resolve. Even though originally formulated as an assessment of adult satisfaction with family support, the Family APGAR has been used as a research tool to measure family functioning. Family APGAR is essential when family is directly engaged in caring for the patient, when caring for a new patient in order to serve as general outlook of family, when caring for a patient whose family is in crisis, and when a patient's behavior makes the physician suspect a psychosocial problem or family dysfunction.

Children who fulfilled the inclusion and exclusion criteria were invited to join the study. Informed consent and assent, when applicable, were obtained from those who agreed. The investigators administered the WHOQOL-BREF and Family APGAR; the respondents were allowed to ask questions and clarify items not clear to them. The questionnaires were collected and scored according to instructions on the use of the tool. The mean score of the items within each domain in the WHOQOL-BREF was used to calculate the domain score. Mean scores were then multiplied by 4 in order to make domain scores comparable with the scores used in the WHOQOL-100. The scores were transformed twice: first, to convert to a range of 4 to 20 and second, to convert the domain scores to a 0 to 100 scale. The respondents were then classified as having a good QoL or a poor QoL. The Family APGAR scores were computed and the respondents were functional (4 to 10) or dysfunctional (≤3).

A Pearson correlation coefficient was computed to determine the magnitude and direction of correlation of the WHO-QOL BREF and Family APGAR scores and the data were plotted using a scatter plot diagram. Prevalence rate ratio was computed to determine the association and chi square was used for significance. A value of <0.05 was used to determine significance.

Results

The sample consisted of 26 boys and 24 girls with a mean age of 8 years. Quality of life was poor in majority of the respondents in all four domains: physical 74%, psychological 66%, social 52% and environmental 76%. Twenty-seven out of the 50 families were considered functional.

Table 1 shows a moderate direct correlation between all the four domains of QoL and family function, with the environmental domain having highest Pearson's coefficient. The correlation of all four domains was significant. The prevalence risk ratios were 2.84 (physical), 2.77 (psychological), 2.07 (social) and 4.26 (environmental). The prevalence risk ratios were significant for the latter three domains but not for the physical domain (P=0.104). The positive correlation between each of the domains and family function is further seen in Figures 1 to 4.

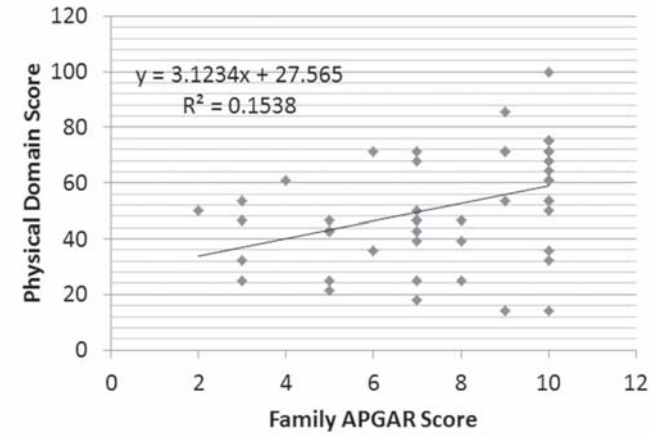
Table 1. Correlation between QoL domains and family function.

	Functional (Mean, SD)	Dysfunctional (Mean, SD)	Pearson Coefficient (r)*	P-value**	Confindence Interval	R square value***
Physical	58.07 ±20.79	43.63 ±15.15	0.3921	0.0049	0.1276, 0.6045	0.1538
Psychological	72.84 ±18.97	53.62 ±18.60	0.5652	<0.0001	0.3403, 0.7289	0.3194
Social	-80.09 ±15.60	63.04 ±18.26	0.4964	0.0002	0.2530, 0.6807	0.2464
Environmental	55.79 ±13.97	62.64 ±26.34	0.5981	<0.0001	0.3836, 0,7514	0.3577

*(r) = + 0.8-1.0 strong direct correlation; +0.4-0.7 moderate direct correlation; +0.1-0.3 weak direct correlation; - 0.8-1.0 strong inverse correlation; -0.4-0.7 moderate inverse correlation; -0.1-0.3 weak inverse correlation

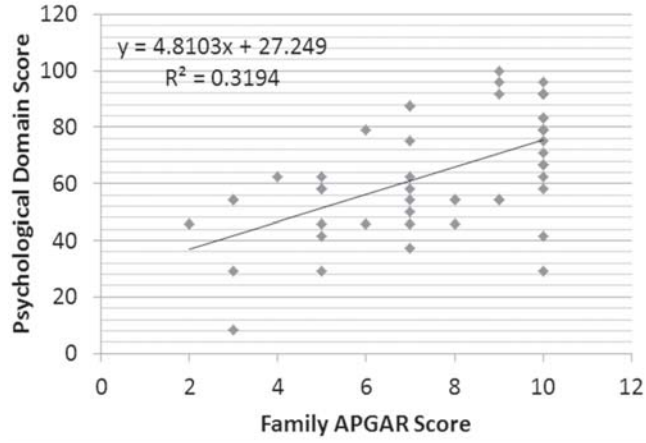
** P-value < 0.05 statistically significant; > 0.05 statistically insignificant

*** R-squared value < -1 = negative association; 0 = no association; < +1 = positive as-sociation



***R-squared value <-1 = negative association; 0 = no association; <+1 = positive association

Figure 1. Scatter plot of physical domain scores and family APGAR scores.



***R-squared value <-1 = negative association; 0 = no association; <+1 = positive association

Figure 2. Scatter plot of psychological domain scores and family APGAR scores.

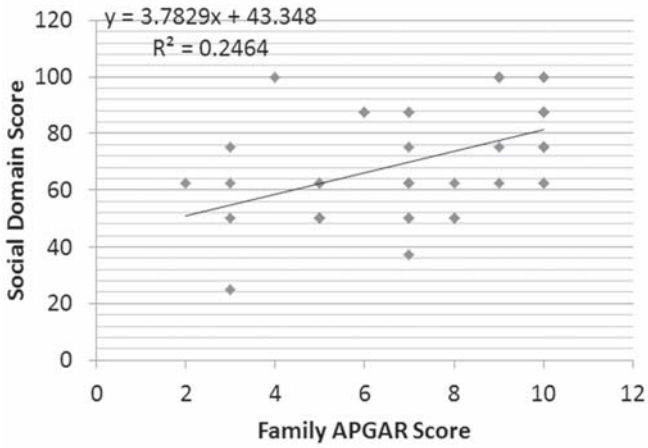


Figure 3. Scatter plot of social domain scores and family APGAR scores.

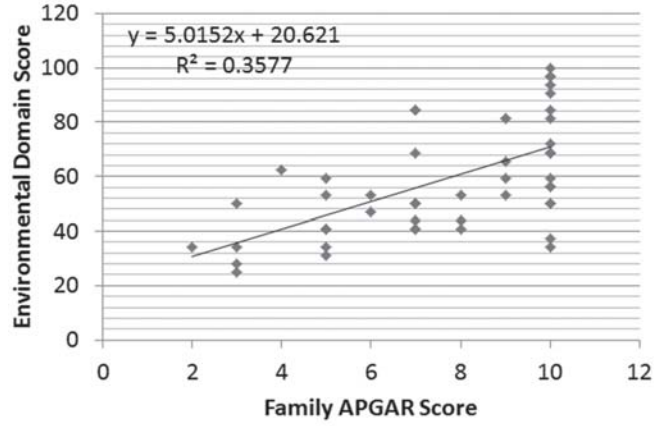


Figure 4. Scatter plot of environmental domain scores and family APGAR scores.

Discussion

Less than half of the parents interviewed were found to have dysfunctional families. The presence of leukemia in the subjects placed their families in unusual situations in terms of the QoL domains. A family is considered dysfunctional if the family cannot cope with the changes that occur in each facet that makes up the domains.[9]

Majority of the leukemia patients found in our research were found to have a poor QoL based on the four domains. It is the four domains that define their QoL, which in turn affects the survival rate. Redaniel found that the relative survival of leukemia and lymphoma in children was much lower in Filipinos living in the Philippines (32.9 and 47.7%) than in Asian Americans (80.1 and 90.5%) and Caucasians (81.9 and 87%).[3] The patients that were surveyed in this research came from either a government or a charity hospital. This may have affected the quality of care and survival further.

All our results showed a positive association between a highly functional family and good quality

of life. According to Kars, protection means guarding the child against the negative aspects of illness and treatment. Preservation refers to the way parents influence the child's perception of his/her life, thus contributing to his/her coping and willingness to undergo treatment, to maximize the chances for survival. Six aspects were identified: a trusting relationship, presence, emotional support, advocacy, routines and rituals and effacing oneself.[10] This shows that subjects' families play a significant role on their perspective. The parents' positive outlook can improve the quality of life of the subject because of the high correlation of parental behavior and the quality of life seen in the study. Young's study provided evidence that cancer affects not only the patients/survivors but also their family members.[9] This adds emphasis on the need for communication between parents, family members, and the patient for improving the QoL.

David proposed that healthy family functioning be defined in terms of a family effectively coping with cultural, environmental, psychosocial, and socioeconomic stresses throughout the family life cycle.[7] This definition can be applied to our research of having a highly functional family. Our findings are consistent with other studies[5,6] but different from Cadman, who reported increased rates of parental treatment for "nerves" and increased maternal negative affect scores among parents of children with chronic health problems.[4] However, families with pre-existing problems prior to diagnosis for the most part experienced increased deterioration in family life and had difficulty coping.[6] This would further explain why having a functional family is essential in helping a pediatric patient cope with his/her disease.

In conclusion, a highly functional family is associated with a good quality of life especially in the psychological, social and environmental domains. The quality of life may improve patient care if they are used as prognostic indicators, aiding in decision-making, resource allocation and healthcare policy. These findings provide insights for future research in which further studies could be done in those domains and their effect and application to the patient.

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A case control study on the association of screen media exposure and decreased visual acuity among public school students in Quezon City

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Abstract

Introduction The purpose of this study was to determine the association of screen media exposure and decreased visual acuity among public school students in Quezon City. The study focused on three levels of exposure: duration and frequency of exposure and distance from screen media. Television, hand-held consoles and computers or laptops meanwhile were the screen media devices included in the study.

Methods The study was conducted among 10 to 11 year old students from two public elementary schools in Quezon City. The visual acuity was determined through self-reporting and assessed through a visual acuity examination. The duration and frequency of exposure and distance from screen media were determined by an interview-guided questionnaire among students with decreased visual acuity and normal visual acuity.

Results A total of 130 subjects consisting of 69 with decreased visual acuity and 61 with normal visual acuity. Those with decreased visual acuity were mostly females (62.3%). The odds of moderate to severe exposure among the cases was 3.98. The adjusted odds ratio, after considering the effect of family history and eye-straining activities, was 6.48. Frequency of exposure and distance to screen media did not show any significant association.

Conclusion This study showed a significant association between decreased visual acuity and moderate to severe duration of exposure but not with frequency and distance from screen media.

Key words: decreased visual acuity, screen media

Decreased visual acuity is a common complaint in school-age children. It is usually noticed when the child has difficulty reading the blackboard or is not doing well in his studies. According to the US Preventive Services Task Force, common causes of decreased visual acuity in children include refractive errors such as anisometropia, astigmatism, and hyperopia.

Refractive error is one of the five leading causes of visual impairment in the world affecting 145 million people, 12 million of which are children aged 5 to 15.[1] It is also the second leading cause of treatable blindness.[2] Refractive errors include myopia (nearsightedness), hyperopia (farsightedness), and astigmatism.[3] The presence of refractive errors in an individual has been associated with factors like family

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history, prolonged study hours, increased duration of television use, and extended computer use.[1]

In 2011, more than half of the estimated 44,483,911 people within the pediatric age group in the Philippines were found to have refractive errors. Children aged five to fifteen years are at greater risk of developing refractive errors because they are in the active phase of growth. They are also subjected to greater eye strain from increased near work exposure to screen media in a milieu of demanding academic schedules.[4] As of 2010 most Filipino children were computer literate with 74% having access to the internet despite only 38% having at least one computer at home. Furthermore, the widespread availability and affordability of television and the inherent entertainment value it brings has allowed every home to have at least one television.[5] All these correlate to an increased use of screen media and a consequent increase in exposure.

A study of the visual acuity of children aged 6 to 15 years in 2011 showed that watching television from a distance of less than 5 feet was significantly associated with defective vision.[6] It also found that the prevalence of defective vision was higher among those who watched television longer.[6] Prolonged use of computer and other devices resulted in the coining of the term "Computer Vision Syndrome," pertaining to eye and vision problems experienced by those exposed to the computer for long periods.[7]

Early detection of refractive error helps in the prevention of adverse outcomes later in life. In developing countries such as the Philippines, however, only 10% of the population is able to avail of medical eye care, even simple refraction, making it difficult to catch errors of refraction in its early state.[7]

This study examined the association of three screen media and considered three levels of exposure: distance from the screen media, duration and frequency of exposure to the screen media. Electronic screen media is exemplified through television, computer monitors, video game consoles, and the like. These three screen media were chosen due to the subjects' frequent exposure to them. The study aimed to determine the association between the levels of exposure and decreased visual acuity, and possibly the specific factors causing refractive errors in the subject's age group. The increasing number of children with refractive errors, together with the recent development of certain vision problems such as the aforementioned Computer Vision Syndrome and the various studies exploring the causes of refractive errors but without arriving at a quantified and scientifically analyzed correlation between refractive error and screen media exposure, makes this study very timely.

Methods

A case control study design was utilized to determine the association between screen media exposure and decreased visual acuity among elementary school children from public schools in Quezon City.

Culiat Elementary School and New Era Elementary School were randomly selected from the Department of Education's list of schools in the randomly selected District VI of Quezon City. Children 10-11 years old were chosen randomly and labeled as with decreased visual acuity and with normal visual acuity, based on self-reporting of history of past diagnosis of refractive error. Visual acuity was verified using a Snellen's chart and those with 20/>25 vison were labelled as having decreased visual acuity (VA) and those with 20/20 or 20/25 vision, as normal VA. A pinhole test was conducted to ensure that the subject's decreased visual acuity was not due to organic problems. With the aid of the pinhole exam, the most probable causes were narrowed down to error of refraction or dry eyes. The visual acuity ranges used were based on the report prepared by the International Council of Ophthalmology (ICO) which took into consideration the definitions of blindness of various countries. Those with past illnesses which may have caused the refractive error, or refused to participate, or had language barriers were excluded. Given that the proportion of children with decreased visual acuity due to refractive errors is 53%, the maximum error of the study is 9%, with a 5% level of statistical significance, the required sample size for both groups is 130 subjects.

The three types of screen media considered were television, game console and computer. The following parameters were used to quantify the level of exposure to screen media: 1) duration or the number of hours in a day, 2) frequency or the number of times in a week, and 3) distance from the screen. The classification scheme for the three factors is shown in Table 1. Numerical values were assigned as follows: mild 0, moderate 1, severe 2 and most severe 3. These were based on the assumption that the three screen media have the same effects on the vision of the

subjects. The overall level of exposure in terms of duration, frequency and distance is the sum of the numerical values over the three screen media; mild (0-2), moderate (3-5) or severe (6-8). Two confounding variables were identified: 1) family history of error of refraction and 2) eye-straining activities such as reading while lying down, in a moving vehicle or in low light; sewing; looking directly towards the sun or any light source; frequent rubbing of the eyes and opening of eyes in chlorinated pools.

Table 1. Classification of the level of exposure to screen media in terms of duration and frequency of exposure and distance from the screen.

Level of Exposure	Mild	Moderate	Severe	Most Severe
Duration *(hours/day)*	1-3	4-6	7-9	>9
Frequency *(per week)*	1-3	4-6	7-9	>9
Distance *(cm)*				
TV	>300	150-300	< 150	None
Console	> 64	32-64	< 32	None
Laptop/PC	> 64	32-64	< 32	None

Informed consent and assent were obtained. The subjects' visual acuity was verified as previously described. A pre-tested interview-guided questionnaire that included items regarding demographic profile, family history of errors of refraction, practice of eye-straining activities, and duration, frequency and distance of exposure to TV, console and PC, was administered to the subjects. When needed, a letter was sent to the parents to verify the answers in the questionnaire. The data collection was done during recess time or prior to start of class. This is crucial to remove the possible influence of eyestrain acquired during the conduct of their classes on the results of the children's visual acuity.

The data were analyzed using SPSS version 19. Quantitative variables were summarized using mean and standard deviations while categorical variables were summarized using frequency and proportions. The analysis of the data was done separately for those with decreased VA and with normal VA. The mean duration and frequency of exposure to the three types of screen media were compared between the two groups using the t-test with a level of significance of 0.05. Multiple logistic regression analysis was used to determine the association between the overall level of exposure in terms of duration, frequency and distance to the occurrence of decreased VA while taking into consideration the effects of family history, history of error of refraction, and practice of eye-straining activities as confounding variables. The association was considered significant if the p-value of the adjusted odds ratio was less than 0.05. The confounding effect of family history and practice of eye-straining activities was assessed using backward elimination. From the full model containing the variables of screen media exposure and decreased VA, confounders were assessed one variable at a time. The order of assessment of the confounding variables was based on the P-value of the association, starting with the variable with the largest p-value to that with the smallest P-value. A confounding variable was considered significant when the change in the odds ratio was more than 10%. Significant confounders were returned to the model; otherwise, the variable was dropped.

Results

A total of 130 school children aged 10-11 years old consisting of 61 students with decreased VA and 69 students with normal VA. There were more females with decreased VA than females with normal vision and there were more females among those with decreased VA as seen in Table 2. More of those with decreased VA than of those with normal VA were doing the eye-straining activities except for looking directly at light source and frequent rubbing of eyes. Reading while lying down was the most common activity practiced by both groups.

Table 2. Classification of the subjects (N=130) into with decreased VA and with normal VA according to gender and family history of error of refraction.

	Decreased VA (n = 61)		Normal VA (n = 69)	
	N	%	N	%
Gender				
Female	33	54.1	26	37.7
Male	28	45.9	43	62.3
Family history of refractive error	29	47.5	31	44.9

Results showed no significant difference between those with decreased VA and those with normal VA both for the mean duration and the mean frequency of exposure to all three screen media as seen in Tables 3 and 4, respectively. Table 5 shows the comparison on distance of exposure between the two groups. All students had moderate to severe level of distance of exposure to television. Moreover, there were no significant difference in the percentage of those with moderate to severe exposure to console and PC screen media between those with decreased VA and with normal VA.

A summary of the overall level of exposure in terms of duration, frequency and distance considering all the three screen media are shown in Tables 6 to 8. Most of those with decreased VA and with normal VA had mild duration and mild frequency of exposure. Mild exposure was more common among those with normal VA while moderate to severe exposure was more common among those with decreased VA. Distance of exposure to screen media, whether mild or moderate to severe, was almost the same among those with decreased VA and with normal VA. The crude and adjusted odds ratio of the association between the level of exposure to screen media and decreased visual acuity is presented in Table 9. Results show that duration of exposure to screen media was significantly associated with

Table 3. Comparison between subjects with decreased VA and with normal VA on the mean duration (hours in a day) of exposure to each screen media.

Screen Media	Normal VA (n = 69)		Decreased VA (n = 61)		P-value*
	Mean	SD	Mean	SD	
TV	3.84	2.41	3.66	2.53	0.67
Console	1.45	2.30	1.51	2.56	0.89
PC	2.58	1.85	3.21	2.70	0.12

* T-test with P-value = 0.05

Table 4. Comparison between subjects with decreased VA and with normal VA on the mean frequency (number of times in a week) of exposure to each screen media.

Screen Media	Normal VA (n = 69)		Decreased VA (n = 61)		P-value*
	Mean	SD	Mean	SD	
TV	5.07	3.01	4.79	2.90	0.58
Console	1.84	2.70	1.28	2.40	0.22
PC	3.03	2.53	3.46	2.79	0.36

* T-test with P-value = 0.05

Table 5. Comparison between subjects with decreased VA and with normal VA on the percentage of moderate to severe level of distance of exposure to each screen media.

Screen Media	Normal VA (n = 69)		Decreased VA (n = 61)		P-value*
	n	%	n	%	
TV	69	100.0	61	100.00	-
Console	22	31.9	19	31.2	0.93
PC	39	56.5	33	54.1	0.78

* T-test with P-value = 0.05

decreased VA while frequency and distance were not. A moderate to severe duration of exposure was associated with a six-fold increase in the chance of having decreased VA. Logistic regression showed that the following confounders were significant: frequent rubbing of eyes, looking directly at light source, reading while lying down and reading in moving vehicles.

Discussion

Among the three variables used to quantify screen media exposure, only duration of exposure showed

Table 6. Level of duration of exposure to screen media among subjects with a decreased VA and with normal VA.

Level of Duration of Exposure to Screen Media	Normal VA (n = 69)		Decreased VA (n = 61)	
	n	%	n	%
Mild	65	94.2	49	80.3
Moderate to Severe	4	5.8	12	19.7

Table 7. Level of frequency of exposure to screen media among those with decreased VA and with normal VA.

Level of Duration of Exposure to Screen Media	Normal VA (n = 69)		Decreased VA (n = 61)	
	n	%	n	%
Mild	53	76.8	44	72.1
Moderate to Severe	16	23.2	17	27.9

Table 8. Level of distance of exposure to screen media among subjects with decreased VA and with normal VA.

Level of Duration of Exposure to Screen Media	Normal VA (n = 69)		Decreased VA (n = 61)	
	n	%	n	%
Mild	38	55.1	34	55.7
Moderate to Severe	31	44.9	27	44.3

Table 9. Comparison between the crude and adjusted odds ratio of level of exposure to screen media among subjects with decreased VA and with normal VA.

Level of Exposure to Screen Media	Crude		Adjusted	
	O.R.	P-value	O.R.	P-value
Duration				
Moderate to Severe	3.98	0.02	6.48	0.01
Frequency				
Moderate to Severe	1.28	0.54	0.57	0.30
Distance				
Moderate to Severe	0.97	0.94	0.98	0.96

* Multiple logistic regression analysis with P-value = 0.05

a direct association with decreased VA with an adjusted OR value of 6.48. Children exposed to screen media 4 to 9 hours in a day were six times more likely to have decreased VA than those exposed less than 4 hours daily. This result agrees with the study conducted in South Wales Valleys of Wales in which there is prevalence of defective vision among children with longer duration of television watching.[5] Another study in India also showed that watching television had a significant role in visual impairment among school children.[7] In the present study, screen media exposure included not only watching a television but also playing with a game console and using a computer. Computer Vision Syndrome describes the effects of prolonged exposure to computers which are manifested as ocular discomfort, muscular strain, and stress.[8] These symptoms are experienced depending on the level of visual abilities, amount of time spent in front of the computer screen, and presence of uncorrected vision problems such as hyperopia, myopia, astigmatism or presbyopia. Usually these symptoms decline after computer use, but some individuals may experience continued reduced visual abilities, such as blurring of vision even after computer use.[9]

The increasing exposure of individuals to screen media as one becomes older thus increases their chance of having errors of refraction manifested as decreased visual acuity, especially children between ages 11 and 12 who have an increased screen media exposure of up to eight hours per day.[10] Another study stated that one of the modifiable risk factors of myopia is prolonged screen media exposure, in addition to reading a lot of books, too much or too little light exposure, reading in a supine position, and history of wearing glasses.[11]

Frequency of screen media exposure was not associated with decreased visual acuity. It is possible that the chance of decreased VA is associated with length of time exposed to the screen media in a day with limited rest time and not with how often a person is exposed in a week. Distance of screen media exposure was not associated with decreased VA, contradicting the study done in India which showed that watching a television less than 5 feet away and playing a handheld game console or using a computer less than 13 inches significantly increased the chance of defective vision.[6] Given that these same limits were used in the present study, it is possible that the limits for mild and moderate to severe exposure were different. Moreover, the differences in the types and settings of the screen media used might have affected the association between distance of and decreased VA. Another study conducted to determine the profile of school children aged 6 to 15 years old having an error of refraction also showed that near-work activities of children provided greater risks of refractive errors.[9] It is also possible that the effect of the level of screen media exposure in terms of duration has a greater weight in the risk of developing error of refraction manifested by decreased visual acuity, thus masking the true association of distance of exposure with error of refraction.

This study showed a significant relationship between duration of screen media exposure and decreased VA. The result tells us that certain preventive mechanisms and solutions should be introduced if prolonged exposure cannot be avoided, especially during this digital age wherein exposure to various kinds of screen media is observed across all ages.[12] Statistical analysis showed no significant relationship between frequency and distance of screen media exposure and refractive error manifested by decreased VA. However, the impact of distance cannot be disregarded as previous studies have shown that it is a significant risk for decreased visual acuity secondary to error of refraction.

The results of the study may be used as a guide for: (1) parents to limit the exposure of their children to screen media, whether for entertainment or academic purposes; (2) ophthalmologists to advice patients on the acceptable amount of time of exposure to screen media and (3) comprehensive examination to definitively determine the cause of the decreased visual acuity, such as error of refraction and dry eye syndrome.

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A descriptive cross-sectional study on the knowledge, attitudes, and perceptions of evidence-based medicine among clinical clerks of medical schools in Metropolitan Manila

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Abstract

Introduction Evidence-based medicine (EBM) is beneficial to the provision of health care. It is important to assess the adequacy of EBM training during the pre-clinical years by exploring its current state among clinical clerks. The purpose of this study was to determine the current level of knowledge, attitudes, perceptions, and barriers to the practice of EBM among clinical clerks.

Methods This descriptive cross-sectional study was done among clinical clerks of medical schools in Metropolitan Manila. Participants who fulfilled the inclusion criteria were included via convenience sampling. A self-administered survey questionnaire adapted from a previous study was used as the data collection tool.

Results Three hundred seventy-two participants from four participating schools were included in the study. Participants considered themselves to have adequate training in medical literature searching and critical appraisal. They perceived themselves to be competent in most skills required to apply EBM and showed positive attitudes towards practicing EBM. Majority appraised not more than one article per week literature and used research databases two to five times a week. They cited insufficient time, inadequate information resources, and lack of understanding of statistical analysis as top three barriers in the practice of EBM.

Conclusion Participants have adequate knowledge and perceived skills, accurate perceptions, and positive attitudes towards utilizing EBM in their clinical decision-making. Application of EBM during clerkship, however, was limited because of insufficient time, inadequate resources and lack of understanding of statistical analysis.

Key words: Evidence-based medicine, clinical clerks, KAP

Evidence-based medicine (EBM) is defined as "conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients".[1] It assimilates a physician's clinical knowledge, acquired through experience and practice, with the most appropriate and current scientific research in making decisions about patient care. These studies include basic medical science, patient-centered clinical research, accuracy and precision of diagnostic tests, the power of prognostic markers, and the efficacy and safety of

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therapeutic, rehabilitative, and preventive regimens. It is emphasizes however that evidence by itself does not make the decision; integration with clinical expertise and the values, concerns and preference of the patient is needed to reach optimal clinical outcomes and quality of life.

The study and practice of EBM is beneficial in providing total health and helps in providing better quality and cost-effective care for patients. It also aids patients in achieving a better prognosis or clinical outcome as they partner with their health care providers. At the same time, the health care provider utilizes EBM for his life-long learning, as medicine is an ever-changing science. EBM keeps health care providers abreast with the latest medical advances. Physicians are able to identify and apply the most efficient treatments to maximize the quality and quantity of life for individual patients. Consequently, this lessens the risk of practices becoming out of date which may be detrimental to patients.[1] In developing countries like the Philippines, the bulk of medical health care expenses are shouldered by the patient with the government paying only up to 28%.[2] The health situation in the country thus necessitates EBM because its practice could potentially save millions of pesos in health expenses.[3] It has been increasingly recognized that EBM, when integrated in daily practice, leads to improvements in knowledge and skills of health professionals, which ultimately leads to improvements in health care outcomes.[4] Improvements in health care outcomes benefit the major stakeholders (i.e. patients, healthcare providers) in the health care system, and the health care system itself, especially in countries with limited resources.

There is no sufficient local data on the current state of EBM among the medical students, especially among the clinical clerks exposed to clinical decision-making in the hospital setting. Thus, this study aimed to determine the current level of knowledge, attitudes and perception of EBM among clinical clerks in Metropolitan Manila. At the same time, it aimed to determine the percentage and median scores of clinical clerks who have good knowledge, positive attitude, and accurate perceptions of EBM. The study also aimed to identify the barriers to the practice of EBM as perceived by the participants, as well as the level of application of EBM in their practice.

Clinical clerks were chosen as subjects since clerkship is the last level of medical education that didactic interventions can be given prior to clinical practice as registered physicians. In addition, clinical clerks are expected to have knowledge and skills on EBM. Findings of the study may be used as a basis to make recommendations in the development and implementation of training programs for EBM, not only in the clinics but also in the classroom setting, especially during the first two years of medical education. The results may aid training institutions for clinical clerks, post-graduate interns, and residents to incorporate the findings in their training curriculum. Findings may also aid medical school administrators in developing and improving their curriculum. Policy-makers may also come up with new guidelines to encourage the incorporation of EBM training in the curriculum of medical schools and training hospitals. Results may also be used as baseline data for other studies, which aims to further establish the status of EBM in the Philippines.

Methods

A descriptive cross-sectional study design was used to determine the current knowledge, attitudes and perceptions of EBM among clinical clerks from medical schools in Metropolitan Manila (Figure 1).

Invitations to participate were sent to 13 medical schools in Metropolitan Manila. Clinical clerks, regardless of age and sex, who were currently enrolled in a medical school in Metropolitan Manila and were willing to participate, were recruited by convenience sampling from among medical schools that allowed their students to join. Selected clinical clerks were enrolled in the study after obtaining their consent. A sample size of 372 was computed based on a proportion of favorable EBM responses of 59%, a 95% significance level, and a difference of 5%.[8]

Data were collected using an adapted five-part self-administered questionnaire.[9] Permission was obtained from the author to modify the questionnaire in such a way that the items that were included were pertinent to the current study and demographic information elicited would be applicable to clinical clerks. Data consisted of demographic information, EBM as part of medical education, knowledge of EBM techniques, perceptions, attitudes, and application of EBM in clinical practice. It consisted of 19 items using a five-point Likert scale and short answer open-ended questions for the demographic information, multiple choice select box questions for application of EBM and partially close-ended ranking questions for barriers in the use of EBM.

The response rate was computed based on the number of participants who were able to return accomplished questionnaires. Knowledge, attitudes, and perceptions were measured using frequency distribution and central tendency, specifically the median score. An interquartile range (IQR) was obtained to account for the variability of responses. The mean scores of the respondents' answers for each part of the questionnaire for knowledge, attitudes and perceptions were obtained. From these values, the

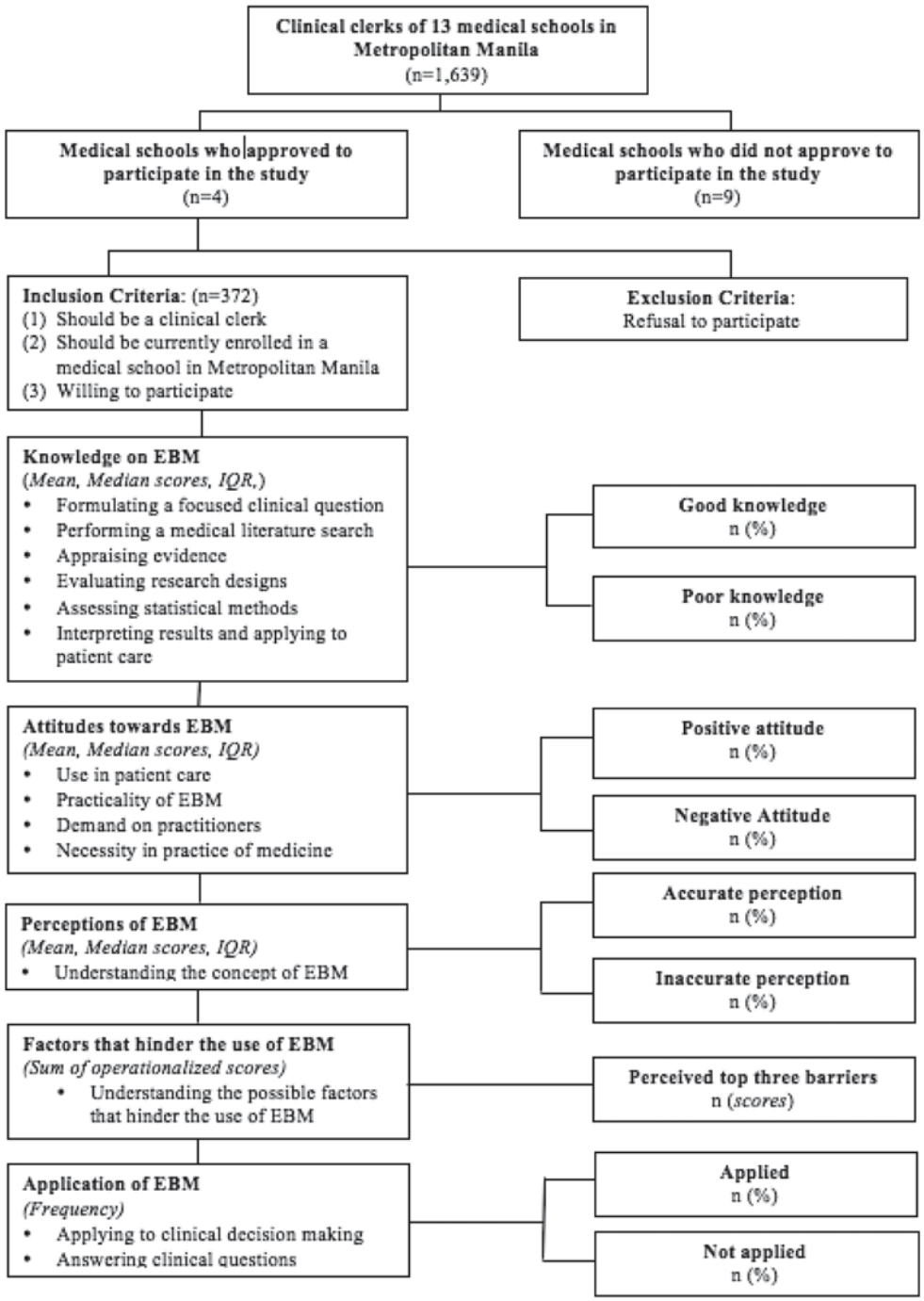

Figure 1. Flowchart of the study.

percentage of participants with good or poor knowledge, positive or negative attitude and accurate or inaccurate perception from each school and for all the schools combined were analyzed. Good knowledge was determined by a mean score of 3 or higher. Positive attitude was indicated by a mean score of 4 or higher on items 1 and 4, and a score of 2 or lower on items 2 and 3. A mean score of 4 or higher was translated as an accurate perception of EBM. The mean score and standard deviation of the respondents' age and number of months in clerkship, and the frequency and percentage of male and female participants were computed to facilitate presentation of the demographic profile of the sample in the study. To the rank the perceived barriers of the participants, an assigned score was designated for the each item selected. A rank of one was given a score of 3; a rank of two was scored as 2; and a rank of three was scored as one. The choices that were not ranked were scored as zero.

Results

In the academic year 2012-2013, there were 1,639 clinical clerks in 13 medical schools in Metropolitan Manila. Four out of the 13 schools agreed to participate in the study - two were non-stock, non-profit, private institutions, while the other two were government-owned universities. Two schools had a five-year program with their fourth year medical students as clinical clerks while the other two had a four-year program. Included in their curriculum were courses that included discussions on EBM. Three hundred seventy two clinical clerks from four medical schools participated in the study. The mean age of the participants was 24.5 years old, and the average duration of clinical clerkship was 9.4 months. Among them, there were 224 females (60.2%) and 148 (39.8%) males. The summary of the characteristics for each school is listed on Table 1.

The median score for EBM training was 3 to 4 across the four schools as seen in Table 2. Clinical clerks from schools B and D deemed their training in critical appraisal and medical literature search to be adequate. School A rated training medical literature searching to be adequate but training in critical appraisal was insufficient. Clerks from school C recognized the existence of EBM training in their school but perceived it to be insufficient.

Table 1. Characteristics of the study population.

	A (n=11)	B (n=35)	C (n=210)	D (n=116)	All Schools (n=372)
Age in years, mean (± SD)*	25.18 (± 0.98)	24.54 (± 0.89)	24.72 (± 1.34)	23.87 (± 1.54)	24.45 (± 1.42)
Gender					
Female, n (%)**	8 [72.73]	27 [77.14]	130 [61.90]	60 [51.72]	224 [60.22]
Male, n (%)**	3[27.27]	8 [22.86]	80 [38.10]	56 [48.28]	148 [39.78]
Number of Months in Clinical Clerkship, mean (± SD)*	12 (0)	11 (0)	8.97 (± 4.15)	9.47 (± 0.53)	9.41 (± 3.21)

* In parentheses (SD standard deviation)
** In brackets [% percentage]

Table 2. Characteristics of the study population.

	Median (IQR)				
	A (n=11)	B (n=35)	C (n=210)	D (n=116)	All Schools (n=372)
Previous training in critical appraisal in medical school	3 (3-4)	4 (4-5)	3 (3-4)	4 (0)	4 (3-4)
Previous training in medical literature searching in medical school	4 (3-4)	4 (4-5)	3 (3-4)	4 (0)	4 (3-4)

Scores based on a 5-point scale: 1=none; 2=a little; 3=some; 4=adequate; 5=extensive; IQR inter-quartile range

Median scores for items on knowledge and skills in EBM were 3 to 4 (Table 3). For most of the items, the clerks assessed themselves to be competent. Participants from the four schools viewed themselves to be somewhat competent in assessing statistical methods in a clinical study. Clerks from schools A and C also believed they were somewhat competent in terms evaluating study designs. In addition, clerks from school C rated themselves as somewhat competent in applying rules of appraisal when reading journal articles and in interpreting results and applying them to specific patients. Ninety-four percent of respondents had good knowledge of EBM.

As seen in Table 4, the median scores for attitudes towards EBM were 2 to 4. Ninety-seven percent of participants from all schools agreed that EBM was necessary in the practice of medicine, and that it would help them in patient care. In addition, 63% disagreed that it is impossible to practice EBM and that practicing EBM places an unreasonable demand on practitioners. Median scores for perceptions on EBM were 4 to 5 (Table 5) across the four schools, indicating a good perception of EBM among the participants.

Majority of the participants (58.9%) from all schools appraised not more than one article per week for clinical decision-making and used MEDLINE or other medical literature databases (49.2%) 2 to 5 times a week to aid them in their clinical practice (Table 6). Table 7 lists barriers in the utilization of EBM in clinical decision-making as perceived by the participants. The top three barriers cited were insufficient time (556), inadequate information resources (310), and lack of understanding of statistical analysis (287).

Table 3. Perceived knowledge and skills in EBM techniques.

	Median (IQR)				
	A (n=11)	B (n=35)	C (n=210)	D (n=116)	All Schools (n=372)
I am able to ask/formulate a focused clinical question	4 (0)	4 (3.5-4)	4 (3-4)	4 (0)	4 (3-4)
I am able to do a medical literature search	4 (0)	4 (4-4.5)	4 (3-4)	4 (4-5)	4 (3-4)
I am able to apply the rules of appraisal when reading journal articles	4 (3-4)	4 (3-4)	3 (3-4)	4 (0)	4 (3-4)
I am able to evaluate study designs	3 (3-4)	4 (3-4)	3 (3-4)	4 (3-4)	3 (3-4)
I am able to assess statistical methods in a study	3 (3-4)	3 (3-4)	3 (2-4)	3.5 (3-4)	3 (3-4)
I am able to interpret results and apply these to specific patients	4 (3.5-4)	4 (3-4)	3 (3-4)	4 (3-4)	4 (3-4)

Scores based on a 5-point scale: 1=not at all competent; 2=know a little; 3=somewhat competent; 4=competent; 5=very competent; IQR inter-quartile range

Table 4. Personal attitudes towards EBM.

	Median (IQR)				
	A (n=11)	B (n=35)	C (n=210)	D (n=116)	All Schools (n=372)
I believe EBM will help me in my patient care	4 (4-4.5)	4 (4-5)	4 (4-5)	4 (4-5)	4 (4-5)
I feel that EBM is impossible to practice	2 (0)	2 (0)	2 (2-3)	2 (1-2.25)	2 (2-3)
I feel that practicing EBM places an unreasonable demand to practitioners	2 (2-2.5)	2 (2-2.5)	2 (2-3)	2 (2-3)	2 (2-3)
I believe that EBM is necessary in the practice of medicine	4 (0)	4 (4-5)	4 (4-5)	4 (4-5)	4 (4-5)

Scores based on a 5-point scale: 1=strongly disagree; 2=disagree; 3=not sure; 4=agree; 5=strongly agree; IQR inter-quartile range

Table 5. Perceptions on EBM.

	Median (IQR)				
	A (n=11)	B (n=35)	C (n=210)	D (n=116)	All Schools (n=372)
EBM is an integration of the best clinical evidence, clinical expertise and patient values	4 (4-4.5)	4 (4-5)	4 (0)	4 (4-5)	4 (4-5)
EBM can be used for clinical decision-making	4 (4-5)	4 (4-5)	4 (4-5)	5 (4-5)	4 (4-5)
EBM is a paradigm shift in medical practice	4 (4-5)	4 (4-5)	4 (0)	4 (4-5)	4 (0)
One component of EBM is asking a clinical question	5 (4.5-5)	5 (4-5)	4 (4-5)	5 (4-5)	4 (4-5)
EBM entails searching the literature	5 (4-5)	5 (4-5)	4 (4-5)	5 (4-5)	4.5 (4-5)
Appraisal of literature is an important part of EBM	5 (4.5-5)	5 (4-5)	4 (4-5)	5 (4-5)	5 (4-5)
One of the tenets of EBM is integrating the data	5 (4-5)	4 (4-5)	4 (4-5)	5 (4-5)	4 (4-5)

Scores based on a 5-point scale: 1=strongly disagree; 2=disagree; 3=not sure; 4=agree; 5=strongly agree; IQR inter-quartile range

Table 6. Application of EMB in the clinical practice.

	Total (% Frequency)				
	A+ (n=11)	B (n=35)	C (n=210)	D (n=116)	All Schools (n=371)
Appraising literature related to clinical decision making					
a. ≤ 1 article	6 (60)	23 (65.71)	138 (65.71)	52 (44.83)	219 (58.87)
b. 2-3 articles	4 (40)	10 (28.57)	61 (29.05)	41 (35.34)	116 (31.18)
c. 4-5 articles	0 (0)	2 (5.71)	10 (4.76)	12 (10.34)	24 (6.45)
d. > 5 articles	0 (0)	0 (0)	1 (0.48)	11 (9.48)	12 (3.23)
Use of MEDLINE or other databases to search for answers to clinical questions					
a. ≤ 1 time	3 (30)	14 (40)	68 (32.38)	31 (26.72)	116 (31.18)
b. 2-5 times	7 (70)	17 (48.57)	103 (49.05)	56 (48.29)	183 (49.19)
c. 6-10 times	0 (0)	2 (5.71)	14 (6.67)	11 (9.48)	27 (7.26)
d. > 10 times	0 (0)	2 (5.71)	25 (11.90)	18 (15.52)	45 (12.10)

+ School A (N=10) due to non-response of one respondent

Table 7. Ranking of perceived barriers+ to the use of EBM in clinical practice as perceived by the clinical clerks.

	Ranking				
Barrier	A	B	C	D	All Schools
Insufficient time	1	1	1	1	1
Inadequate information resources	2	2	3	2	2
Lack of understanding of statistical analysis	3	3	2	3	3
Lack of training in critical appraisal of literature	5	-	4	-	4
Lack of interest	-	4	5	4	5
Inadequate skills to search the literature	4	-	-	-	-
Lack of support for EBM among my colleagues in the clinics	-	5	-	-	-
Inadequate skills to critically appraise literature	-	-	-	5	-

Discussion

Perceived knowledge of EBM

Our study showed that the clinical clerks had sufficient knowledge and skills in implementing the EBM process. As stated by Al Musa, those who have been taught and trained in EBM gained a higher level of knowledge compared to those who did not.[6] Those exposed to EBM during their undergraduate medical education gained higher knowledge than those exposed only in the residency level.[9] Such exposures and training courses may have influenced positive attitudes in the clinical clerks towards its use in the practice of medicine. They were able to recognize its necessity and benefit in clinical decision making. This study also showed that a significant proportion of clinical clerks were not confident in evaluating statistical methods, similar to the findings in a previous study in involving residents.[8] Inadequacy in the evaluation of statistical methods was one of the key barriers perceived.

Attitudes on EBM

The clinical clerks agreed that EBM was helpful in patient care, and that it was necessary in the practice of medicine. A few felt that EBM was not impossible to practice and that it did not place an unreasonable demand on practitioners. Their positive attitudes may be explained by the introduction, familiarization, and training that the clinical clerks received in their first three years in medical school. This trend was previously observed in a study utilizing a pre- and post-survey and skills test of medical students, wherein attitudes toward and proficiency in EBM improved after receiving training.[10]

However, there was a lower percentage of clinical clerks that had a positive attitude regarding EBM when its actual practice and the additional time it required was taken into consideration. A previous study observed that consultants and trainees recognized the necessity and benefit of using EBM but felt that practicing it placed an unreasonable demand on them, requiring intellectual effort and time investment.[8] In other studies, family and government hospital physicians showed a positive attitude toward the use of EBM in practice, but stated the need for further training.[11,12] These results may indicate that even though majority are in favor of EBM, clinical clerks and practitioners alike have certain negative attitudes toward it when certain barriers such as time and training are also taken into consideration.

One study reported an identifiable gap between the most ideal practice supported by scientific evidences and the actual clinical care rendered to patients being a constant finding among several previous studies.[5] Positive attitudes among the clerks may result in a wider acceptance of and willingness to use EBM in the future as physicians, thus bridging the gap.

Perception of EBM

The clinical clerks had a median score of 4 regarding perceptions in EBM and 98% had an accurate perception of EBM. Majority had fairly accurate concepts of EBM and it correlated with the results that they had good knowledge. Studies showed that EBM is increasingly recognized when integrated in daily practice and leads to improvement in the knowledge and skills of health professionals, which ultimately leads to improvements in health care outcome.[4] With a fairly accurate perception on EBM among clinical clerks of medical schools in Metro Manila, there is a road to progress in terms of the making clinical decisions based on evidence based medicine that would benefit the needs of both the patient and the practitioner.

Application of EBM

Based on the results, 60% of clinical clerks appraised one or less article and 52% used MEDLINE or other databases to search for answers to clinical questions 2-5 times. Despite 97% having a positive attitude to EBM, only 63% responded positively when it came to practice and demand on the practioners. Although evidence-based medicine is widely accepted, there is still limited application due to the barriers to its practice.[3] Having good knowledge, attitude and perception on EMB did not translate to good application.

Perceived Barriers in Utilizing EBM

Clinicians and healthcare providers, such as clinical clerks, who would want to improve the

efficiency and quality of healthcare services, could find help by using EBM. However, there are barriers to the successful and efficient application of EBM, such as those listed in Table 7. The most commonly cited barriers to the use of EBM in the clinical practice of the clinical clerks were insufficient time, inadequate information sources, and lack of understanding of statistical analysis, consistent with a previous study.[3,9] Insufficient time may be due to the demanding workload of a clinical clerk. Inadequate information sources may be due to lack of resources and/or lack of or limited access to information resources. This can be resolved by using an information system that integrates evidence and guidelines with patient care that is accessible so as to promote the use of the databases and facilities for EBM.[15] Lack of understanding of statistical analysis, together with lack of training in literature search and critical appraisal may be resolved by improving programs in EBM.

In the clinical setting, clinical clerks are not directly involved in decision-making regarding patient care. Because of this, they may not be encouraged to utilize EBM in their practice in the clinics. In the context of medical education, EBM should be introduced as early as possible so that the developing minds of the medical students would be able to imbibe its essence. It should also be incorporated in lectures by the faculty so that it can be modelled, and at the same time, the content of the lecture will not only come from textbooks, but also from current literature. This would help in molding a more holistic and well-prepared healthcare provider.

The limitations of this study include (1) selection bias due to convenience sampling brought about by inability to obtain complete lists of potential subjects and (2) a data collection tool that measured perceived knowledge rather than actual performance. To ensure face, construct and content validity of the data collection tool, the questionnaire adapted from a previous study[8] was checked by reviewing literature and reviewed by a content expert. Response bias was minimized by using a structured questionnaire allowing the researchers to ask all the subjects uniform questions with predetermined responses, facilitating collection of objective numerical data. A low return rate was avoided by using a questionnaire containing only 18 closed-ended questions. Moreover, a cover letter explaining the objectives of the study and consent form ensuring confidentiality and anonymity as well as verbal explanation were given to each subject.

Majority of the clinical clerks from four schools in Metro Manila who participated in the study had adequate knowledge, a positive attitude and accurate perception of EBM and its use in their clinical practice. However, application was limited due to barriers like insufficient time, inadequate information sources and lack of understanding of statistical analysis. The researchers recommend an improvement in the implementation of EBM in the medical curriculum through adequate exposure of medical students at the pre-clinical level. Incorporation and appraisal of current relevant literature even in classroom-based case-oriented sessions should be practiced. Clinical clerks should also be given a chance to execute decision-making during patient care based on evidence.

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The effect of oral vitamin C supplementation on the blood pressure levels of hypertensive adults in Barangay Doña Imelda: a randomized controlled study

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Abstract

Introduction The study aimed to determine the effect of 1000 mg vitamin C supplementation on the systolic and diastolic pressure of hypertensive subjects taking oral anti-hypertensive agents.

Methods Thirty-two previously diagnosed hypertensive patients maintained on medications were randomly assigned to receive oral vitamin C 1000 mg daily or a dummy drug for four weeks. Post treatment systolic and diastolic blood pressures were compared with baseline measurements within groups. The mean difference in the systolic and diastolic blood pressures between the vitamin C and control groups were compared.

Results There was a significant decrease in the mean systolic pressure (26.4 mm Hg) and diastolic pressure (7.6 mm Hg) in the vitamin C group. A significant decrease was seen in the mean systolic pressure (12.6 mm Hg) but not in the diastolic pressure (4.3 mm Hg) of the control group. A comparison between groups did not show a significant difference in the mean decrease of both systolic pressure (13.8 mmHg, p = 0.29) and diastolic pressure (3.25 mmHg, p = 0.16).

Conclusion The investigators conclude that four weeks of daily supplementation of 1000 mg vitamin C did not cause any significant decrease in the systolic and diastolic blood pressure of hypertensive subjects as compared to placebo. Further studies need to be conducted for higher doses considered in the safe range of oral vitamin C used as an adjunct to pharmacological therapy.

Key words: Vitamin C, hypertension

Hypertension is one of the leading causes of the global burden of disease, contributing to 7.6 million deaths and 92 million disability-adjusted life years in 2001.[1] Data from the World Health Organization's global brief on hypertension showed that complications of hypertension account for 9.4 million deaths worldwide every year.[2] The same report showed that hypertension is more prevalent in low and medium-income countries as compared to high-income countries.[2] Locally, it is a chronic problem affecting more than 10 million adults, with an additional 15 million considered at an increased risk for developing the disease.[3] According to a report by the Council of Hypertension (COH) of the Philippines, its prevalence has increased from 11%

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in 1992 to 28% in 2012.[4] Hypertension is not curable, which makes control of blood pressure very important in decreasing the risk of complications. According to WHO, "in low- and medium-income countries, many people do not seek treatment mainly because it is prohibitively expensive."[2]

Vitamin C as a supplement is inexpensive, widely available, and considered to be generally safe. There may be promising evidence of its use as part of a blood pressure-lowering regimen. But despite multiple studies showing evidence of moderately improved blood pressure levels with vitamin C supplementation, authorities are hesitant to recommend its inclusion in maintenance regimens for hypertensive patients. Experts have suggested that more studies are needed in order to determine its clinical use and to be able to make appropriate, evidence-guided recommendations regarding vitamin C supplementation in hypertensive patients.[5]

A recent study from The American Journal of Clinical Nutrition concluded that an acute intravenous administration of vitamin C reduces cardiovascular adrenergic drive in hypertensive patients, causing a decrease in the blood pressure of hypertensive subjects but not in normotensive subjects.[5] According to the same study, an increase in oxidative stress appears to be involved in the pathophysiology of hypertension by increasing sympathetic outflow.[5] The antioxidant effects of vitamin C help lower oxidative stress, thereby decreasing sympathetic outflow.[5] Another study attributed blood pressure lowering effects of vitamin C to direct vascular mechanisms.[5, 6] In particular, vitamin C is said to protect nitric oxide from inactivation by scavenging reactive oxygen species, thereby restoring nitric oxide mediated vasodilation.[5, 6] Based on these proposed mechanisms and other previous studies on vitamin C's effects on blood pressure,[7] the investigators hypothesized that a daily oral supplementation of vitamin C may help lower blood pressure in hypertensive subjects.

The objective of the study was to determine if oral vitamin C supplementation would help decrease the systolic and diastolic blood pressure levels in adult patients with hypertension. Specifically, the study aimed to determine if a dose of 1000 mg of oral vitamin C daily could be used in addition to an existing anti-hypertensive drug regimen to help lower the systolic and diastolic blood pressure of known hypertensive subjects.

Methods

This was a randomized double-blind, placebo-controlled trial comparing the effect of vitamin C supplementation with a placebo, given for one month, on the systolic and diastolic blood pressure of hypertensive patients on maintenance medications in Barangay Doña Imelda, Quezon City. The study was approved by the Ethics Review Committee.

Filipino men and women between the ages of 21 to 75 years previously diagnosed with hypertension and already on maintenance medication, living in Barangay Doña Imelda in Quezon City, with at least three readings of systolic blood pressure (SBP) ≥140mm Hg and/or a diastolic blood pressure (DBP) ≥90mmHg measured on different days were recruited. Those with any known major pathologies, specifically renal failure (whether or not on hemodialysis), cancer and G6PD deficiency; or on vitamin C or multivitamin supplementation were excluded. A sample size of 16 subjects per group was computed based on the following parameters: 5 mm Hg standard deviation,[5] 95% confidence interval, 5mmHg difference to be detected.

Initial blood pressure screening for two days at the barangay hall and a two-week house-to-house campaign were conducted to identify hypertensive residents. Of the 130 residents screened during the recruitment period, 50 residents were considered potential subjects based on a reported diagnosis of hypertension and an elevated initial blood pressure reading. They underwent further screening for the eligibility criteria and those who fulfilled the required parameters underwent a three-day home follow up to determine eligibility in terms of three blood pressure measurements of SBP ≥140mmHg and/or a DBP ≥90mmHg. A written informed consent was obtained from those who qualified and agreed to join the study. The average of the three initial SBP and DBP readings were used as the baseline blood pressure of each subject.

Subjects were randomly assigned to receive oral vitamin C 1000 mg daily (treatment) or a dummy tablet (control) for four weeks. Before the start of supplementation, subjects were instructed to continue taking their prescribed maintenance medications for hypertension. They were also instructed not to alter their eating or exercise habits. During data collection, a group of three investigators were assigned to conduct one-on-one home visits done at the same time daily, in order to measure each subject's blood

pressure and administer the treatment. Only the trained nurse in the group measured the blood pressure using a Welch Allyn Durashock DS44 integrated aneroid sphygmomanometer, according to a common protocol. In order to minimize intrapersonal bias, only one nurse took blood pressure readings per group rotation. In addition, the nurses who conducted the measurements were unaware of the intervention assignment of each subject. A second investigator was assigned to provide each subject with either vitamin C or the dummy drug. In order to ensure compliance with treatment, subjects were requested to take their treatment in the presence of the investigator. The third investigator served to record measurements, interview each subject for side effects, or to answer any questions or concerns.

Data was presented as the mean decrease in both SBP ± standard error and DBP ± standard error of the mean, accepting $p < 0.05$ as the significance level. A paired t-test was done to determine if there was a significant decrease in the SBP and DBP before and after treatment within each study group. Possible differences between the treatment and control groups were tested using an independent t-test.

Results

Thirty-two subjects were initially included in the study. Two subjects from the treatment group dropped out during the first week without providing a reason. Three subjects from the control group dropped out due to rashes on both upper extremities, hospitalization and subsequent death (specific cause not known to investigators), and transfer of residence, respectively. This left 14 subjects in the treatment group and 13 in the control group. No significant differences between the groups were noted based on age, age distribution, gender, alcohol intake, smoking and baseline mean diastolic pressure. A significant difference was noted between the treatment groups in terms of caffeine intake and mean systolic pressure, with the treatment group having a higher baseline mean systolic pressure. The details are shown in Table 1.

Results showed a mean decrease of 26.4 mmHg ± 4.5 SE in the SBP and 7.6 mmHg ± 1.87 SE in the DBP of those receiving oral vitamin C supplementation compared to a mean decrease of 12.6mm Hg ± 2.95 SE in the SBP and 4.3 mmHg ± 2.34 SE in the DBP of the control group. The decreases in the SBP and DBP in the vitamin C group were significant. The decrease in SBP in the control group was significant but that in the DBP was not. The details are shown in Table 2.

The decrease in SBP between the vitamin C and control groups was 13.8 mm Hg and 3.3 mm Hg for the DBP. A comparison of the decrease in SBP and DBP between the vitamin C and control groups did not show any significant difference as seen in Table 3.

Discussion

The main finding of the study was that providing a daily regimen of 1000mg vitamin C for four weeks did not cause a significant decrease in both the SBP and DBP in hypertensive subjects as compared to those receiving a dummy drug. Although the

Table 1. Demographic characteristics of treatment and control groups.

Characteristics	Vitamin C (n = 14)	Control (n = 13)	P-value
Age (years)			
Mean ± SD	52.3 ± 11.60	52.2 ± 9.51	0.97
Gender			
Male	5 (36%)	4 (31%)	0.45
Female	9 (64%)	9 (69%)	
Coffee drinkers	11 (79%)	10 (77%)	0.02
Alcohol drinkers	3 (21%)	2 (15%)	0.23
Smokers	3 (21%)	4 (31%)	0.11
Mean SBP baseline (mm Hg)	168.6	150.0	0.03
Mean DBP baseline (mm Hg)	95.7	87. 7	0.09

Table 2. Summary of the difference in the mean systolic and diastolic blood pressure before and after 4-week trial within treatment groups.

	Vitamin C		Control	
	Baseline	After treatment	Baseline	After treatment
SBP*	168.6	142.2	150.0	137.4
Mean decrease* ± SE	26.4 ± 4.50		12.6 ± 2.95	
p-value	< 0.01		< 0.01	
DBP*	95.7	88.1	87.7	83.4
Mean decrease* ± SE	7.6 ± 1.87		4.3 ± 2.34	
p-value	< 0.01		0.09	

*Values are in mm Hg; SBP - systolic blood pressure; DBP - diastolic blood pressure

Table 3. Summary of the differences in the mean systolic and diastolic blood pressure between treatment groups.

	Vitamin C	Control
SBP*		
Mean decrease	26.4	12.6
Mean difference	13.8	
P-value	0.29	
DBP*		
Mean decrease	7.6	4.3
Mean difference	3.3	
P-value	0.16	

*Values are in mm Hg; SBP - systolic blood pressure; DBP - diastolic blood pressure

treatment group's SBP showed a significant decrease, the control group was also shown to have had a significant decrease. No significant difference between the two groups was seen in a comparison performed by the investigators.

Results of the current study showed a significant decrease in both the mean SBP and DBP in the vitamin C supplementation group. This appears to be consistent with previous studies, including the meta-analysis by Juraschek.[7] However, the current study results also showed a significant decrease in the mean SBP but not the DBP for the subjects in the control group receiving a dummy drug.

In a post-study interview, several subjects claimed that prior to the study, they would only take their medications when they would feel symptoms that they attributed to as having high blood pressure, such as a headache specifically felt in the back of their head or dizziness. They claimed that daily monitoring made them more aware of their blood pressure readings, which motivated them to take their medications daily. A possible explanation, therefore, for the significant decrease in the blood pressure of both groups could be attributed to an improved compliance of the subjects in taking their prescribed anti-hypertensive medications due in part to daily blood pressure monitoring and constant reminders from the investigators.

Another factor that could have affected the results include the environment, specifically the temperature, especially since the study was conducted during the peak summer months. Kim showed that blood pressure decreases in relation to increases in both indoor and outdoor temperatures.[8] According to the same study, blood pressure was lower in the summer because the veins of the skin expand in order to diffuse body heat.[8] Although attempts at controlling the environment and temperature were made by taking the blood pressure measurements at the same time every day, daily temperature variability cannot be controlled and can therefore be considered an unmeasured confounding variable that may partially explain any observed associations.

Despite having only trained nurses taking the blood pressure measurements and the use of a common protocol, the skill level and interpersonal variability between the different investigators taking the blood pressure were still possible confounding variables that could have affected the results.

Because the study aimed to determine if vitamin C can be added as an adjunct instead of as a main treatment for high blood pressure, possible limitations of the study could lie in the effect of various dietary and lifestyle factors on vitamin C concentrations in the blood. In particular, alcohol and caffeine intake, and cigarette smoking were not controlled; their

possible effects on vitamin C metabolism and serum concentration may account for some additional limitations. Studies have shown a dynamic between smoking and vitamin C with regard to blood pressure. Katayama showed that smoking increases heart rate, mean blood pressure and branchial-ankle pulse wave velocity, and vitamin C does not counter the increase in the first two parameters but decreases the last parameter.[9] Schectman found that smoking decreases serum levels of vitamin C independent of dietary intake.[10]

Caffeine has been known to inhibit the absorption of vitamins and minerals, including vitamin C. The diuretic effect of caffeine washes away water-soluble vitamins, thereby increasing their excretion.[11] A significant difference in the caffeine intake of the treatment group compared to the control group was noted, with the treatment group consuming more caffeine. A higher caffeine intake in the treatment group may have caused significantly lower blood concentrations of vitamin C, which, in part, could have accounted for the insignificant difference in mean SBP and DBP decrease between the treatment and control groups.

Alcohol intake, although not specifically linked to vitamin C absorption or metabolism, has been linked to a possible increase in blood pressure. Interventional studies have shown that the cessation of alcohol intake reduces the blood pressure in both hypertensive and normotensive individuals.[12] Five subjects reported alcohol consumption, with two out of the five subjects drinking at least three times a week.

Although multiple studies have shown an inverse association between vitamin C levels and blood pressure, the current study did not show any significant decrease in both the SBP and DBP related to a daily oral vitamin C intake of 1000 mg when used as an adjunct to pharmacological therapy. Based on data analysis, the investigators therefore conclude that four weeks of daily supplementation of 1000 mg oral vitamin C did not cause any significant decrease in the SBP and DBP of hypertensive subjects as compared to a dummy drug. The effects of various dietary and lifestyle factors that were not accounted for in the current study could have affected results and should be considered in future studies. Additionally, randomized controlled studies need to be conducted using higher doses considered in the safe range of oral vitamin C intake used as an adjunct to pharmacological therapy. Studies longer than the current four-week trial should also be considered. Lastly, any preventive effects of vitamin C on the development of hypertension should also be investigated in future studies.

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The effect of Wii: Big Brain Academy on the attention level of physical therapy students

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Abstract

Introduction his study aimed to determine the effect Wii: Big Brain Academy on the attention level of physical therapy students.

Methods This was a quasi-experimental study involving physical therapy students chosen by purposive sampling who underwent a 4-week intervention by playing Wii: Big Brain Academy 10 minutes 3 times a week. Attention scores obtained through the Repeatable Battery for the Assessment of Neuropsychological Status after four weeks were compared with the baseline scores. Another test was administered after a two-week wash out and compared with the post-intervention scores.

Results The mean attention scores after the intervention showed a significant increase from the baseline (P = 0.03). The follow up scores were lower than the post-intervention scores but the difference was not significant (P = 0.62).

Conclusion Results suggest that playing Wii: Big Brain Academy for 4 weeks may improve the attention level of physical therapy students.

Key words: Attention level, Big Brain Academy, physical therapy, Repeatable Battery for the Assessment of Neuropsychological Status, Wii

Attention is the ability to give thought to a single object or activity.[1] The ability to concentrate is a cognitive process by which information is sorted out.[2] Attention plays a significant role in improving cognition.[3] Working memory deficits, including decreased ability to concentrate, leads to a lower level of academic performance.[4] Improvement in attention leads to a greater positive effect on learning and retention.[5]

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Many recent neuroscientific investigations focused on improving attention or executive control abilities. In recent years, action videogame play by young adults has been consistently shown to be associated with superior attention capacities.[6] Action video games have been proven to improve selective visual attention in students.[7, 8, 9, 10] Brain training games have been shown to be capable of improving executive functions, working memory, and processing speed.[11]

Nintendo released the home-gaming console Wii in 2006. Its immediate popularity was due to its unique motion-sensing controller, a handheld pointing device called Wii Remote, which detects movements in three dimensions, allowing for more natural and free movements.[12] The gaming system targets young audiences with the approach of

introducing games that try to focus on intelligence instead of the "kill-them-all" type games of the other gaming systems.[13] In 2007, Nintendo released Big Brain Academy: Wii Degree for its Wii platform. The official Nintendo website claims that the cognitive training game features tests in the form of puzzles that are based on logic, reason, math, visual, and memory. It can also accommodate up to eight players at a time. It is programmed to challenge mental acuity. It contains five mini-games: Identify, Memorize, Analyze, Compute, and Visualize. Each of the tasks takes at least a minute, and can be played with four varying degrees of difficulty: Easy, Medium, Hard, and Expert. It can be played in three modes: Solo, Multiplayer, and Online. Big Brain Academy: Wii Degree can stimulate and challenge one's mind while being entertained.[14] Big Brain Academy: Wii Degree is being used in the rehabilitation of executive function and memory following traumatic brain injury.[15] The game has also been found to have potential use in pre-school classrooms as it could enhance the cognitive ability of children, particularly in solving basic arithmetic equations.[16,17]

Physical therapists are expected to apply knowledge and experience to the situation, analyze and reanalyze to deduce the problem and treatment, rationalize and justify, use induction to reach a conclusion, and, solve problems and build patterns. These components are affected by the degree of attention of the physical therapist.[18] Entry-level performance attributes include knowledge, clinical skills, safety, clinical decision-making, self-directed learning, interpersonal communication, and professional demeanor.[19] Attention is the key to develop the cognitive skills emphasized by studies as the foundation for the ideal clinic-based physical therapist. Although there is a lot of new technology claiming to improve attention, there is a lack of studies to support those claims. Technology, especially media, plays a huge role in influencing today's generation. It is for those reasons that the researchers aimed to determine the effect of the Wii Big Brain Academy: Wii Degree on the attention level of physical therapy students.

Methods

This was a quasi-experimental study among physical therapy students from a private university in Quezon City in academic year 2013-2014. The concentration level of the subjects was measured using the Repeatable Battery for the Assessment of Neurological Status (RBANS) before and after a 4-week Wii Big Brain Academy intervention and after a two week washout period. The study was approved by the Ethics Review Committee.

BS Physical Therapy students enrolled during the second semester of academic year 2013-2014, Level II or Level III, regular or irregular, male or female, 18 to 22 years old, were recruited by purposive sampling. Those who had previously played the Wii Big Brain Academy or engaged in resistance exercises or could not tolerate prolonged exposure to the LCD screen were excluded.

The RBANS is a battery of questions that tests immediate memory, visuospatial/constructional, language, attention, and delayed memory. The researchers used the attention part which consisted of coding and digital span, a repetition test of working memory where progressively increasing items with 2 to 9 digits had to be recalled by the subject. The intervention was the Nintendo Big Brain Academy: Wii Degree an electronic educational game consisting of 15 activities divided into five categories: identify, memorize, analyze, compute and visualize – in easy, medium and hard levels of difficulty.

Prospective participants were screened using questionnaires; those who met the criteria and agreed to participate were asked to sign an informed consent. A baseline RBANS was obtained. Participants took the one on one exam at 4 to 6 o'clock in the afternoon inside an extended room, with four air conditioning units at a constant temperature, eight light bulbs open to maintain a good lighting and wooden armchairs for the participants and examiner to seat on. The exam was administered for approximately 25 minutes. The whole set was administered even if the attention part was the only parameter being evaluated.

Participants were subjected to the Wii game Big Brain Academy: Wii Degree in a room with two air conditioning units on, four open light bulbs, a LCD projector, and a projector screen. The game was projected with the subjects 6 feet apart from the projector screen. The participants were allowed to sit in an arm chair to give adequate support to his/her arm while playing the game. The game was played two at a time for 15 minutes, 3 times a week for 4 weeks between 4 to 7 pm. The instructions were already programmed in the game. Participants were not allowed to eat 2 hours prior to playing the game.

A post-intervention RBANS was obtained after the fourth week. A follow up was done after a two-week wash out period. It was administered carefully in same environment, around the same time and with the same proctor. Those who failed to complete the 4-week intervention due to non-compliance were excluded from the analysis. Participants were asked not to play any other video games during the four week intervention in order to prevent co-intervention.

The mean, proportion and standard deviation were determined for the subjects' age, gender, year level, academic status and academic admission. A paired t-test determined the effect of Wii Big Brain Academy: Wii Degree on the attention of the subjects. All statistical level of significance was set $p < 0.05$.

Results

There were 120 level II and 90 level III physical therapy students enrolled at the time of the study and 18 and 24, respectively, decided to join. Nine second year and 11 third year students failed to complete the required number of sessions, leaving 22 participants who completed the study. Their mean age was 19.1 years. Among the participants, 13 (57%) were female and 13 (57%) were in level III. There were 19 (86%) regular students and 17 (77%) started as freshmen. Their demographics characteristic are presented in Table 1.

The mean RBANS attention scores showed a significant increase from the baseline ($p = 0.03$). There was a decrease in the attention scores in the follow up with a mean total score of 99.7 ± 16.89 (SD); however, the decrease was not significant as seen in Table 2.

Table 1. Characteristics of subjects included in the study (n = 22).

Variables	
Age years, mean ± SD)	19.1 ± 1.23
Gender(# of females)	13 (57%)
Year Level (# of Level III)	13 (57%)
Academic Status(# of regular students)	19 (86.4%)
Academic Admission Status(# of freshmen)	17(77.3%)

Discussion

The results of the study indicate that playing Wii: Big Brain Academy produced improvement in attention, similar to the studies of Kueider[20] and Nouchi.[11] This contradicted the findings of Green & Bavelier[9] and emphasized the appropriation of the gameplay and content in stimulating our cognitive abilities.[21] Females represented the greater number of the participants since males usually have no preference for a game and interactive stimulation for a more dominant cognitive gain.[22]

Table 2. Mean RBANS attention pre-test, post-test and follow up test scores.

Attention	Difference		P-value
Pre-intervention	99.7 ± 14.63		
Post-intervention	114.3 ± 15.52	14.6	0.03
Follow Up	99.7 ± 16.90	-14.6	0.62

The results showed statistically significant improvement in attention scores and in the RBANS as a whole, indicating that Wii: Big Brain Academy influences cognitive processes not limited to attention. This may be attributed to the direct relationship of attention with learning and retention.[5] After a wash out period of 2 weeks, the effects of Wii: Big Brain Academy on attention diminished. This may be due to the leisurely nature of the video game which, according to Verghese,[23] preserve and prolong cognition. Koepp also reported that a rapid surge of dopamine in the brain during video game leads to a faster learning retention.[24]

The previous study for Wii: Big Brain Academy showed no increase in cognitive functions.[25] It is crucial to consider that the study used a crossover procedure, where each participant underwent both the experimental brain training session and control the reading articles session. Such design is prone to the "carryover effect", which is the persistence of the effects from the previous intervention to the subsequent intervention phases, causing the difference between the two treatments to be different in the two time periods, eventually resulting in a significant treatment-period interaction (Shen & Lu, 2006). Ackerman also reported that most of the participants felt no satisfaction and enjoyment in playing Wii: Big Brain Academy after the study. Entertainment is largely responsible for the effect of Wii-based interventions.[26]

The study suggests that Wii: Big Brain Academy may be effective in improving the attention of physical therapy students. There was a statistically significant difference between the attention scores at pre-test and

post-test 4 weeks after playing the game. On the other hand, there was no statistically significant difference between the attention scores at post-test and the follow up test 2 weeks after the wash-out period. This means that playing the Wii: Big Brain Academy may help physical therapy students improve their attention but may need to play the game continuously in order to obtain a long term benefit. The findings of the study were for a selected group only. Further research is advised before generalizing these findings to the larger population.

The researchers pose the possible questions to be answered by the next research: 1) How long will it take for the effect of Wii: Big Brain Academy to last? 2) How many sessions will result in a greater improvement in the attention of college students? 3) What specific time of the day will result in a greater improvement? 4) Will this game result in similar benefits when applied to other subjects like workers with white collar jobs?

The study showed that playing Wii: Big Brain Academy resulted in an improvement on the attention and may be therefore recommended as it may favorably affect the academic performance of physical therapy students.

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Effectiveness of laughter yoga as an adjunct to naproxen treatment in relieving symptoms of knee or hip osteoarthritis in geriatric patients: a randomized controlled trial

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Abstract

Introduction The Philippine Rheumatology Association recommends the use of non-pharmacologic interventions including yoga for the management of osteoarthritis, however, little is known about the benefits of the alternative therapies. The study aimed to assess the effectiveness of laughter yoga as an adjunct to naproxen treatment in relieving symptoms of knee and hip osteoarthritis in geriatric patients.

Methods Residents of a home for the aged who met the criteria for knee or hip osteoarthitis were recruited and randomized into naproxen plus laughter yoga or naproxen alone groups via fish bowl method. The experimental group underwent 10 sessions of laughter yoga 20 minutes a day. The primary outcomes were change in pain, stiffness and physical disability, measured with the Western Ontario and McMaster Universities (WOMAC) LK 3.0 Osteoarthritis Index.

Results There was a significant improvement from the baseline in the pain, stiffness and physical disability scores in both groups. However, there was no significant difference between the two treatment groups in terms of change in pain ($p = 0.26$), stiffness ($p = 0.39$) and physical disability ($p = 0.54$) scores.

Conclusion Laughter yoga did not confer an additional reduction in pain, joint stiffness and physical disability when used as an adjunct with naproxen among patients with knee or hip osteoarthritis.

Key words: Laughter yoga, osteoarthritis, naproxen, geriatric population

Osteoarthritis (OA) is the most common form of arthritis and one of the leading causes of disability in the Philippines. The Food and Nutrition Research Institute National Nutrition Health Survey done in 2003 noted a 0.5% prevalence of OA among individuals 40 years and above in both rural and urban areas. In a population of 80 million, this means that more than 3.2 million Filipinos are affected.[1] Osteoarthritis imposes a substantial economic burden in the Philippines. With an average of 60 new osteoarthritis cases each year, indirect costs of treatment amounted to Php803,854.23 (US$ 16,077.00), mainly from maintenance and operating

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expenses and capital outlay of clinics. Direct costs amounted to Php647,016.00 (US$12,940.00) largely for medicines (90%). The annual cost of treating uncomplicated osteoarthritis at the Philippine General Hospital Arthritis Clinic is Php1,450,870.20 (US$29,017) or Php28,448.43 (US$ 569.00) per patient.[2] Symptoms associated with osteoarthritis include pain, tenderness, stiffness of the joint and loss of flexibility. As the disease progresses, cartilage loss, joint narrowing and formation of reactive bony spurs become evident leading to significantly diminished physical function. Since there are no disease-modifying agents available for OA, the goal of medical management is to alleviate pain and to improve functioning of the affected joint through analgesics, exercise and lifestyle modification.

The Philippine Rheumatology Association emphasizes the use of non-pharmacological interventions to relieve symptoms of OA. One of the novel adjunctive interventions gaining interest is yoga. It has been described to be beneficial in several medical conditions such as coronary artery disease and asthma.[3] Other conditions where it may be beneficial include osteoarthritis, rheumatoid arthritis, hypertension, diabetes mellitus, epilepsy, and carpal tunnel syndrome. Yoga was also suggested for use as a preventive and curative approach for the body, spirit and mind.[4] Performing yoga asanas and relaxation showed significant improvement in tenderness of fingers. Laughter yoga has shown to positively affect health and well-being, with results that include improved immediate mood (vigor-activity and friendliness).[5] It was shown that adults with chronic or recurrent low back pain who underwent yoga sessions had greater improvement in back function.[6]

The mechanisms for the effect of laughter yoga include elevation of the pain threshold through the increase of endorphins and the reduction in stress hormone levels;[7] reduction in stress,[8] anxiety,[9] and negativity;[10] and modification of physical, psychological and social well-being by altering the way a person sees the world and attributes meaning to events.[11]

This study assessed the effectiveness of laughter yoga as a nonpharmacologic intervention complementing naproxen in relieving symptoms of joint pain, joint stiffness and physical disability in osteoarthritis of the hip or knee among the elderly. The results of this study may aid health care providers in the management of osteoarthritis by utilizing laughter yoga as one of the non-pharmacologic treatment options. Moreover, this study could serve as the basis for plans to establish data to support large scale researches on laughter yoga in the management of osteoarthritis.

Methods

This was a randomized controlled trial comparing the effectiveness of naproxen and laughter yoga with naproxen alone for the relief of joint pain, joint stiffness and physical disability among residents with osteoarthritis of the hip or knee from a home for the aged in Marikina City. The study was approved by the Ethics Review Committee.

Residents of Lualhati ng Maynila Home for the Aged fulfilling the following criteria were recruited: symptomatic osteoarthritis of the hip or knee of more than four weeks duration prior to entry into the study based on the Clinical Criteria for the Classification of Idiopathic Osteoarthritis of the Hip and Knee, respectively, of the American College of Rheumatology (ACR); aged 60 to 85 years; a Mini Mental Status Examination score of more than 25. Excluded were those who had any of the following: secondary arthritis related to syphilitic neuropathy, ochronosis, metabolic bone disease or acute trauma; contraindications to laughter yoga such as hernia, epilepsy, uncontrolled hypertension, urine incontinence, severe back pain and persistent cough; contraindications to naproxen such as known hypersensitivity to the drug and clinically active renal, hepatic or peptic ulcer disease; use of drugs and herbal products that have the same clinical effect and significant drug-to-drug interaction such as warfarin, antihypertensives, methotrexate and lithium; current participation in exercise or other non-pharmacological modalities to reduce symptoms of osteoarthritis; and unwillingness to adhere to the assigned treatment. A sample size of 11 per group was computed based on a standard deviation of 7, detectable difference of 6 and an alpha error of 0.05.

The instrument used was a Tagalog version of the Western Ontario and McMaster Universities Osteoarthritis (WOMAC) Likert 3.1 Index, a validated tool that assessed joint pain, joint stiffness and physical disability. It consisted of 24 questions - 5 for pain, 2 for stiffness and 17 for physical disability – using a 5-point Likert scale. Two items in the physical disability subscale were not applicable to the

subjects. The average value was substituted for the score for those items.

A complete list of the current 308 residents of the Luwalhati ng Maynila Home for the Aged was obtained. An initial screening survey was conducted by the proponents, who underwent briefing prior to survey implementation. The survey form consisted of a personal data portion, a checklist of symptoms of osteoarthritis of hip and knee adapted from a previous study, a checklist of health conditions contraindicated in performing laughter yoga, and a Mini Mental Status Examination (MMSE). Those who fulfilled the criteria underwent a thorough physical and rheumatological examination by a licensed physician. Osteoarthritis of the knee or hip was diagnosed using the Clinical Criteria for the Classification of Idiopathic Osteoarthritis of the Knee and Hip developed by the ACR and confirmed by radiographic imaging of knee or hip joint. Determination of ESR level as a laboratory criterion was not done. Informed consent was obtained from the qualified residents.

Those who fulfilled the entry criteria were assigned to either the experimental (naproxen plus laughter yoga) or control (naproxen) groups by the fish bowl method. Individual baseline scores for joint pain, joint stiffness and physical disability were determined for both groups using the WOMAC Osteoarthritis Likert 3.1 Index. Subjects in both groups were given naproxen 550 mg twice a day after breakfast and after dinner for 3 weeks by the resident nurse. To ensure compliance, participants were observed during intake of the medication. A checklist was utilized to monitor medication intake and side effects. In addition, the experimental group underwent 10 sessions of laughter yoga 20 minutes every other day for 3 weeks. The sessions consisted of clapping and warming-up exercises, deep breathing exercises, childlike playfulness and laughter exercises. All sessions were facilitated by a certified laughter yoga instructor. Post-treatment scores for joint pain, joint stiffness and physical disability were likewise determined.

Data were entered in Microsoft Excel and were analyzed using Statistical Package for the Social Sciences (SPSS) v.19. Descriptive statistics were used to evaluate the demographic and clinical characteristics of the subjects. A chi-square test was used to compare categorical variables. A paired t-test was used to compare mean scores for joint pain, joint stiffness and physical disability within groups before and after treatment. An independent t-test was used to compare the difference in scores between the naproxen plus laughter yoga and the naproxen alone groups.

Results

Twenty two subjects, consisting of 11 each for the naproxen and naproxen plus laughter yoga groups, were included in this study. Both groups had a mean age of 68 years and more than 70% were women. The mean BMI in both groups was 21. More than 81% of both groups had knee osteoarthritis. The baseline characteristics of both groups were similar as seen in Table 1. There was no significant difference between the two groups in terms of their baseline WOMAC pain, stiffness and physical disability scores as seen in Table 2.

As seen in Tables 3 and 4, both the naproxen plus yoga laughter and naproxen alone groups showed significant improvements in joint pain ($P<0.01$), joint stiffness ($P<0.01$) and physical disability ($P< 0.01$) scores. When the mean change in scores was compared between the naproxen plus yoga laughter groups and naproxen, the differences in all three components was not significant (pain $P = 0.25$, stiffness $P = 0.39$, physical disability $p = 0.54$), as seen in Table 5.

Discussion

This randomized controlled trial used laughter yoga as an adjunct to a non-steroidal anti-inflammatory drug to improve symptoms, i.e., joint pain, joint stiffness and physical disability of knee or hip osteoarthritis. The results showed that there was no significant difference in the mean change in pain, stiffness, and physical disability between the laughter yoga group and the naproxen control group based on the WOMAC scores.

The benefit of laughter yoga in reducing the joint pain in knee and hip osteoarthritis is still not clearly established. However, there are evidences that showed effectiveness of other forms of yoga in reducing joint pain among patients with osteoarthritis. According to Tse,[12] cognitive-behavioral strategies for pain management include hypnosis, relaxation with guided imagery, distraction, and the use of support groups. Humor is one of the distraction techniques used in pain control. The same study stated that after laughter or other humorous encounters, natural killer cell

Table 1. Comparison of demographic and clinical characteristics of naproxen plus laughter yoga and naproxen groups.

Characteristics	Patient Groups: Naproxen + laugh-ter yoga (n=11) n	Mean ± SD[a] or %F	Naproxen (n=11) n	Mean ± SD[a] or %F	P value[b/c]
Age (years)		68.3 ± 5.6		68.6 ± 8.3	0.90
Gender					
Male	3	27.2	3	27.3	0.76
Female	8	72.7	8	72.7	
BMI					
≤18.5	3	21.4 ± 3.9	3	21.0 ± 2.8	1.00
18.6 - 24.9	5		7		
≥25.0	3		1		
Affected Joint					
Knee	9	81.8	9	81.8	1.00
Hip	2	18.2	2	18.2	

[a]Standard Deviation
[b]Independent T-Test
[c]Chi Square Test

Table 2. Baseline WOMAC scores of naproxen and naproxen plus laughter yoga groups.

WOMAC Score	Patient Groups: Naproxen+ laughter yoga (n = 11) Median	Naproxen (n = 11) Median	P value[a]
Pain	9	8	0.69
Stiffness	4	3	0.33
Physical disability	22	26	0.57

[a] Mann-Whitney U Test

Table 3. Change in WOMAC scores before and after treatment in the naproxen group (n = 11).

WOMAC Score	Mean (SD[a])	P value[b]
Pain	68.3 ±16.57	0.003
Stiffness	56.1 ± 34.58	0.005
Physical Function	57.2 ± 22.62	0.003

[a]Standard Deviation
[b]Paired T-test

Table 4. Change in WOMAC scores before and after treatment in the naproxen plus laughter yoga group (n = 11).

WOMAC Score	Mean (SD[a])	P value[b]
Pain	59.7 ± 17.52	0.003
Stiffness	43.3 ± 33.50	0.007
Physical Function	52.1 ± 14.61	0.003

[a]Standard Deviation
[b]Paired T-test

Table 5. Comparison of change in WOMAC scores before and after treatment between naproxen plus laughter yoga and naproxen groups.

WOMAC Score	Patient Groups: Naproxen+ laughter yoga (n = 11) % Change (SD[a])	Naproxen (n = 11) % Change (SD[a])	P value[b]
Pain	59.7 ± 17.52	68.3 ± 16.57	0.25
Stiffness	43.3 ± 33.50	56.1 ± 34.58	0.39
Physical Function	52.1 ± 14.61	57.2 ± 22.62	0.54

[a]Standard Deviation
[b]Independent T-test

activity, immunoglobulin G and immunoglobulin M levels increased for as long as 12 hours bringing about beneficial health outcomes. Another study by Goodenough[13] found that weekly sessions of laughter and humor resulted in a decrease in reports of pain and perceived loneliness, and increased reported happiness and life satisfaction. Our results showed that the combination of laughter yoga and naproxen reduced pain perception by 59.6% but failed to show significant improvement compared to those taking naproxen alone.

Haslock[14] and Park and McCaffrey[15] showed reduction in joint stiffness in patients with osteoarthritis. However, Kolasinski[16] showed that Iyengar yoga postures were less effective in reducing joint stiffness in knee osteoarthritis. This study showed a reduction in joint stiffness by 43.2% although these changes did not reach statistical significance when compared to the control group.

The randomized trial by Tilbrook and Cox[6] showed that laughter yoga in adults with chronic or recurrent low back pain led to greater improvement in back function than the usual care. This study showed that physical function improved by 52.1% after yoga intervention but was not statistically different from that of the control group.

This randomized clinical trial showed that laughter yoga did not confer an additional reduction in pain, joint stiffness and physical disability when used as an adjunct to naproxen among patients with knee or hip osteoarthritis. However, laughter yoga is a safe and feasible exercise option for patients with osteoarthritis.

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Biopsychosocial factors associated with cognitive impairment among the geriatric population in Barangay Doña Imelda, Quezon City

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Abstract

Introduction While several studies have already found a higher risk for geriatric cognitive decline with lifestyle practices and co-morbidities, there is a dearth of local data. This study aimed to identify the biopsychosocial factors that influence the level of cognitive impairment among the geriatric residents of Barangay Doña Imelda, Quezon City.

Methods A cross-sectional study was done on residents 65 to 85 years old who were recruited by purposive sampling. A five-part data gathering tool was used to collect information on demographics, depression, activities of daily living, family support and cognitive impairment. Analysis was done using frequency, percentage, mean, standard deviation, and stepwise multiple linear regression.

Results Most of the respondents were women, with a mean age of 70 years. Around 40% of the samples were smokers and alcohol drinkers. The group had mild cognitive impairment and mild depression, a high level of physical function and above average family support. The significant predictors of cognitive impairment were smoking, alcohol consumption, physical functioning, care-taker, and religion. Smoking and alcohol were found to have a direct influence on the level of cognitive impairment, while physical functioning had an inverse relationship. Those who were independent and were non-Roman Catholics tended to have less cognitive impairment.

Conclusion Smoking, alcohol consumption, physical functioning, care-taker and religion were significant predictors of cognitive impairment among the geriatric residents of Barangay Doña Imelda; smoking was the best predictor of cognitive impairment.

Key words: Geriatrics, cognitive impairment, biopsychosocial factors

Cognitive impairment among the elderly and its risk factors has been exhaustively studied worldwide. However, there is a dearth of local data. A United Nations study showed that the Philippines' senior citizen population will increase by 400% in 38 years, from 5.9 million in 2012 to 23.6 million in 2050, equivalent to 6.1% in 2012 rising to 15.3% in 2050.[1] A study in 2005 showed 34.93% of persons with disabilities in the country were senior citizens.[2] This data raises concerns regarding geriatric health care and pension systems and poses great challenges for completely new approaches to health care, retirement, living arrangements, and intergenerational relations.[1]

This increase in geriatric population has posed medical, nursing, and welfare problems[3] so that

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healthcare professionals should be fully aware of the physical changes in older patients and the problems brought about by dementia, depression, and other psychosocial issues.[4,5] Aging is a natural process which causes changes in the cognition and physical capacity of an individual. However, one should be proactive and prevent or minimize such impairment for a better quality of life. The first step in prevention is identifying the factors that may lead to cognitive decline. Factors that hamper the elderly from leading a healthy life include various biological, psychological and social problems occurring in older age, as well as a high incidence of diseases. Socio-economic factors such as decrease in economic independence and breakdown of the family support system also contribute to the cognitive decline seen in elderly. Sociodemographic factors (gender, age, educational background), health status and presence of chronic illnesses, use of maintenance medications and lifestyle factors (smoking and drinking) are some of the biological factors that play a role in the mental health of the elderly.

Therefore, the focus of this study was to determine the influence of certain biopsychosocial factors on the degree of cognitive impairment among the geriatric population of Barangay Dona Imelda, Quezon City. Specifically, this study aimed to: 1) determine and describe the biological factors affecting the degree of cognitive impairment by determining activities of daily living; 2) identify significant medical and lifestyle conditions; 3) determine the psychosocial factors by describing the sociodemographic facets of the respondents (age, sex, religion, educational attainment, monthly income, presence of a care-taker, type of family, and occupation), 4) measure the degree of depression and perceived social support; 5) determine the degree of cognitive impairment through the Folstein Mini-Mental Status Examination (MMSE) and; 6) determine if the aforementioned biopsychosocial factors significantly influenced the degree of cognitive impairment.

Methods

This was a cross-sectional study among geriatric residents of Barangay Doña Imelda, Quezon City, to determine the influence of biopsychosocial factors on the degree of cognitive impairment using a five-part data-gathering tool. The study was approved by the Ethics Review Committee; permission was sought from barangay officials and the senior citizens association.

Residents of Barangay Doña Imelda 65 to 85 years old, who were natural born Filipinos were recruited. Those who were severely mentally and/or physically challenged including, but not limited to, those who were comatose, unconscious, stuporous, or hooked on life support, as well as the deaf/mute/blind respondents were excluded. A sample size of 152 respondents was computed based on a 32% incidence of cognitive impairment among Filipinos, a difference of 15% and level of significance of 0.05. The respondents were selected by non-probability purposive sampling.

Biopsychosocial factors pertained to the independent variables of the study categorized as biological, psychological, and social. The psychosocial factors consisted of the sociodemographic characteristics, degree of depression and perceived social support from the respondents' respective families, as determined from the personal data sheet, Geriatric Depression Scale and Perceived Social Support-Family Scale, respectively. Biological factors consisted of physical functioning (as measured by Barthel's Index of Activities of Daily Living), chronic illnesses and lifestyle factors (i.e. smoking and alcohol intake). *Cognitive impairment* referred to cognitive decline, mental status impairment/decline or presence of mental disability/dementia as measured by the Mini Mental Status Examination.

Five data collection tools were used: 1) Personal Data Sheet (PDS); 2) Folstein Mini Mental Status Examination (MMSE); 3) Barthel's Index of Activities of Daily Living (ADL); 4) Geriatric Depression Scale (GDS); and 5) Perceived Social Support-Family Scale (PSS-Fa). The PDS was used to collect personal, demographic data and health information. The MMSE is a 15-item set that requires the respondent to answer a series of questions or perform specific tasks to determine the degree of cognitive function. The ADL is a 10-item questionnaire that asks the respondent to grade how well he/she can perform certain daily activities. The GDS is a 15-item questionnaire answerable by "yes" or "no" that measures the degree of depression. The PSS-Fa is a 20-item questionnaire answerable by "yes", "no" or "I don't know" to determine the level of support from the respondent's family. The GDS and PSS-Fa were labelled as Survey Number 1 and Survey Number 2, respectively, to minimize bias on

the part of the respondent. Questionnaires were translated to Filipino with the help of a certified translator. The translated questionnaire was pilot tested on a different set of 20 participants who met the eligibility criteria.

An informed consent was secured from residents who met the eligibility criteria and agreed to join the study. A pencil-and-paper, one-on-one interview was conducted in the respondent's home. Each participant was paired with a trained interviewer who remained constant throughout the duration of the data collection period. The participant was first asked to accomplish the PDS by himself or assisted by the interviewer. The MMSE was performed next, followed by the ADL, GDS, and PSS-Fa. It took the respondent less than one hour accomplish the whole set.

The GDS, ADL, PSS-Fa and MMSE were scored based on instructions for their respective use. GDS scores were interpreted as no depression (0 to 4), mild (5 to 10), and severe (≥ 11) depression. Physical activity scores were interpreted as high (17 to 20), above average (15 to 16), average (12 to 14), below average (10 to 11) and low (0 to 9). PSS scores were interpreted as low (0 to 9), below average (10 to 11), average (12 to 14), above average (15 to 16), and high (17 to 20) social support. The MMSE measured the level of cognitive ability of the participants. Scores for each of the 15 items depended on the task the participant was able to accomplish; results were then classified as no cognitive impairment (26 to 30), mild (21 to 25), moderate (10 to 20), and severe (0 to 9) cognitive impairment.

Data gathered were statistically treated using Microsoft Data Analysis and the Statistical Package for Social Sciences (SPSS) Version 17. Frequencies and percentages were used to analyze the sociodemographic data such as age, sex, religion, educational attainment, occupation, care taker, monthly income, type of family as well as health status. The mean was used to determine the level of cigarette smoking in terms of pack years, alcohol intake in terms of bottles per week, degree of depression, perceived social support and cognitive impairment. Standard deviation was employed to assess the variability and dispersion of the mean scores. Lastly, stepwise multiple regression analysis was used to determine if the risk factors considered significantly influenced the degree of cognitive impairment of the respondents.

Results

The investigators were able to recruit 160 respondents. Majority were females (79%), Roman Catholics (92%), manual laborers (58%), took care of themselves (78%) and had a monthly income of PHP 5,000 or less (65%). More than 70% did not finish high school and most of them (46%) grew up in nuclear families. Their characteristics are shown in Table 1. As shown in Table 2, the commonly

Table 1. Summary of demographic characteristics among geriatric residents of Barangay Doña Imelda, Quezon City.

Parameter	N	%	Mean +/- SD
Age			
65-70	101	63%	70.0 ± 4.88
71-75	35	22%	
76-80	17	11%	
80-85	7	4%	
Sex			
Female	127	79%	
Male	33	21%	
Religion			
Roman Catholic	147	92%	
Non Roman catholic	13	8%	
Educational Attainment			
No Formal Education	12	8%	
Elementary Level	35	22%	
Elementary Graduate	36	23%	
High School Level	31	19%	
High School Graduate	20	13%	
Vocational Studies	11	7%	
College Level	6	4%	
College Graduate	9	6%	
Office Worker	7	4%	
Free Lance Worker	42	26%	
Licensed Professional	1	1%	
Care Taker			
Self	125	78%	
Others (family, hired maid, relatives)	35	22%	
Monthly Income			5,568.97 ± 5,178.23
≤5000	105	65%	
5001-10,000	36	23%	
10,001-15,000	15	9%	
15,001-20,000	1	1%	
20,001-25,000	2	1%	
25,001-30,000	0	0%	
30,001-35,000	0	0%	
35,001-40,000	1	1%	
Type of Family			
Single Parent	41	26%	
Nuclear	74	46%	
Extended	45	28%	

encountered diseases included hypertension (36%), stroke (11%), respiratory disease (11%) and heart disease (10%). More than 40% of the respondents consumed 18 bottles of alcohol per week, while 39% had 25 pack years of cigarette smoking as seen in Table 3.

Table 2. Summary of commonly encountered co-morbidities among geriatric residents of Barangay Doña Imelda, Quezon City.

Chronic Illness	N	(%)
Hypertension	60	38
Stroke	18	11
Heart disease	17	11
Respiratory diseases	9	6
Diabetes mellitus	8	5
None	22	14

Table 3. Smoking and alcohol profile of geriatric residents of Barangay Doña Imelda, Quezon City.

Parameter	N	%	Mean consumption
Alcohol intake	66	41%	18 bottles/week
Smoking	62	39%	25 pack years

Table 4. Summary of cognitive, physical activity, depression, and social support profile of geriatric residents of Barangay Doña Imelda, Quezon City.

Parameter	N	%	Mean + SD
MMSE			
No cognitive impairment	90	56%	24.9 ± 3.46
Mild	51	32%	
Moderate	19	12%	
Severe	0	0%	
BI			
High	151	94%	19.4 ± 1.21
Above Average	5	3%	
Average	4	3%	
Below Average	0	0%	
Low	0	0%	
GDS			5.3 ± 3.20
No depression	71	44%	
Mild	76	48%	
Severe	13	8%	
PSS-FA			15.6 ± 3.35
High	76	48%	
Above average	39	24%	
Average	27	17%	
Below average	7	4%	
Low	11	7%	

The mean MMSE score of the participants was 24.85±3.46 (SD), indicating that the respondents had mild cognitive impairment, implying that they may require some supervision or assistance with their day-to-day functioning. The participants demonstrated a very high level of physical function (ADL = 19.35±1.21 (SD)), indicating that they were very capable of carrying out their activities of daily living. The mean GDS score was 5.31±3.2 (SD), indicating that the group had mild depression. Finally, the mean PSS score of 15.58±3.35 (SD) indicated that the level of family support was above average. The details are shown in Table 4.

Of the variables that could be tested by odds ratio, only smoking (OR = 17.33, P < 0.001), alcohol consumption (OR = 6.19, P < 0.001), and depression (OR = 3.14, P = 0.01) were significant. The medical conditions present in the participants were not significant risk factors. However, on further statistical analysis of the significant risk factors and the continuous variables not tested with odds ratio, only smoking, alcohol consumption, physical function, care taker and religion were found, by using step-wise multiple regression, to significantly influence the level of cognitive impairment.

As shown in Table 6, Model 5 contains the significant predictors of cognitive impairment and when taken as a whole, accounted for 61.5% of the variance of scores in MMSE (F = 49.24, P < 0.001). Only 39.5% of the variance in MMSE score was accounted for by other factors not included in the study. Smoking by itself accounted for 47.3% of the variance. The addition of alcohol consumption to smoking yielded an additional 7.8%. In the same manner, physical function added 3.6%, care taker 1.5%, and religion 1.3% of the total variance.

Table 7 shows that smoking was the best predictor of cognitive impairment among the geriatrics. A beta weight of -0.439 (P < 0.001) indicated an inverse relationship between it and MMSE scores. The beta weight of alcohol consumption (-0.383 P < 0.001) also revealed an inverse relationship. On the other hand, the beta weight for physical function (0.161, P = 0.003) revealed a direct relationship with MMSE

scores, while caretaker variable (beta weight = -0.122, P = 0.022), indicated an inverse relationship. The beta weight of religion (0.114) indicated that non-Catholics had a higher MMSE score than the Catholics.

Discussion

This study is one of first few attempts to identify the relationship of biopsychosocial factors and cognitive impairment in the elderly in the local setting. Cognitive impairment is greatly underestimated as an inevitable risk concomitant with aging.[6] It is often ignored due to several co-morbidities that may or may not even be related to the mental decline.

The finding that smoking was the best predictor of cognitive impairment among the variables included in the study was consistent with several literature stating that smoking had an adverse effect on

Table 5. Summary of the odds ratio of tested variables among geriatric residents of Barangay Doña Imelda, Quezon City.

Tested variables	OR	P value	Lower class interval	Upper class interval
Hypertension	0.92	0.807	0.484	1.756
Stroke	3.04	0.053	0.954	9.686
Heart disease	0.66	0.433	0.241	1.812
Renal Disease	0.38	0.288	0.067	2.109
Arthritis	1.04	0.974	0.225	4.800
Gout	0	0	0	0
Glaucoma	0.77	0.812	0.106	5.626
Cataract	0	0	0	0
Goiter	0	0	0	0
Epilepsy	0	0	0	0
Diabetes	0	0	0	0
Depression	3.14	0.017	1.187	8.309
Smoking	17.33	<0.001	4.943	60.780
Alcohol intake	6.19	0.001	2.430	15.770
Religion	0.23	0.001	0.099	0.511

Table 6. Modeling of predictors of cognitive impairment among geriatric residents of Barangay Doña Imelda, Quezon City.

Model*	R	R^2	R^2 Change	F	Sig F
1	0.687	0.473	0.473	141.567	0
2	0.742	0.551	0.078	96.197	0
3	0.766	0.587	0.036	73.981	0
4	0.776	0.602	0.015	58.683	0
5	0.784	0.615	0.013	49.235	0

*Model 1 Predictors: smoking; Model 2 Predictors: smoking, alcohol consumption; Model 3 Predictors: smoking, alcohol consumption, physical function; Model 4 Predictors: smoking, alcohol consumption, physical function, caretaker; Model 5 Predictors: smoking, alcohol con-sumption, physical function, caretaker, religion

Table 7. Coefficients for the best predictors of cognitive impairment among geriatric residents of Barangay Doña Imelda, Quezon City.

Model	Unstandardized coefficients		Standardized coefficients	t	Sig.
	B	Std. Error	Beta		
5 (Constant)	16.801	3.179		5.284	0
Smoking	-0.077	0.011	-0.439	-6.925	0
Alcohol consumption	-0.075	0.012	-0.383	-6.072	0
Physical function	0.489	0.159	0.161	3.072	0.003
Caretaker	-0.365	0.158	-0.122	-2.314	0.022
Religion	0.341	0.15	0.114	2.270	0.025

cognitive functioning especially in the executive aspect such as verbal fluency, memory, attention and information processing.[7,8] Their results further revealed that long time former smokers and those who never smoked had no significant difference in the decline of cognitive function[7, 8, 9,10] whereas regular and current smokers showed significantly greater cognitive impairment compared with those who never smoked regardless of sex differences.[10,11] The mechanism as to why smoking influences the level of cognitive impairment remains unclear, but researchers have hypothesized that smoking is an important risk factor for vascular diseases and could influence executive function via vascular pathways.[12] Other researchers hypothesized that smoking was independent of cardiovascular integrity and was found to be associated with periventricular and subcortical white matter lesion progression.[13]

Like smoking, greater alcohol consumption was associated with higher level of cognitive impairment. This was consistent with other studies. Heavy drinking patterns, both chronic and episodic, could result in severe impairments of the nervous system including brain function.[14] Further, chronic heavy drinking and alcohol-dependent individuals showed impairment of cognitive function, learning and memory, as well as personality changes.[3, 15] Cognitive decline in these individuals showed irreversible neurological impairment associated with brain damage, including atrophy of nerve cells and brain shrinkage[16] in cortical and subcortical regions and the hippocampus.[14,16] On the other hand, less alcohol drinking was associated with less cognitive impairment,[14] though other studies stated that moderate drinking may have a protective role against dementia especially among older adults.[17,18]

The ability to care for oneself through acts of daily living is already one measurement of cognitive status. It is apparent that the higher the daily functions of a person, the lower are the chances that the subject will have cognitive impairment. This study showed how important it is to maintain physical functioning and independence as they were associated with good cognitive functioning. There are numerous researches that support the premise of physical function disturbances preceding the onset of cognitive impairment[19,20,21,22] regardless of the presence of any muscle degeneration associated with dementia.[5] Impairment of such physical functioning such as walking to and getting up from a chair unassisted contributes to greater disabilities later in life and poor cognitive performance.[15] Good physical function preserves muscle mass and prevents cognitive deterioration.[8,23,24] Other studies however, hypothesize that the relationship of physical function and cognitive decline are bidirectional, cause-effect in nature or share etiological pathogenesis with sarcopenia and dementia via sex hormone decline or cytokine activation.[25,26,27,28,29] This is consistent with the results of this study, which show that physical functioning and self-care influence cognitive impairment, and not the other way around.

Finally, the last variable found to have a significant influence on cognitive impairment is religion. In this study, subjects were dichotomized into Roman Catholics and non-Roman Catholics. Although most of the respondents are affiliated with Catholicism, this study did not determine the level of their commitment, practice, participation, or adherence to Catholicism and their contribution to the decline or stability of one's cognitive status. Religion, viewed as a social affiliation, imposes rules, sanctions, and rewards that may be related to MMSE scores. Religious affiliation does not automatically necessitate active participation. Previous studies have shown that religious attendance is a demonstration of physical capability and social engagement, which were found to have an inverse association with cognitive decline.[30] Moreover, religious attendance is particularly helpful in elderly as well as the depressed women as it may offer mental stimulation.[31] Engaging in social and intellectual leisure activities is related to better ability to cope with pathological changes[32] in the brain that leads to efficient cognitive networks that delay manifestation of cognitive difficulties.[3,31] The non-Roman Catholics may have an advantage over the Roman Catholics along this line for they have more varied social interactions during church rites and activities.

Results show no significant relationship between sociodemographic parameters (age, sex, educational attainment, monthly income, family type, and occupation) and cognitive impairment. In addition, gender bias toward the female was seen. This may have been due to the fact that females have a longer life span than males or that they are the ones who mostly stay at home and were the ones interviewed. Studies have found that age, lower educational background, previous depression, social relations

and functional disability[33] are factors that lead to cognitive impairment. Sex, race and educational level are also said to be associated with cognitive performance with sex differences being secondary to educational disparities among elderly males and females.[9] Cognitive impairment is however a conglomerate of biological, physical and functional factors coupled with psychological and social aspects as well.[33] Though the respondents may be of the older age group, lower educational/socioeconomic background, their physical and functional scores indicate that they are very much independent. As previously stated, the ability to care for self is already a measure of good cognitive ability. So despite age and the other socioeconomic factors, their physical and functional capabilities relate more to their cognitive prowess than the other stated parameters.

Previous studies have indicated that medical comorbidities, such as chronic kidney disease,[34] chronic obstructive pulmonary disease,[35] cardiovascular disease,[36] and chronic heart failure[37] significantly worsen cognitive performance. Our study did not find any significant relationship between any of the chronic diseases and cognitive impairment. A Philippine-based study in 2009 supports this finding. These results have been attributed to inherent genetic differences that influence the manifestation of such illness. This individual predisposition to chronic illness explains the lack of correlation.[6] Aside from that, duration of exposure to these diseases and compliance to maintenance medications were not assessed. The relative acuteness or chronicity relates highly to disabling cognitive functions as the time it takes for the disease to heal or progress dictates much of a person's overall functionality.[38] This goes hand-in-hand with adherence to maintenance medications. Non-compliance to maintenance medications may imply a poorer physical and cognitive prognosis. On the other hand, prolonged exposure to medications such as anticholinergics,[39,40] narcotic agents, antidepressants, anticonvulsants, and benzodiazepines, coupled with polypharmacy are more commonly related to manifestations of delirium and dementia.[40]

Our results show that depression does not have any significant relationship with mental decline. Depression, as well as anxiety, sometimes triggers reversible cognitive impairments in the elderly, especially those who are more vulnerable.[36] Vulnerability as well as reversibility of cognitive impairment is highly dictated by genetic coding.[6] Hereditary diseases, as well as history of depression, have not been taken into account in this study.

Perceived social support, taken as the emotional component of social support, was not found to significantly influence cognitive change, mortality and survival time.[41] Three mechanisms have been conceived to account for the effect of social support on cognition: (1) physical activation through living a socially active lifestyle (e.g. leaving the house more often to meet friends); (2) cognitive stimulation through social interaction; and (3) positive emotions caused by perceived social support, which may decrease stress levels. None of the three components have significant influence on cognitive change.[41] In contrast, when controlled for adequacy of emotional support, lack of social integration has a significant negative influence,[25] indicating that social support does not have an influence on cognitive change, but that cognitive change influences social support.[42]

This study was conducted in a single urban setting which might not represent the population of geriatric individuals. Rural dwelling respondents as well as specific population representing the various social stratifications can be included in future studies. Even though the MMSE can adequately detect the presence of cognitive impairment, it cannot describe specifically all the aspects of a person's cognitive function. False negative or positive results are also affected by the patient's educational background such that the level of literacy greatly affects the outcome. Adjustments for educational background were not done, and this may have affected the results. Therefore, adjustments for educational competence for MMSE testing are suggested. The presence of mood disorders and history of depression were not investigated. Only present depression was taken into consideration. These can significantly affect the MMSE scores in a phenomenon called pseudodementia.[6] Future studies should take into account a more in depth psychological profile of the respondents. Duration of the chronic diseases and compliance to maintenance medications were also not measured. Both are significant factors in patient outcome and should be included in future research. History of familial diseases was also not taken into account. Although this could give a hint on the respondent's genetic make-up, recall bias is also possible. Future researches are recommended to take this aspect into consideration.

Despite several previous studies implicating chronic diseases with cognitive impairment, lifestyle factors such as smoking and alcohol intake were found to be more significantly related with cognitive impairment. Religion and ability to care for self also related significantly with cognitive impairment. Collectively, these factors are strong predictors of cognitive impairment.

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A cross-sectional study on the sexual knowledge and practices, and attitudes towards sex education of public high school students in Parañaque City and Maragondon, Cavite

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Abstract

Introduction This study aimed to describe the knowledge, attitude and practices regarding sexuality and reproduction among students in public high schools in an urban and rural setting.

Methods This was a cross-sectional study involving high school students from two public schools in Paranaque City and Maragondon, Cavite. Respondents answered a questionnaire on sexual knowledge and attitude towards sex education, and sexual practices. Results were described using proportion. Chi-square was used to identify significant differences in the two groups and prevalence odds was used to determine association between variables.

Results Sexual knowledge was significantly higher in the rural group and the major source of knowledge came from the internet. Most of the participants had a positive attitude towards sex education. Only a small percentage engaged in sex, most of which were from the urban area. Engagement in sexual practices was brought about by curiosity and the most commonly used form of contraception was withdrawal. Condom use was higher among the rural participants.

Conclusion Sexual knowledge was high and attitudes toward sex education were positive. A small percentage of respondents engaged in sex. There were differences between the urban and rural groups in terms of knowledge and use of contraceptive methods.

Key words: Sex education, sexual knowledge, high school, sexual attitude, sexual practices

Many adolescents are very much aware of the different aspects of sexuality and sexual behaviors as early as the onset of puberty. As they mature from puberty they become more engaged in exploring their sexuality. According to the 2002 Young Adult Fertility and Sexuality (YAFSS 3),[1] the average age of sexual debut was 18 years among youth 15 to 24 years old. The median age of first sexual intercourse among women 15 to 49 years old was 21.5 years based on the 2008 National Demographic and Health Survey (NDHS). In addition, 2.1% of women aged 15 to 19 had their first sexual intercourse at age 15. The earlier age of

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initiation of sexual activity, which oftentimes takes place without adequate protection, is detrimental since it poses a higher risk of unintended pregnancy which in turn leads to a hasty marriage or abortion.[2] Health and mortality risks are significantly higher for both mother and baby in teenage pregnancies. Early entrance into family life as a result of teen pregnancy may result in early termination of formal education, limited employment opportunities, financial difficulties and marital conflict.[3] Young unmarried mothers also face social stigmas that may have harmful psychological and social impact.[4] Another aspect of teenage sex is the increased risk of sexually transmitted infections (STIs).

According to a survey by the United Nations Population Fund (UNFPA), teenage pregnancies in the Philippines surged by 70 percent from 114,205 in 1999 to 195,662 in 2009. UNFPA also reported that in the ASEAN region, the Philippines has the third highest teen pregnancy rate and is the only country in the region where the rate is increasing.[5] Owing to the health consequences, adolescent sexual behavior is certainly a growing concern.

Sexual activity in the Philippines begins in the late teenage and for some even pre-teenage years, and attitudes about gender roles, sexual activity and family planning are likely to be formed during these early years. By determining the level of knowledge and behavior on sexuality, and attitude towards sex education of high school students, this study may be useful in planning information, education and counseling programs for adolescents and for developing services for teenagers. This study may also be instrumental in the proper guidance of teenage students in adolescent sexuality to prevent the hazards associated with premature initiation of sexual activity.

The general objective of this study was to describe the knowledge and practices regarding sexuality and reproduction, and the attitudes on sex education of public high school students in the urban and rural settings. Specifically, the study aimed to determine: (1) sources of sex information; (2) differences in the sexual knowledge and practices, and attitudes towards sex education between high school students in the urban and in the rural areas and; (3) if sexual knowledge affects the sexual practices of the students.

Methods

This was an analytic, cross-sectional study which used a self-administered questionnaire to obtain data on knowledge of sex and attitudes towards sex education, and an interviewer-assisted questionnaire to determine the sexual practices among high school students from two public schools in urban (Parañaque City) and rural (Maragondon, Cavite) settings. The study was approved by the Ethics Review Committee. Permission was obtained from the proper school authorities.

Students 13 to 16 years old enrolled in two public chosen by convenience sampling were recruited. Students who were mentally and physically incapable, who were not willing to participate or had participated in the pilot study were excluded. Respondents were chosen by simple random sampling. The computed sample size was 170 based on a proportion of 81.2 and a standard error of 7.2 from a study by Raja[7] and a 95% confidence level.

A three-part self-administered questionnaire was used to obtain data on demographic characteristics (Part I), knowledge of sex (Part II) and attitude towards sex education (Part III). Parts I and II were adapted from the questionnaire used by Raja[6] and Part III was adapted from the study by Majova.[7] The first part consisted of items on sex, type of family, family income religious affiliation and source of information. The knowledge portion consisted 30 multiple-choice type items with only one correct answer covering reproductive anatomy and physiology, pubertal changes, certain aspects of sexuality, masturbation, intercourse, pregnancy, contraception and STI. Part III consisted of 10 positive statements and 10 negative statements statements intended to assess the attitudes towards sex education.

An interviewer-assisted questionnaire (Part IV) adapted from a study by Ichwanny[8] was administered to determine the sexual practices of the students. It asked if the participants have had a relationship and at what age; engaged in holding hands, kissing or touching private parts; engaged in sex and at what age, if a contraceptive was used and what type and if intercourse resulted in pregnancy or abortion.

The questionnaire was translated to Filipino and back-translated for validity. Prior to actual survey, a pilot study was conducted on 20 randomly selected subjects who met the inclusion criteria to ensure comprehension, clarity and suitability of questions to local conditions. The questionnaire was modified based on the results of the pilot study.

Parental consent forms were given out by class advisers to 120 students in Parañaque City and 140 students in Maragondon, Cavite. The consent forms were continuously given out to randomly selected students until the sample size of 85 per school was completed. On the actual test day, students were gathered in one room, asked to sign an assent form, and the researchers with the advisers facilitated test administration of parts I-III of the questionnaire. Survey procedures were designed to protect student privacy by allowing for anonymous participation.

Part IV of the questionnaire was interviewer assisted. One-on-one (male to male and female to female) interview with the participants was done. Prior to the interview, researchers standardized the delivery of interview by reading the questionnaire as is and doing mock interviews. Researchers also underwent desensitization strategies to minimize judgement or uncomfortability in discussing the topic. Participants were also constantly reminded of the confidentiality of the results.

The knowledge score was the number of correctly answered items. A respondent was considered to have adequate knowledge if he/she answered 60% or more of the items correctly. A respondant was considered to have a positive attitude if his/her score was more than the mean score for Part III and a negative attitude towards sex education if his/her score was below the mean score. Descriptive statistics were used to summarize the demographic characteristics of the respondents. Proportion and percentage were used to obtain the demographic profile of the participants and determine the sources of sexual knowledge of the participants. Proportion and percentage were also used to describe the sexual knowledge and practices of the participants, and their attitudes towards sex education. Chi square was used to test for a significant difference between the sexual knowledge and practices, and attitudes towards sex education of participants from urban and rural areas. The significance was set at $P \leq 0.05$. Prevalence odds ratio was also computed to determine the association of sexual knowledge and practices, and attitudes towards sex education with the geographical location of the students. Chi square was also used to find a significant difference between the sexual knowledge and sexual practices. The level of significance was set at $P \leq 0.05$. Prevalence odds ratio was also computed to determine the association between the two.

Results

Eighty-five high school students each from Parañaque City (urban) and from Maragondon (rural) were included in the study. There were more females in both groups. The age mode in both groups was 15 years. Majority came from nuclear families, with a higher percentage in the rural group (76.5% vs 62.4%). More respondents had a family income above the poverty line in both groups. More than 60% of both groups were Catholic. The details are shown in Table 1. The top three sources of information for both urban and rural groups were: internet, parents and friends as seen in Figure 1.

Majority of the respondents from both groups had adequate sexual knowledge, with a higher percentage in the rural group (77.6% vs 62.4%); the difference was significant (POR = 0.47, P = 0.30) as

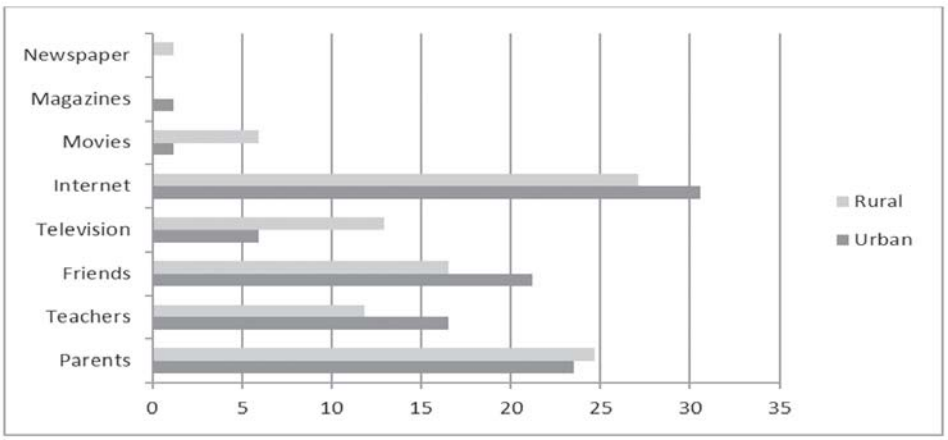

Figure 1. Sources of sexual knowledge among urban and rural participants.

seen in Table 2. The topics with the highest proportion of adequate knowledge for both groups were "contraception" (rural 98.8%, urban 88.2%) and "reproductive anatomy and physiology" (rural 92.9%, urban 70.6%). At least 50% of respondents had adequate knowledge in the other topics except "pregnancy" which had the lowest percentage of adequate knowledge in both groups (rural 36.5%, urban 28.2%). The difference between the urban and rural groups was significant for "reproductive anatomy and physiology" (POR = 0.18, P < 0.01) and "contraception" (POR = 0.09, P < 0.01). The details are seen in Table 2. Table 3 shows that majority of the participants in the rural group (63.5%) had a positive attitude towards sex education while a slight majority had a negative attitude in the urban group (50.5%).

Table 1. Demographic characteristics of urban and rural participants.

Demographic Variable	Category/Interval	Urban n (%)	Rural n (%)
Sex	Male	40 (47.1)	42 (49.4)
	Female	45 (52.9)	43 (50.6)
	Age 13 yrs	17 (20)	14 (16.5)
	14 yrs	22 (25.9)	15 (17.6)
	15 yrs	29 (34.1)	31 (36.5)
	16 yrs	17 (20)	25 (29.4)
Type of family	Nuclear	53 (62.4)	65 (76.5)
	Extended	21 (24.7)	11 (12.9)
	Single parent	11 (12.9)	9 (10.6)
Family Income	Below poverty line (≤P5000)	33 (38.8)	33 (38.8)
	Above poverty line(>P5000)	52 (61.2)	52 (61.2)
Religious Affiliation	Catholic	63 (74.1)	64 (75.3)
	Protestant	0	5 (5.9)
	Iglesia ni Kristo	7 (8.2)	0
	Born Again	12 (14.1)	10 (11.8)
	Muslim	0	1 (1.2)
	Others	3 (3.5)	5 (5.9)

Table 2. Sexual knowledge of urban and rural participants.

Sexual Knowledge Topics		URBAN n(%)	RURAL n(%)	POR	CI	P-value
Overall knowledge	Adequate	53 (62.4)	66 (77.6)	0.48	0.24, 0.94	0.03
	Inadequate	32 (37.6)	19 (22.4)			
Reproductive Anatomy and Physiology	Adequate	60 (70.6)	79 (92.9)	0.18	0.07, 0.47	< 0.01
	Inadequate	25 (29.4)	6 (7.1)			
Puberty	Adequate	50 (58.8)	47 (55.3)	1.16	0.63, 2.12	0.64
	Inadequate	35 (41.2)	38 (44.7)			
Masturbation	Adequate	50 (58.8)	47 (55.3)	1.16	0.63, 2.12	0.64
	Inadequate	35 (41.2)	38 (44.7)			
Intercourse	Adequate	55 (64.7)	51 (60)	1.22	0.66, 2.28	0.53
	Inadequate	30 (35.3)	34 (40)			
Pregnancy	Adequate	24 (28.2)	31 (36.5)	0.69	0.36, 1.31	0.25
	Inadequate	61 (71.8)	54 (63.5)			
Contraception	Adequate	75 (88.2)	84 (98.8)	0.09	0.01, 0.71	< 0.01
	Inadequate	10 (11.8)	1 (1.2)			
STD	Adequate	53 (62.4)	53 (62.4)	1.00	0.54, 1.86	1.00
	Inadequate	32 (37.6)	32 (37.6)			

Majority of respondents from both urban and rural groups had a relationship (64.7% vs 70.6%) and held hands (58.8% vs 55.3%) but a minority in both groups engaged in other more intimate practices. Less than a quarter of both broups engaged in sex and the proportion was lower in the rural group (14.1% vs 21.2%) but the difference was not significant (P=0.23). The details are shown in Table 4. The mean age of the participants when they had their first relationship was 13 years for both the urban and rural areas with 9 years being the youngest for the urban adolescents and 10 years for the rural group. The mean age when they first engaged in sexual intercourse was 14 years with the youngest being 13 years for both urban and rural groups.

The most common reason for engaging in sex was curiosity in both groups and the percentage was slightly higher in the rural group.More participants from the rural group were forced by their partner. Four participants from the urban area mentioned love as the reason for engaging in sex (Figure 2). The most common form of contraception used by adolescents from urban area was withdrawal while the use of a condom was the most common form used by rural participants (Figure 3). None of those who engaged in sexual intercourse resulted in pregnancy.

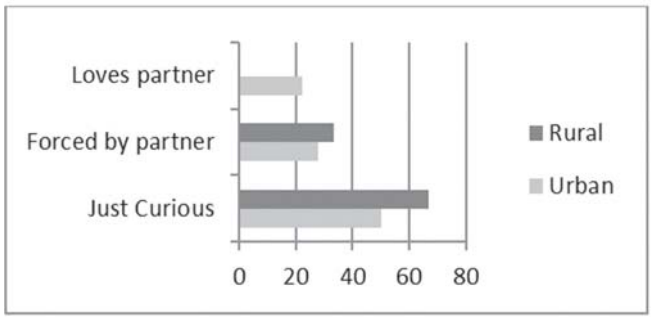

Figure 2. Reasons for engaging in sex among urban and rural participants.

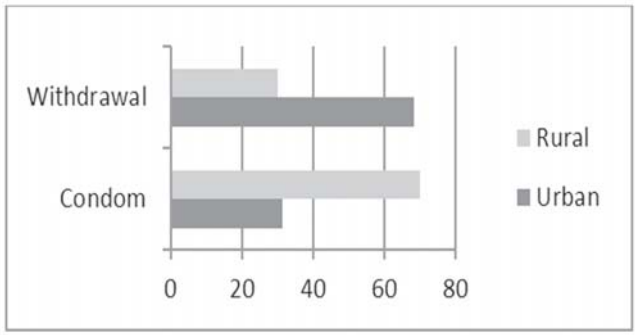

Figure 3. Contraceptive use among urban and rural participants.

Table 3. Attitudes towards sex education of urban and rural participants.

Attitudes towards Sex Education	URBAN n(%)	RURAL n(%)	POR	CI	P-value
Positive	42 (49.4)	54 (63.5)	0.56	0.30, 1.04	0.06
Negative	43 (50.5)	31 (36.5)			

Table 4. Sexual practices of urban and rural participants.

		URBAN n(%)	RURAL n(%)	POR	CI	P-value
Had a relationship	Yes	55 (64.7)	61 (70.6)	0.72	0.38, 1.38	0.32
	No	30 (35.3)	24 (29.4)			
Held hands	Yes	50 (58.8)	47 (55.3)	1.16	0.63, 2.12	0.64
	No	35 (41.2)	38 (44.7)			
Kissed lips	Yes	28 (32.9)	30 (35.3)	0.90	0.48, 1.70	0.75
	No	57 (67.1)	55 (64.7)			
Engaged in touching of private parts	Yes	22 (25.9)	17 (20)	1.40	0.68, 2.87	0.36
	No	63 (74.1)	68 (80)			
Engaged in sex	Yes	18 (21.2)	12 (14.1)	1.63	0.73, 3.65	0.23
	No	67 (78.8)	73 (85.9)			

The probability that a respondent with adequate sexual knowledge would engage in sexual practices is around half the odds of a participant with inadequate knowledge engaging in sexual practices (POR = 0.58). The probability is even lower among the urban teenagers (POR = 0.39) but increased in the rural participants (POR = 1.52) as seen in Table 5. The differences were not significant.

Discussion

There are numerous sources of knowledge about sex are and are not limited to in-school sex education. According to the results, the primary source of sexual information of participants both from urban and rural setting came from the internet followed by parents and then peers. The internet may be the main source because it offers access to information in a convenient and confidential way. It is a valued information source of sensitive health issues for adolescents today because first, adolescents can easily access this medium. Second, the internet offers adolescents a confidential and less threatening way to get information that might otherwise be difficult or compromising to obtain. Third, the interactive nature of the Internet can provide adolescents "personalized" information. With this medium, an adolescent can enter data on his or her specific concerns and receive individualized advice.[9]

All of the participants were still living with their parents, this indicating that parents had a big influence in their lives. However, Luwaga[10] found that not all parents are open to providing sexual information to their children for fear that it may arouse curiosity and lead the adolescent to do risky sexual behavior. Other parents think they are not prepared to provide sexual information to their adolescents therefore, they avoid the topic and rely on teachers to provide their child the right information as they believe they are more equipped and trained to teach.

The influence of peers has a significant part since most of the time they are together in and out of school. Ichwanny[8] noted that adolescents are affected by peer pressure since they seek to be accepted by their peers. Thus, adolescents take into serious consideration their peers' perspective. This is reflected in the result as peers were the third most common source of sexual knowledge.

The results also show that majority of the respondents had adequate sexual knowledge, consistent with the findings of Raja[6]. The results also showed a significantly higher level of sexual knowledge of adolescents from rural area, a finding different from that of Chaves which showed that urban young adults out number their rural counterpart due to easier access to the movies and videos of the internet.[11] Correlated with internet as the main source of information, this implies that the internet has reached the rural areas.

Majority of the respondents had adequate knowledge of reproductive anatomy and physiology, puberty, masturbation, intercourse, contraception and sexually transmitted diseases; this was consistent with the 2008 NDHS findings that knowledge of contraceptive methods was high among young women, with 96.3% of 15 to 19 year olds and 99.2% of 20 to 24 year olds having heard of modern methods of contraception.[12] However, majority of the respondents had inadequate knowledge on pregnancy.

Table 5. Association of sexual practices with sexual knowledge among urban and rural participants.

Sexual practices	Sexual knowledge		POR	CI	P value
	Adequate	Inadequate			
	All participants		0.58	0.26, 1.31	0.19
Yes	18	12			
No	101	39			
	Urban		0.39	0.14, 1.13	0.08
Yes	8	10			
No	45	22			
	Rural		1.52	0.30, 7.61	0.61
Yes	10	2			
No	56	17			

This may be one of the explanations for a high rate of teenage pregnancy in the Philippines. According to World Bank, the Philippines is among the top 10 countries where teenage pregnancies are on the rise. Seven out of every 10 pregnant women are teenagers, often younger than 19 years old.[13]

Adolescents from the rural area had significantly higher knowledge on reproductive anatomy and physiology, and contraception. This may be because participants from the rural area had more reliable sources of knowledge than the respondents from the urban area. According to Chaves, rural children were more reliant on their teachers and the mass media for their knowledge, while urban children were more reliant on word of mouth from their own peers and also the mass media.[11]

The study showed that the respondents were engaging in premarital sex at an earlier age compared to the 2002 YAFSS which showed that the average age of sexual debut was 18 years.[1] The results showed that 21% of the respondents from the urban area and 14% from the rural had engaged in sexual intercourse. This was consistent with the findings of Sandoval.[14]

More respondents from the urban area had more intimate the sexual relations than their rural counterparts. According to Sandoval, adolescents and young adults in urban cities are exposed to cosmopolitan life and consequently receive more information on sex and sexuality. Youth in small towns have narrower and more restricted ideas on sexuality, because of the family's and Church's strong control and influence.[14]

Most of the participants who have engaged in premarital sex said that their reason was curiosity. Among the respondents, 55% said that it was something they did not plan, but they went along with it while 43% said that it was something that they wanted to happen at that time. According to the YAFSS 2002, the majority of those who had premarital sex said the first sexual encounter was a spontaneous event.[1] The second reason for engaging in sexual intercourse was being forced by their partners, which may indicate that there are a lot of sexual abuse occurring. This was similar to the findings of other studies among women 15 to 23 years old.[15, 16]

Withdrawal was the most common contraceptive method among urban teenages compared with the use of a condom for their ural counterparts. This was consistent with the findings of a WHO report.[12] Contraceptive practices of Filipino adolescents are greatly affected by social norms, values, and traditions. Religion is one of the major influences in the formation of the norms and values of Filipinos. The conservative teachings of the Catholic Church forbid the use of artificial or the modern contraceptive methods.[17] This considerably contributes to the low level of contraceptive practice among Filipino adolescents, particularly those from the urban areas based from the results of the study. Low rates of condom use among the urban participants may also be attributed to the stigma of buying a condom, a process which involves asking the clerk in a crowded pharmacy for the condoms, publicly signalling that the buyer is intending to engage in sexual relations.[18]

Although none of the participants who engaged in sex resulted in pregnancy or abortion, adolescents from the urban area are more at risk for teenage pregnancy and sexually transmitted diseases because of their risky sexual behavior. Adolescents from the rural area are more protected because of most of them use a condom.

In the results, majority of the participants had a positive attitude towards sex education in accordance with the results of Majova[7] which showed that 55% of the participants have a positive attitude towards sex education. However, more participants from the rural area had positive attitude than those from the urban setting contrary to the findings of Majova. The disparity of the results from previous literature may be because urban and rural students now have same exposure to the internet and social media. Rural students were even shown to have higher level of sexual knowledge than the urban students.

As observed from the data, the more adequate the knowledge of the adolescents in the rural areas the more likely they were to engage in sexual practices. Aside from the finding that students with adequate knowledge engaged more in sexual practices, more students in the rural area practiced safer sex as supported by higher number of students using condoms in the rural area. This can be related to the finding that there were more subjects in the rural group who engaged in sexual intercourse who were more knowledgeable on contraception, the transmission of STIs and other repercussions of engaging in unprotected sex. In contrast, results in the urban population revealed that the more inadequate the sexual knowledge was the more they

engaged in more risky sexual behaviors that increased the risk of teenage pregnancy and sexually transmitted infections.

The major source of sexual knowledge of the respondents from urban and rural setting was the internet. Sexual knowledge was higher in the rural group as compared to the urban group, specifically on reproductive anatomy and physiology and contraception. Sexual attitudes and practices toward sex education of both urban and rural teenagers were not significantly different. The primary reason for engaging in sexual practices was curiosity in both settings. With regard to sexual practices, those from the urban group who had had sexual intercourse only used withdrawal as contraceptive while most from the rural group used a condom.

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A double-blind placebo-controlled quasi-experimental trial of the effectiveness of *Moringa oleifera (malunggay)* as an adjunct to standard medications compared to standard medications alone for the relief of pain in patients with osteoarthritis or rheumatoid arthritis

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Abstract

Introduction Despite numerous studies on *Moringa oleifera* (malunggay*)* there is no current literature to support its therapeutic benefits as an anti-arthritic agent. This study aimed to determine the effectiveness of malunggay as an adjunct to standard medications for the relief of pain of osteoarthritis and rheumatoid arthritis.

Methods This was a non-randomized, double-blinded placebo-controlled quasi-experimental trial on patients with osteoarthritis or rheumatoid arthritis. The experimental group was given malunggay capsules for one week while the control was given a placebo on top of their usual medications. Pain scores, measured with a numerical rating scale, were compared within groups before and after treatment and between groups. Treatment success was also compared between groups.

Results Sixteen subjects, consisting of seven in the treatment group and nine in the control, were enrolled in this study. Both control (0.78, P = 0.05) and malunggay (2.14, P = 0.04) groups experienced pain relief after one week but the difference was significant in the malunggay group. The mean difference in pain relief between the two groups was not significant. The success rates for both groups was similar (RR = 1.03).

Conclusion The findings do not support the effectiveness of *M. oleifera* as an adjunct to standard pain medications for osteoarthritis or rheumatoid arthritis. It needs to be tested further and cannot be recommended at this time.

Key words: Pain, Malunggay, Arthritis

Rheumatic diseases are a major health concern in the Philippines due to its high prevalence: 4.1% for osteoarthritis (OA) and 0.17% for rheumatoid arthritis (RA). They affect an estimated 3.76 million and 150,000 Filipinos respectively.[1] Arthritis or rheumatism ranked first among the most common causes of disability worldwide according to Centers for Disease Control and Prevention report in 2009,[2] accounting for an increase in years of life lost to disability (YLD), and direct and indirect costs. The guidelines for the management of OA and RA

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include the use of both pharmacologic and non-pharmacologic treatment modalities with pain relief as the primary goal.[7] Pharmacologic treatment for OA utilizes oral or topical analgesics, opioids, and intra-articular injections depending on the level or severity of pain.[8] Management of RA involves the use of combined disease modifying anti-rheumatic drugs (DMARDs) accompanied by short-term glucocorticoids. These treatments provide symptomatic relief and slow down or halt the disease progression but do not provide cure. The increase in dosage and addition of drugs to address the severity of symptoms over time is directly proportional to the progression of the disease, multiplying the risk for toxicity among the elderly who comprise majority of RA and OA cases.

With this in mind, a locally available herbal preparation *Moringa oleifera* (malunggay), which has anti-inflammatory properties, was utilized to determine if it has synergistic effect when added to standard arthritic treatment for reducing pain. However, many reports of malunggay's therapeutic benefits as an anti-arthritic agent have not been supported by placebo controlled clinical trials, nor have they been published in high-visibility journals. Current literature suggests limited knowledge in terms of dynamics and/or possible synergism of malunggay with standard anti-arthritic treatment. Furthermore, dosages and preparations of malunggay as an anti-inflammatory agent with analgesic properties have only been extensively tested in animals. The study's main objective was to determine the effectiveness of *Moringa oleifera* (malunggay) capsules for the relief of pain when used as an adjunct to standard medications for osteoarthritis or rheumatoid arthritis.

Methods

A double-blind, placebo-controlled quasi-experimental design was used to determine whether there will be significant difference in pain relief using malunggay capsules as an adjunct to standard medications compared with standard medications alone among adults with osteoarthritis or rheumatoid arthritis from selected clinics in Metro Manila. The study was approved by the Ethics Review Committee. Permission was obtained from the attending physician of the patients.

Patients previously diagnosed with osteoarthritis or rheumatoid arthritis aged 18 years old and above, with at least moderate pain (grade ≥ 4/10) based on the Numeric Rating Scale and undergoing standard anti-arthritic treatment were recruited from selected clinics in Metro Manila. Those who were pregnant, lactating or had psychological ineptitude were excluded. The computed sample size was seven for each group based on a 95% confidence level, 80% power, and SD = 2.

The researchers were randomly assigned to a particular type of treatment to be administered. Each researcher was blinded – he/she was not aware of the type of treatment assigned to him or her. Then these researchers recruited subjects from selected clinics in Metro Manila. Informed consent was obtained from eligible patients who agreed to join the study. Demographic data was obtained by interview and a baseline pain score was determined with the use of a Numeric Rating Scale (NRS). Those assigned to the experimental group were given 21 capsules containing 300 mg of malunggay while those assigned to control group were given 21 placebo capsules. Subjects were instructed to take three capsules a day for seven days. Each participant was sent an SMS during the mid-week to remind them about the 7-day trial. After the trial, each participant was followed up by a phone call for the end-of-treatment pain score.

Data analysis utilized the IBM SPSS Statistics 21.0 in the determination of mean and standard deviations of each variable. Independent t-test was done to compare the mean age and mean years diagnosed with osteoarthritis or rheumatoid arthritis. Fisher's exact test was done to compare the sex composition and type of arthritis. A Mann-Whitney U test was done to compare the mean baseline pain scores. Comparison of the baseline and endpoint pain scores of each group using the Wilcoxon Signed Rank test was done to determine whether there is a significant decrease in pain after one week. The difference in pain scores of each group was also compared using independent samples t-test to determine if there was a significant difference in the pain scores between the two groups. Lastly, the treatment outcomes between the two groups were compared using the Fisher's Exact test and the relative risk was computed to determine if the malunggay capsules were beneficial for pain relief.

Results

Sixteen eligible patients with either RA or OA were recruited; nine of them were assigned to the placebo

control group and the other seven, to the malunggay group. The mean age of the experimental group was 52 years while that of the control group was 56 years. All those enrolled in the experimental group and half of those in the control group were women. The subjects had been diagnosed with OA or RA for approximately three years. More than half of the malunggay group had RA while 2/3 of the placebo group had OA. The mean baseline pain score was higher in the experimental group (6.3 vs 4.3). There were no significant differences between the experimental and control groups except for the baseline pain scores as seen in Table 1. A comparison of medications taken is shown in Table 2.

There was a significant decrease in mean pain scores from the baseline in the malunggay group (2.14, P = 0.04, Wilcoxon signed rank) but not in the placebo group (0.78, P = 0.05, Wilcoxon signed rank) as seen in Table 3. The decrease in mean pain scores between the malunggay and placebo groups was not significant (P = 0.16). There was no significant difference in terms of treatment success between the malunggay and placebo groups (RR = 1.03, P = 1.0, Fisher's exact) as seen in Table 4.

Table 1. Baseline characteristics of malunggay and placebo groups.

Characteristics	Malunggay Group (n=7)	Placebo Group (n=9)	P-value
Age	52.3 (11.69)	5 6.2 (9.67)	0.47*
Sex			
Male	0	4	0.09**
Female	7	5	
Years diagnosed with arthritis	3.6 (3.88)	3.2 (2.71)	0.86*
Type of arthritis			
Osteoarthritis	3	6	0.62**
Rheumatoid arthritis	4	3	
Baseline pain score	6.3 (1.70)	4.3 (0.71)	0.03***

* Independent t-test
** Fisher's exact test
*** Mann-Whitney U test

Table 2. Medications taken by malunggay and placebo groups.

	Malunggay	Placebo	P value
Paracetamol	2	2	0.39*
NSAIDs	5	5	
Cox-2	1	2	
Opioid	2	0	
Others	0	3	
DMARDs	4	4	
Monotherapy	3	4	1.00**
Combination	4	5	0.66***

Table 3. Summary of pain scores of malunggay and placebo groups.

Groups	Baseline Pain Score, Mean ± SD	End point Pain Score, Mean ± SD	P-value*	Difference	P-value*
Malunggay	6.3 ± 1.70	4.1 ± 2.67	0.04	2.2	0.16
Placebo	4.3 ± 0.71	3.6 ± 1.33	0.05	0.7	

* Wilcoxon signed rank test

Table 4. Comparison of treatment outcomes between malunggay and placebo groups.

Group	Treatment Success	Treatment Failure
Malunggay	4	3
Placebo	5	4

RR = 1.03 (95% CI = 0.43, 2.45), p = 1.00, Fisher's exact

Discussion

The group that took malunggay capsules for seven days had significantly decreased the pain compared to the placebo group. The significant decrease in pain in the experimental group may have been due to their higher baseline pain scores as a result of non-randomization of the subjects. Another factor for the difference in baseline pain scores may have been the medications being taken: two malunggay group subjects were taking opioids in addition to NSAIDs compared to the lower strength pain relief medications being taken by subjects in the placebo group. Since the subjects enrolled in the experimental group initially experienced more intense pain than those enrolled in the control group, it is more likely that they would experience greater pain relief than the control group at the end of treatment.

The mean difference in the decrease in pain scores between the two groups was not significant. In addition, the computed relative risk showed that there was no difference in the success rate of the malunggay and placebo groups. The wide confidence interval indicates that this is inconclusive. Despite previous animal studies suggesting an anti-inflammatory effect of malunggay extract and roots, the results of this study were not able to support the claim that malunggay, as an adjunct to standard medications, is effective in decreasing the pain of patients with osteoarthritis and rheumatoid arthritis.

The lack of statistical significance of the results in this study may be attributed to the study design. The lack of random assignment of subjects to either experimental or control group is a major weakness of the quasi-experimental study design because it did not sufficiently control important confounding variables which may have underestimated the true effect of malunggay on pain reduction.

Although the study design utilized in this research is not as powerful as the true experimental design in establishing causal relationship, this study still allows consideration of but does not rule in such relationship between the malunggay and pain reduction in patients with osteoarthritis and rheumatoid arthritis. Malunggay did not offer significant additional pain relief when added to the standards medications used for osteoarthritis and rheumatoid arthritis. The effectiveness of malunggay capsules as an adjunct in the relief of pain of osteoarthritis and rheumatoid arthritis needs to be tested further in a randomized clinical trial and cannot be recommended at this time.

Acknowledgments

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A cross-over trial of land and aquatic plyometric training on the improvement of vertical jump height among male students of the University of the East Ramon Magsaysay Memorial Medical Center

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Abstract

Introduction The study aimed to compare the effects of land and aquatic plyometric training on the vertical jump height measurement of male students.

Methods Twenty eight male participants were randomized into Groups A and B. Group A underwent land plyometric training for three consecutive weeks then after a 1-week washout period, the group shifted to aquatic plyometric training for another three consecutive weeks. Group B underwent aquatic plyometric training first before the land plyometric training. The plyometric training program consisted of split squat jumps, squat jumps, double leg tuck jumps and elevated skips, with the aquatic phase done in waist deep water. Baseline and weekly measurements of the vertical jump height before and after the cross-over were obtained using the Sargent jump test. The differences within and between the two groups were compared.

Results Both groups showed an increase in the vertical jump height measurement from the baseline before and after the cross-over. There was a significant difference between the baseline and post training measurements of Group A after cross-over ($P < 0.01$). Group B already showed a significant difference in the measurements after the first week of training before and after cross-over ($P < 0.01$).

Conclusion Aquatic plyometric training produced better results in increasing vertical jump height compared to land plyometric training.

Key words: land plyometric training, aquatic plyometric training, Sargent jump, crossover trial, vertical jump

Plyometric training is a system of high-velocity resistance training characterized by a rapid eccentric contraction during which the muscle elongates, immediately followed by a rapid reversal of movement with a resisted shortening contraction of the same muscle.[1] This is when a person performs strong and volatile movements which generate a large amount of force quickly. The aim of this kind of training is to produce a powerful contraction.[2] It has been used in sports and is regarded as a useful training tool for athletes who require dynamic, explosive types of movement such as in basketball.[3]

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Numerous benefits can be attained in plyometric training. Research has shown that athletes who use plyometric exercises are better able to increase acceleration, vertical jump height, leg strength, joint awareness, and overall proprioception.[4] It is also considered an effective mode of training as it enhances the power and contraction of the muscle. It also provides the opportunity to train specific movement patterns in a correct manner at a more functionally appropriate speed. This provides functional strengthening of the muscle, tendon, and ligaments specific to the demands of everyday activities and sports.[5]

A 7-week plyometric training program incorporating squat jumps, drop jumps, and jumping courses has been found to lead to significant gains in maximal isometric torque of the ankle plantar flexors. Also, by maximizing the force produced during the concentric phase of muscle contraction, plyometric exercises can increase joint stability and lower limb stability.[6]

Traditionally, plyometric training programs are done on land. However, it was found out that these land plyometric exercises cause muscle soreness and musculoskeletal injury.[7] Because of this, various studies modified this type of training to eliminate or minimize its adverse effects. Research has suggested that aquatic plyometric training may provide a safer and more effective alternative. This is explained by the buoyancy of water which reduces the impact on weight-bearing joints, thereby decreasing the risk of injuries.[8] Another explanation would be the resistance to movement resulting from the water's viscosity.[4]

The studies mentioned above show that both the land and aquatic plyometric training have their benefits. In line with this, the purpose of this study was to compare the effects of land and aquatic plyometric training on the vertical jump height of male students from the University of the East Ramon Magsaysay Memorial Medical Center. Specifically, the study aimed to determine the (1) difference in the vertical jump height before and after land plyometric training; (2) difference in the vertical jump height before and after aquatic plyometric training; (3) rate of change of vertical jump height in both study groups before and after cross-over and; (4) difference in vertical jump height between the two study groups.

Methods

This was a randomized cross-over trial comparing the effects of land to aquatic plyometric training with aquatic to land plyometric training on the vertical jump height of male students from the University of the East Ramon Magsaysay Memorial Medical Center done in a classroom (land plyometric training) and in a private pool (aquatic plyometric training). The study was approved by the Ethics Review Committee.

Subjects were recruited from among the male members of the Knights Club, a sports club in the university, by simple random sampling using a table of random numbers to determine potential participants. A blinded assessor determined their eligibility based on the following criteria: aged 17 to 21 years, physically fit as confirmed by a licensed physician, with 80 to 85% strength,[1] with range of motion 90 to 95%,[1] able to perform squat exercise 1.5 to 2.5 times their body weight,[9] and signed an informed consent. The following were excluded: those with musculoskeletal injury or skin infections; those with diagnosed cardiopulmonary conditions such as hypertension, congenital heart defect, rheumatic heart disease, asthma, bronchitis and emphysema; those with neurologic conditions; and those with hydrophobia. Those who met the criteria were randomized into group A or B using block randomization to assure equal representation in each group. This was done by dividing the participants into groups with four members each and assigning a specific pattern of enrolment as follows: Pattern 1: AABB; Pattern 2: ABAB; Pattern 3: ABBA; pattern 4: BABA. Those that were designated "A" were enrolled in Group A, and those labelled "B", in Group B. The sequence of enrolment started from patterns 1 to 4 until the computed sample size of 15 participants per group was achieved.

After completion of the target population, the vital signs and initial vertical jump heights were assessed through the Sargent jump test by a blinded licensed physical therapist. The Sargent jump test measured vertical jump height by computing the difference between the countermovement jump (M2) and the standing reach height (M1). The participants were asked to do warm up exercises for 5 minutes prior to the exercise proper. Group A proceeded to the land plyometric training program protocol while Group B proceeded to aquatic plyometric training program protocol. Sessions lasting 60 minutes were conducted simultaneously three times a week for three

weeks. After a one-week wash out or rest period, Group A underwent aquatic plyometric training while Group B underwent land plyometric training. Participants were asked to cool down for five minutes after each session. Plyometric training is a progressive series of exercises consisting of squat jumps, double leg tuck jumps, split squat jumps and elevated splits. The same exercises were done in waist deep water for the aquatic plyometric training. Both land and aquatic plyometric training were conducted by a licensed physical therapist based on guidelines set by the National Strength and Conditioning Association.[10] The land plyometric training was held in a classroom while the aquatic plyometric training was held in a private swimming pool.

The rate of change was obtained from the baseline vertical jump was measured using the Sargent jump test every week for each group before and after the cross-over to the other mode of training and analyzed using a paired t-test. Measurements of Groups A were compared with Group B.

Results

Thirty-one males were recruited and 28 who met the eligibility criteria signed the consent and started the plyometric training in their respective groups. Three participants dropped out due to conflicts in schedule and health reasons leaving 11 participants in Group A (land to aquatic) and 14 in Group B (aquatic to land). Table 1 shows that the baseline characteristics of the two groups are comparable.

There was an increasing trend in the vertical jump height from baseline to post-training in both land and aquatic phases of plyometric training in Group A. A significant increase in the vertical jump height was noted between the second and third weeks in both the land (3.38 cm, P = 0.02) and aquatic phase (1.94 cm, P < 0.01) of the plyometric training. The increase in the vertical jump height between baseline and post-training was significant in the aquatic phase (1.38 cm, P = 0.02) but not in the land phase (1.09cm, P = 0.15). These findings are reflected in Figure 1.

There was an increasing trend in the vertical jump height from baseline to post-training in both land and aquatic phases of plyometric training in Group B. There was a significant increase between baseline and the first week in both the aquatic (2.39 cm, P = < 0.01) and land (1.26 cm, P = 0.02) phases of plyometric training. The increase in the vertical jump height between baseline and post-training was significant in both the aquatic (1.9 cm, P = 0.01) and land (1.68 cm, P < 0.01) phases. These findings are reflected in Figure 2.

A more consistent increase was noted in both Groups A and B after the cross-over. The difference between the baseline before cross-over and the post-training vertical leap height was significant in both Group A (2.02 cm, P = 0.04) and Group B (2.76 cm, P < 0.01). The difference was bigger in the aquatic to land plyometric training group (2.76 vs 2.02 cm).

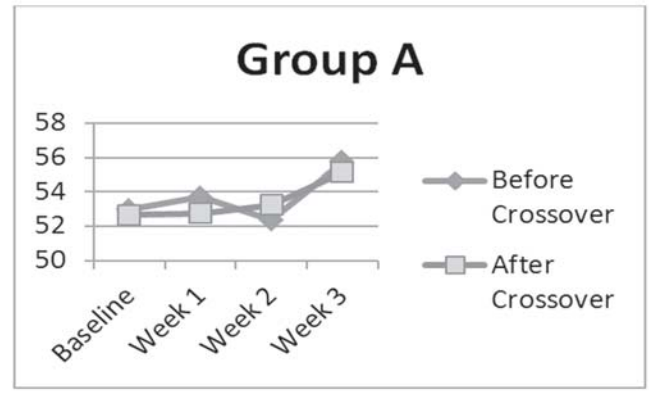

Figure 1. Mean performance of Group A (land to aquatic plyometric training) from baseline to 3rd week before and after cross-over.

Table 1. Baseline characteristics of 28 subjects randomized to Group A (land to aquatic) and Group B (aquatic to land).

Variable	Group A (n = 12) Mean ± SD	Group B (n = 16) Mean ± SD
Age (years)	18.3 ± 0.98	18.2 ± 1.32
Arm reach (m)	2.16 ± 0.07	2.12 ± 0.09
Height (cm)	172.69 ± 3.41	166.94 ± 7.25
Weight (kg)	65.25 ± 11.01	65.25 ± 8.54
Baseline vertical jump height (cm)	52.97 ± 7.92	50.04 ± 8.71

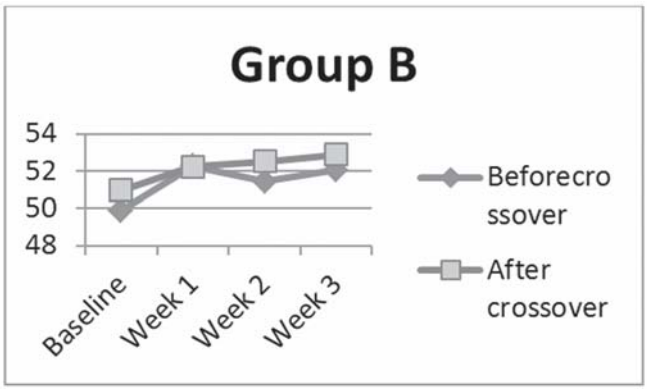

Figure 2. Mean Performance of Group B (aquatic to land plyometric training) from Baseline to 3rd week before and after cross-over.

Discussion

Our study found an increase in the vertical jump height in both groups before and after the cross-over, consistent with the results of Stemm[11] and Arazi[12] and other studies that used a 3-week training period.[13,14] The consistent increase in the vertical jump height in both groups after the cross-over is similar to the findings of Trost, who explained it in terms of better motivation after a change in environment.[15]

Both groups produced higher vertical jump height measurements, however, a bigger increase was noted in Group B, which underwent aquatic plyometric training before land plyometric training. This may be due to the properties of water, such as buoyancy and resistance, and its cold temperature, which help in improving the performance of the participants.[16, 17]

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Personal authors

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Chapter in a book

Selwyn AP, Braunwald E. Ischemic Heart Disease. In: Braunwald E, Isselbacker KJ, Petersdorf RG, editors. Harrison's Principles of Internal Medicine. New York: McGraw-Hill, 1987: 975-982.

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