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# Awareness of medical students of the Patient's Bill of Rights

Sheela Mae G. Tan, Hazael V. Tanael, Maria Angela C. Tanjuatco, Lyzka Camille G. Templonuevo, Eunice Grace D. Vallada, Yzabel N. Vergel de Dios, Joseph Louie M. Vicencio, Alyssa Nina T. Vilaga, Maria Isabela C. Vilela, Patricia Jan S. Villa, Vielka Z. Villanueva, Jesryph Flor A. Villegas, Fria Franchesca P. Vitug, Georgina T. Paredes, MD, MPH (Faculty Adviser)

## Abstract

**Introduction** Health care providers must develop awareness and understanding of the rights of patients in order to render quality care. The study aimed to assess the awareness of students of the College of Medicine of the Patient's Bill of Rights.

**Methods** Medical students selected by stratified sampling were asked to answer a questionnaire on patients' rights. Respondents with scores of at least 80% were considered "aware". The proportion of respondents who were "aware" was determined.

**Results** The results revealed that 84.6% of the respondents have >80% awareness level. More than 90% of the medical students sampled were aware of the right to choose a physician, followed by the rights to be shown respect, dignity, and consideration, to be provided healthcare service of best quality by skilled healthcare professionals, to be included in decisions and choices about one's care, and to religious assistance. Less than 70% were aware of the right of the unconscious or legally incompetent patient and right to access and transfer of care and continuity of care.

**Conclusion** More than 80% of medical students exposed to patients are aware of the Patient's Bill of Rights.

**Key words:** Patient's Bill of Rights, awareness, medical education

One of the main goals of health care providers is to provide all patients with high quality health care in a manner that clearly recognizes individual needs and rights.<sup>1</sup> To effectively accomplish this goal, the patient and the healthcare provider must work together to develop and maintain optimum health. As patients become more empowered with knowledge, they begin to judge health care providers on quality and outcomes.

Patient's rights are one of the important ethical issues that a healthcare professional should be aware

of. The Patient's Bill of Rights is a collection of rights which individuals have in the health care system and which healthcare providers are required to observe. However, according to studies, there seems to be a large gap between healthcare providers, patients and the general population in terms of awareness of patients' rights.<sup>2</sup>

To render quality care to patients, health care providers must develop awareness and understanding of the rights of the patients they care for. Observance of patient's bill of rights does not only protect the

patients from risk, but also shields the healthcare providers from the sanctions of law if errors occur. The Patient's Bill of Rights ensures that the rights and dignity of each person receiving medical services are respected and valued.<sup>3</sup> Health care providers must know these rights to be able to deliver excellent service to patients. This study aimed to assess the awareness UERMCCI medical students of the Patient's Bill of Rights.

Determining the awareness of patients' rights of medical students may be of benefit in establishing a formal ethics education for these future healthcare practitioners; this knowledge can help in designing curriculum and educational interventions that emphasize the improvement of student awareness regarding patients' rights. The results of the study will also provide an opportunity for conducting further investigations to enhance patient safety and quality of care, both at the level of beginning professionals such as medical students and of healthcare practitioners. Enhanced compliance of patients may also be achieved if they experience that their rights are well-protected which would ultimately result to better treatment outcomes.

## Methods

This was a survey of medical students who had any form of interaction (interview, physical assessment, intervention) with patients. Inclusion criteria included 1) enrollment in the College of Medicine of the University of the East Ramon Magsaysay Memorial Medical Center, Inc. for the school year 2015-2016 as a second, third, or fourth-year student, 2) an age of 20 years old and above. Those who refused to give consent for the study or refused to continue with the study after initial study enrollment were excluded.

The researchers used a stratified random sampling technique.<sup>4,5</sup> From a total of 1,065 eligible participants, stratification was done according to year level. Probability sampling was done to ensure that each member of the population would have equal chances of being a part of the sample. Slovin's Formula was used to determine a sample size of 382 respondents and the appropriate number for each year level.

The tool utilized in the study, which is composed of situations that measure the awareness on patients' rights, was developed through the triangulation of the 11 patients' rights from the Philippines, Turkey,

Europe, Israel, South Africa and Australia.<sup>6</sup> These include the right to 1) access and transfer of care and continuity of care, 2) good quality medical care, 3) be shown respect, dignity and consideration, 4) choose physicians and practitioners involved in the care, 5) be informed about services, treatment options, and costs in a clear and open manner, 6) be included in decisions and choices about the care, 7) informed consent, 8) religious assistance, 9) privacy and confidentiality, 10) the unconscious or legally incompetent patient, and 11) end-of-life care. The respondents were categorized as "aware" if their score was at least 80% of the highest attainable score, which is 20 points and "not aware" if their score was less than 80% of the highest attainable score.<sup>6</sup> The tool was devised in such a way that specific questions correspond to a specific patient right.

Instructions were given to respondents after they had given their informed consent. They were given sufficient time to answer the survey. The questionnaires with the responses were then gathered, collated, and subsequently analyzed by the researchers. Data collection was done over a span of four months. The proportion respondents who were aware of the Patient's Bill of Rights and for each specific right was computed using Microsoft Excel.

Informed consent was secured from all participants in the study. Anonymity was ensured using a coding system. Aside from general demographic data, no other personal information was collected from the respondents. The study was approved by the Ethics Review Committee.

## Results

A total of 382 medical students from 2nd to 4th year were included in the study. Two-thirds of respondents were female and the mean age of the respondents was 23.4 years (range 20 - 28 years) as seen in Table 1. More than 80% of respondents were aware of the Patient's Bill of Rights, with the sophomores having the highest percentage and the clinical clerks having the lowest percentage of "aware" respondents, as seen in Table 2.

Nine out of 10 second year respondents demonstrated awareness of the rights of a patient to: choose a physician, be provided health care service of best quality by skilled healthcare professionals, be shown respect, dignity and consideration, and be included in decisions and choices about one's care.

**Table 1.** Distribution of respondents per year level according to socio-demographic characteristics

Characteristics	2nd Year (n = 135)	3rd Year (n = 123)	4th Year (n = 124)	Overall (n = 382)
Sex				
Male	50 (37.0%)	39 (31.7%)	51 (40.8%)	140 (36.9%)
Female	85 (63.0%)	84 (68.0%)	73 (59.2%)	242 (63.1%)
Age (yr)				
Mean	22.4	23.3	24.2	23.4
Range	20-27	20-27	21-28	20-28

**Table 2.** Distribution of "aware" and "not aware" respondents per year level

Year Level	Aware No (%)	Not Aware No (%)
2nd Year	117 (86.7%)	18 (13.3%)
3rd Year	105 (85.4%)	18 (14.6%)
4th Year	101 (81.7%)	23 (18.3%)
Total	323 (84.6%)	59 (15.4%)

On the other hand, only two-thirds of second year students showed awareness for the patient's right to access and transfer of care. Around 70% of them were aware of rights of the unconscious or legally incompetent patient. At least 90% of the third year students sampled were aware of the same rights plus the right to religious assistance. They were least aware of the rights of the unconscious or legally incompetent patient and the right to access and transfer of care. More than 90% of the clinical clerks were aware of the same rights as the third year respondents and less than 70% of them were aware of the rights of the unconscious or legally incompetent patient and the right to access and transfer of care. (Please refer to Table 3.)

As reflected in Table 3, more than 90% of the medical students sampled were aware of the right to choose a physician, followed by the rights to be shown respect, dignity, and consideration, to be provided healthcare service of best quality by skilled healthcare professionals, to be included in decisions and choices about one's care, and to religious assistance. The rights which less than 70% the students were aware of were the right of the unconscious or legally

incompetent patient and the right to access and transfer of care.

### Discussion

Overall, 8 to 9 respondents were aware of the Patient's Bill of Rights, with the second year medical students having the highest percentage among the year levels sampled. More than 90% of the medical students sampled were aware of the right to choose a physician, followed by the rights to be shown respect, dignity, and consideration, to be provided healthcare service of best quality by skilled healthcare professionals, to be included in decisions and choices about one's care, and to religious assistance. Around six out of 10 respondents were aware of right of the unconscious or legally incompetent patient and the right to access and transfer of care.

Awareness of patients' rights has been established to be essential for professionals involved in providing health care. Patients' rights are important as they maintain patient dignity and protect patients when they become exposed to the weaknesses of the health care system. UERMMMCI medical students are expected to provide health care to patients in different settings, with a tertiary hospital being one of these areas. Thus, they are also expected to be aware and become advocates of patients' rights to promote the welfare of and protect their patients. However, the study demonstrated that there were several rights that the medical students were not fully aware of, such as the right of the unconscious or legally incompetent patient, followed by the right to access and transfer of care, and the right to informed consent.

While medical students from the United States had consistently positive views on end-of-life care education, students reported that end-of-life care

**Table 3.** Percent distribution of "aware" respondents per year level for each patient right

Specific patients' right	Proportion of "aware" respondents			Overall
	2nd Year	3rd Year	4th Year	
Right to be included in decision and choices about one's care	93.2	94.9	92.5	93.4
Right to be provided health care service of best quality by skilled healthcare professionals	96.8	97.4	89.6	94.2
Right to informed consent	77.9	77.3	77.5	77.6
Right to religious assistance	89.5	93.8	93.3	92.3
Right to end-of-life care	79.5	78.4	77.9	78.5
Right to be informed about services, treatment options, and costs in a clear and open manner	89.5	92.8	81.7	87.5
Right to choose a physician	98.4	96.9	94.2	96.3
Right to be shown respect, dignity, and consideration	95.3	94.8	93.8	94.6
Right to privacy and confidentiality	78.4	75.3	80.8	78.4
Right of the unconscious or legally incompetent patient	71.6	60.3	62.1	64.4
Right to access and transfer of care	67.4	63.4	73.3	68.4

received minimal attention in medical education.<sup>7</sup> Many students and residents reported being "not very well" or "not at all" prepared to address a patient's thoughts and fears about dying, cultural issues related to care at the end of life and spiritual issues; manage their own feelings about a patient's death; or help families during bereavement. Barriers to awareness described in a previous study involving nurses include a lack of information on end-of-life care in current nursing texts, with 62% saying that overall content of end-of-life care in basic nursing education is inadequate.<sup>8</sup> Suggested changes that would most improve end-of-life care education and awareness are inclusion in the curriculum, rotations in hospice or palliative care, and more exposure to dying patients and their families in hospital and hospice settings.<sup>7</sup>

Results of the present study showed a low percentage of awareness of the right of unconscious or legally incompetent patients among respondents across year levels. A study found that medical students at the University of Bern could accurately describe the principles of patient autonomy, substituted judgement, and non-imposition of physician values.<sup>9</sup> However, results also suggested that it was difficult

for them to apply it in clinical practice. The difficulty was thought to be due to the overlap of clinical and ethical reasoning, such as balancing the medical indications, the physician's view of the patient's interest, and the proxy's wishes.

Another study showed that Saudi medical students are very aware of their Patient's Bill of Rights, privacy and confidentiality.<sup>10</sup> It was pointed out that this might be due to religious and cultural issues as most of them are Muslims. Islamic health professionals ensure that they maintain and protect confidentiality as their duty to their clients. However, for 2nd and 3rd year respondents the awareness of the patient's right to privacy and confidentiality was noted to be lower.

In this study, it was also noted that only 67.4% (2nd year), 63.4% (3rd year), and 73.3% (4th year) of the participants were aware of the patient's right to access of care and transfer. The lack of awareness may be due to the complex processes involved in both inter-hospital retrievals and transfers for specialist care, which entail identification of medical teams and beds to take over care of the patient, identification and coordination of the most

appropriate transfer modality and stabilization of the patient for safe travel between the facilities.<sup>11</sup>

A study found out that health care providers in Iran are aware of the right to be provided sufficient information about the patient's disease and its progress.<sup>12</sup> However, they withhold information as they think it limits their authority over patients. Results of the present study show that a good number of students are aware of this right regarding informing patients about services, treatment options and costs in a clear and open manner.

Based on the results of the study, 8 to 9 respondents were aware of the Patient's Bill of Rights. More than 90% of the medical students sampled were aware of the rights to choose a physician, to be shown respect, dignity, and consideration, to be provided healthcare service of best quality by skilled healthcare professionals, to be included in decisions and choices about one's care, and to religious assistance. Around six out of 10 respondents were aware of right of the unconscious or legally incompetent patient and the right to access and transfer of care.

The researchers recommend an analytic investigation relating awareness of the patients' rights with factors that may affect the awareness of these rights such as demographic variables, length of clinical exposure, undergraduate course, and length of time these concepts are taught to students, since these were not analyzed in the study. Including first year medical students in the study would also be recommended, as their awareness of the Patients' Bill of Rights can be used to establish the baseline level for further research.

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# The effect of the Elderly Development Program on the quality of life of elderly individuals

Joeric Emil P. Crescini, Jessica Mara G. Cruz, John Paul M. Cruz, Kathleen Rose P. Cruz, Isabel G. Cupino, Darwyn Paul Y. Daguman, Lea Monica A. Dalde, Allan Vincent F. Datingaling, Manuel John A. Dayao, Kelsey C. Dayrit, Victor L. de Castro III, Remigio Jay-Ar Z. Butacan IV, MD (Faculty Adviser)

## Abstract

**Introduction** The increasing aging population of the Philippines impacts on the socioeconomic development of the country, prompting a deeper look into their quality of life. This study sought to determine the effect of the Elderly Development Program on the quality of life of the elderly population of Los Baños.

**Methods** A 4-month prospective cohort study of the elderly population in Los Baños, Laguna compared the quality of life scores of a group enrolled in the Elderly Development Program and an unexposed control, using the World Health Organization Quality of Life Abbreviated Version for Filipino Older Persons questionnaire.

**Results** Quality of life scores were higher for the EDP group during the four months of observation. In Month 2, significant differences were found in all domains except for the psychological domain. Only the physical health domain score was significant in the EDP group for Month 3 ( $p = 0.003$ ) and Month 4 ( $p = 0.029$ ). Both the EDP and control groups had higher overall and domain scores in Month 4 compared with baseline.

**Conclusion** The Elderly Development Program may improve the overall quality of life of elderly persons, specifically in the physical health domain. These improvements are likely due to the focus of the program on the physical aspect of the elderly.

**Key words:** Elderly, quality of life, Elderly Development Program

The elderly population of the Philippines has been steadily increasing during the past decade. Based

on the latest National Statistical Coordination Board figures, the elderlies comprise 3.83% of the national population, and are expected to rise to 10.25% by 2025.<sup>1</sup> Certain socioeconomic implications of having an increasing elderly population include increasing dependency and changes in social productivity.<sup>2</sup> It may thus be beneficial for policymakers and concerned government agencies to evaluate trends in the quality of life of the elderly population, and seek ways to delay the onset of their dependency. One intervention designed to maintain the quality of life of the elderly is the Elderly Development Program initiated by the

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### Correspondence:

Darwyn Paul Y. Daguman, Department of Preventive and Community Medicine, College of Medicine, University of the East Ramon Magsaysay Memorial Medical Center Inc., 64 Aurora Boulevard, Barangay Doña Imelda, Quezon City 1113; E-mail: darwyn\_daguman@yahoo.com; Telephone: +639151269620

University of the Philippines at Los Baños College of Human Ecology.<sup>3</sup> This program aims to help the senior citizens of Los Baños, Laguna maintain a standard quality of life through their monthly activities such as medical screenings, seminars and physical activities.

This study sought to assess quality of life of elderly Filipinos residing in Los Baños, Laguna and the effect of Elderly Development Program on their quality of life and its domains. Results of this study may help health care workers and social development institutions render improved services to the elderly population. Involved stakeholders and policymakers may also make needed modifications in their policies, procedures and programs on the provision of care to the elderly population, thereby improving the overall standard of care and quality of life.

## Methods

This prospective cohort study done from April to July 2016 aimed to compare the quality of life (QoL) of elderly residents from Los Baños, Laguna enrolled in the Elderly Development Program (EDP) with a group which did not participate in the EDP, using the World Health Organization Quality of Life Abbreviated Version for Filipino Older Persons questionnaire. The mean scores of the exposed and unexposed cohorts in each of the domains and the overall QoL scores were compared and tested for significant differences. The study was approved by the Ethics Review Committee and coordinated with the local Office for Senior Citizens Affairs.

From the target population - residents of Los Baños, Laguna aged 60 years or older, single-stage cluster sampling was done by grouping prospective participants in their respective barangays. From 14 barangays, two were randomly chosen and eligible participants were invited to join in the study. These participants served as the control group, while the exposed group were the elderly participants who had already registered for the EDP. Those with dementia or refused to participate were excluded. A sample size of 100 per group was computed based standard deviations of 6 and 4.5 and means of 74.1 and 72 taken from the Act on Aging study.<sup>4</sup>

The World Health Organization Quality of Life Abbreviated Version for Filipino Older Persons (WHOQOL-BREF Fil OP) questionnaire was used to assess the quality of life of the participants.<sup>5</sup> It is a 26-item questionnaire covering four domains -

physical health, psychological, social relationship and environment - answered with a 5-point Likert-type scale. A higher score denotes a better quality of life.<sup>5</sup> The physical health domain components are the activities of everyday life, dependence on medical substances and aids, energy and fatigue, mobility, pain and discomfort, sleep and rest, and work and capacity. Bodily image and appearance, positive and negative feelings, self-esteem, spiritual beliefs, thinking, learning, memory, and concentration are covered under the psychological domain. Personal relationships, social support and sexual relationships are covered in the social relationships domain. The environment domain includes financial resources, freedom, safety and security, health and social care, home environment, physical environment, chance of obtaining new knowledge and skill, participation in leisure activities and transport.<sup>5</sup> This version was taken from de la Vega and was found to be internally consistent, with a Cronbach's alpha of 0.88, and domain values of  $>0.70$ .<sup>6</sup> It was noted to have concurrent validity domain scores correlating at 0.001 significance levels with general questions on quality of life, physical health and well-being.

The questionnaire was self-administered for capable respondents; assistance in answering and explaining certain questions were provided by the researchers for those who had difficulty accomplishing the questionnaire. Data collection was proctored by two members of the research group on a house-to-house basis to minimize communication among participants and facilitate participant convenience. Quality of life measurements were done every month for four months, with the first session serving as the baseline. This was in line with EDP's monthly operations.

Distribution analysis was done to determine the comparability of the participant groups, and an independent t-test was done to determine if the quality of life scores of the EDP group were significantly higher than those of the unexposed group. Differences between the groups across domains were also compared. A paired t-test was used to assess the difference in the quality of life of each group between the first and fourth month. All statistical analyses were done using SPSS.

## Results

There were 68 participants in the study, majority of the whom were women ( $n = 41$ ), for both EDP and

control groups and were between 60 and 69 years old (n = 42). Most of the respondents were married (n = 40). Distribution analysis revealed that the subject groups are non-comparable. The complete demographic data are shown in Table 1.

Quality of life scores were higher for the EDP group during the four months of observation. The difference was significant only for Month 2. Table 2 gives the summary of mean scores per month. Further analysis suggests that in Month 2, significant differences were found in all domains except for the psychological domain (physical health p = 0.015; social relationships p = 0.041; environment p = 0.047). Only the physical health domain score was significantly higher in the EDP group for Month 3 (p = 0.003) and Month 4 (p = 0.029). Table 3 illustrates the domain scores per group per month.

**Table 1.** Demographic characteristics of the subjects in EDP and control groups

	EDP (n = 35)	Control (n = 33)	p-value
Sex			
Male	13	14	0.362
Female	22	19	
Age			
60-69	21	21	0.657
70-79	10	9	
80+	4	3	
Civil Status			
Single	1	1	0.063
Married	23	17	
Separated	3	0	
Widowed	8	15	
Educational Attainment			
None	0	2	0.055
Elementary	2	11	
High School	7	16	
College	19	4	
Post Graduate	7	0	
Socio-economic Status			
Poor	13	15	0.214
Low income	8	6	
Lower middle income	5	4	
Middle income	7	5	
Upper income	2	3	

Both the EDP and control groups had higher overall and domain scores in Month 4 compared with baseline, however the difference was significant only in the environment domain (p=0.023) in the control group. A summary of the paired t-test results is shown in Table 4.

**Table 2.** Comparison overall mean scores of EDP and control groups from baseline to Month 4

	EDP	Control	p-value
Month 1	56.67	52.95	0.023
Month 2	56.34	51.99	0.014
Month 3	58.89	55.04	0.066
Month 4	57.62	55.14	0.207

\* Independent T-test

**Table 3.** Comparison of mean domain scores per month of EDP and control groups

	EDP	Control	p-value*
Month 1			
Physical health	14.12	12.36	<0.001
Psychological	14.91	14.24	0.217
Social relationships	13.90	14.02	0.848
Environment	13.73	12.33	0.013
Month 2			
Physical health	13.81	12.39	0.015
Psychological	14.71	14.37	0.483
Social relationships	14.02	12.50	0.041
Environment	13.79	12.72	0.047
Month 3			
Physical health	14.43	12.46	0.003
Psychological	15.07	14.42	0.294
Social relationships	15.14	14.71	0.597
Environment	14.25	13.45	0.180
Month 4			
Physical health	14.14	12.66	0.029
Psychological	15.08	14.69	0.445
Social relationships	14.00	14.03	0.972
Environment	14.40	13.76	0.288

\* Independent T-test

**Table 4.** Comparison of domain and overall scores of EDP and control groups at Month 4 vs baseline

	Month 1	Month 4	Difference	p-value*
Physical health				
Control	12.36	12.66	0.30	0.624
EDP	14.12	14.14	0.02	0.834
Psychological				
Control	14.24	14.69	0.45	0.879
EDP	14.91	15.08	0.17	0.535
Social				
Control	14.02	14.03	0.01	0.952
EDP	13.90	14.00	0.10	0.698
Environment				
Control	12.33	13.76	1.43	0.023
EDP	13.73	14.40	0.67	0.097
Overall				
Control	52.95	55.14	2.19	0.174
EDP	56.67	57.62	0.95	0.201

\* Paired T-test

## Discussion

Present findings show that the overall QoL scores and the specific domain scores of the EDP group are higher than those of the unexposed group at each monthly determination and at the end of the study. The difference in overall QoL was significant during Month 2 but not at Month 4. The difference in the physical health domain scores was significant in favor of the EDP group up to Month 4.

The physical health domain showed a significant difference between the EDP and control groups throughout the whole duration of the study. Previous studies have suggested that physical health is a crucial factor influencing the quality of life of the elderly. A study by Paterson and Rice on exercise interventions showed that older adults can adapt physiologically to exercise training and improve their functional capabilities.<sup>7</sup> Physical recommendations for older adults included moderately vigorous cardiorespiratory activities (e.g., brisk walking), strength and/or power training for maintenance of muscle mass and specific muscle-group performance, as well as "balance-mobility practice" and flexibility (stretching) exercise as needed.<sup>7</sup> A previous study showed that the level of physical activity in the elderly population residing in Los Baños was moderate to

low, with 46% of the respondents perceiving themselves to have low physical activity.<sup>8</sup> To address this, the EDP sessions incorporated lectures on the importance of physical activity; physical activities such as tai chi and zumba are conducted. These factors could have played a positive role on this significant difference.

While the EDP includes activities which encourage participation of the elderly and increase knowledge and skill (e.g., cooking lessons and lectures), it does not fully address all areas of the environment domain. In the study, quality of life scores of those exposed to EDP were found to be higher compared to controls in the second month.

The social relationship domain of those who attended the EDP was significantly higher on the 2nd month - however, this significance was mainly attributed to a decrease within the control group from 14.02 to 12.5. A study by Khan and Tahir states that in the elderly population, social aspects involve social networks and social support, and better social networks lead to better health outcome and well-being.<sup>9</sup> By being an active participant of social activities like the EDP, the elderly are able to develop their social network, leading to less social alienation and QoL score declines. This is supported by a study in which participation in such activities was likely to lead to more social contacts with the outside community, therefore providing an additional source of support.<sup>10</sup>

No statistical differences were noted in both groups in the psychological domain throughout the whole duration of the study. These findings may be because the EDP did not focus on the psychological aspect of its participants.

In summary, the overall QoL scores and the specific domain scores of the EDP group are higher than those of the unexposed group at each monthly determination and at the end of the study. The difference in overall QoL was significant during Month 2 but not at Month 4. The difference in the physical health domain scores was significant in favor of the EDP group up to Month 4. The Elderly Development Program may improve the quality of life of elderly individuals, especially in the physical health domain.

One of the limitations of this study is the small sample recruited from the population, which may have accounted for failure to reach statistical significance for some of the domains studied. It is

suggested that future research utilize a larger study population with a longer follow up. Overall, the Elderly Development Program may be recommended for implementation based on its effect on quality of life in comparison to the control group. It may be worthwhile to consider increasing the frequency of sessions per month and evaluating the program regularly. Based on the study findings, program developers should consider adding activities related to the psychological and social relationship domains.

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# Comparison of self-perceived cultural competencies among student nurses

Lady Vi G. Binag, Kirk Ivan L. Eseo, Ivy Joy D. Jimenez, John Carlo M. Samudio, Samantha Isabelle R. Tomacruz, Shaira Mae T. Torrocha, Elaine Jean M. Uayan

## Abstract

**Introduction** Healthcare with its rapidly changing environment dictates that future professional nurses must demonstrate clinical and cultural competencies that meet the demands of relevant and quality nursing care. This study aimed to compare the cultural competency of students in the different year levels of the College of Nursing.

**Methods** This comparative study identified, analyzed, and explained the differences in the cultural competency of Level 1 to Level 4 students in the UERMMMCI College of Nursing in 2016. The mean scores of the different year levels in the Clinical Cultural Competency Questionnaire were compared.

**Results** The mean scores for knowledge, skills and attitude were 3.2, 3.4 and 3.6, respectively. There was no significant difference across year levels in any of the three domains. Race/ethnicity and length of stay in a foreign country was significantly associated with skills ( $p < 0.01$ ) in Level 3 and Level 4 nursing students. Length of stay in a foreign country was significantly associated with attitude ( $p = 0.02$ ) among freshmen nursing students.

**Conclusion** There is no significant difference in the overall cultural competence and in the knowledge, skills and attitude in cultural competence of nursing students across year levels.

**Key words:** Cultural competence, student nurses, perceived cultural competencies

The need for man to be cared for and nursed is fundamental and universal. This requires nurses to render appropriate care to everyone regardless of need, race, color, personal belief, political affiliation,

or religion. Understanding culture allows nurses to appreciate people which in turn is central and imperative to nursing education and nursing practice.<sup>1</sup> Nurses are responsible for providing holistic care to their patients from womb to tomb, irrespective of their culture. Differences in culture continue to be a hindrance in providing effective nursing care to clients, hence, nurses should be culturally competent enough, specifically in their knowledge, attitude, and skills, to give care to a diverse population. Cultural competence is the ability to effectively provide holistic care to a culturally diverse population regarding knowledge

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### Correspondence:

Elaine Jean M. Uayan, College of Nursing, University of the East Ramon Magsaysay Memorial Medical Center Inc., 64 Aurora Boulevard, Barangay Doña Imelda, Quezon City 1113; E-mail: lelaiuayan@gmail.com

about the values and beliefs of a specific culture, use of skills in working with different individuals and having a culturally sensitive attitude towards patients.

Nurses spend more time than any other professional with the patient. They have a unique opportunity to influence access to care, quality of care, and patient outcomes. The nurses' knowledge of the patient's culture, beliefs and health care practices will greatly influence nursing care. However, becoming culturally competent is a process that requires major changes in attitudes, beliefs, behaviors, and communication styles that each person develops throughout his or her lifetime.<sup>2</sup> Over the past decade, the importance of cultural competence as a critical aspect for the provision of high quality health care has increased. As such, cultural competence has been defined in the context of health care delivery and providers, specifically focusing on the nurse-patient interaction. Research suggests that providing culturally competent care improves healthcare quality because it influences healing, wellness and perception of illness. Therefore, understanding the cultural beliefs and practices of the patients establishes a respectful relationship because cultural competency enhances effective communication that allows nurses to elicit their patients' perception of illness and educate them.

The increasing number of Filipino nurses emigrating to different countries for employment or to seek better opportunities requires them to render professional nursing care to peoples of various cultures.<sup>3</sup> In their situation, they can render the best care possible when they are culturally competent. The challenge for nurses is to be knowledgeable about diverse cultures and to bring about greater cultural sensitivity and competency while working within the healthcare system of the host country.<sup>4</sup>

Thus, it is important that the undergraduate nursing curriculum provide students with the knowledge and clinical experiences that will enable them to be comfortable and sensitive to the needs of diverse patient populations.<sup>5</sup> The researchers have not come across any studies that considered the cultural competence of nursing students. The study aimed to determine and compare the cultural competency of students in the different year levels enrolled in the College of Nursing. Specifically, the investigators wanted to find out if the level of competency was associated with specific variables

such as race or ethnicity, languages spoken and/or understood, religion and length of stay in a foreign country. The results of this study can serve as a baseline which may provide the basis for curricular modifications to ensure that the graduates will be culturally competent, making them globally competitive.

## Methods

This comparative study identified, analyzed, and explained the differences in the cultural competency of Level 1 to Level 4 students in the UERMMMCI College of Nursing in 2016. The mean scores of the different year levels in the Clinical Cultural Competency Questionnaire were compared. The association of the knowledge, skills and attitudes domain with race or ethnicity, languages spoken and/or understood, religion and length of stay in a foreign country was determined. The study was approved by the Ethics Review Committee.

This study used a revised Clinical Cultural Competency Questionnaire (CCCQ) with permission from the author.<sup>6</sup> The questionnaire consisted of seven items on socio-demographic data and 35 questions on knowledge, 15 on skills and 12 on attitude, answered using a 5-point Likert type scale. The responses were 1) "not at all", 2) "a little", 3) "somewhat", 4) "quite a bit" and 5) "very". A higher score indicates more or better cultural knowledge, skills and attitudes. The eight items on knowledge touched on demographics, sociocultural characteristics and issues, health risks, disparities in health, ethnopharmacology, healing traditions of racial and ethnic groups, and impact of racism, bias, prejudice discrimination in health experienced by various population groups in the country.

There were 15 items in skills that covered greeting patients in a culturally sensitive way; eliciting the patient's point of view on health and illness, folk remedies (hilot, ventosa) and alternative health practitioners (albularyo, manghihilot); doing a culturally sensitive physical examination; providing a culturally sensitive treatment plan, patient education and counselling, preventive services and end-of-life care; assessing health literacy; working with medical interpreters; and dealing with cross-cultural conflicts in ethics, diagnosis or treatment and adherence to treatment; and apologizing for cross-cultural misunderstandings or errors. Attitude

was assessed with 12 items covering the care of patients from culturally diverse backgrounds, with limited proficiency in English, who insist on seeking folk remedies; attention to gestures or nonverbal cues that may have different meanings in other cultures; interpreting different cultural expressions of pain; advising a patient to change culturally-related behaviors affecting health; addressing a patient's illness indirectly when appropriate; breaking bad news to family first when culturally appropriate; working with health professionals of other cultural backgrounds and with colleagues who speak of patients from other ethnic groups in a derogatory way; and treating patients who make derogatory comments about the nurse's racial or ethnic background.

Students enrolled in the College of Nursing in 2016 were recruited. Consent and assent were obtained as appropriate. After obtaining the necessary

permission, the investigators explained the study to the different classes and administered the CCCQ. The respondents were given 10-15 minutes to answer the questionnaire. The questionnaires were checked for completeness upon submission.

Descriptive statistics were used to analyze the demographic characteristics of the respondents. The mean scores of the different year levels were compared using analysis of variance (ANOVA) to determine if any observed difference was statistically significant. Nominal variables were compared using chi-square. The level of significance was set at 0.05; the data were analyzed using SPSS.

## Results

Of 207 students enrolled in the College of Nursing, 144 (69.5%) participated in the study. The reasons for non-participation were unavailability during data

**Table 1.** Demographic characteristics of respondents by year level (N = 144)

Characteristic	Year Level				Total
	1 (n = 26)	2 (n = 36)	3 (n = 48)	4 (n = 34)	
Age					
18 y/o and below	16	7	0	0	23 (16%)
19 y/o and above	10	29	48	34	121 (84%)
Gender					
Male	12	9	12	12	45 (31%)
Female	14	27	36	22	99 (69%)
Race/ethnicity					
Asian-American	2	3	3	3	11 (8%)
Asian-Filipino	24	33	45	31	133 (92%)
Visited other countries					
Yes	9	15	25	18	67 (47%)
No	17	21	23	16	77 (53%)
If yes, how long?					
11 months and below	5	19	21	16	61 (94%)
12 months and above	1	0	3	2	6 (6%)
Other languages					
Poor	2	1	2	0	5 (4%)
Fair	5	2	2	4	13 (9%)
Excellent	0	1	1	1	3 (2%)
N/A	20	34	40	28	123 (85%)
Previous school attended					
International	2	4	8	6	20 (14%)
Philippines	24	32	40	28	124 (86%)
Religion					
Christian	26	34	45	32	137 (95%)
Non-Christian	0	2	3	2	7 (5%)

collection and refusal to join. Majority of respondents were female and less than half had visited another country. Almost nine out of 10 respondents had previously attended local schools and 95% belonged to a Christian religion (Roman Catholic, Born Again Christian and Baptist). The characteristics of the respondents are shown in Table 1.

The population of nursing students sampled had a moderate level of cultural competence in general. The respondents had moderate to high mean scores in the specific domains of cultural competence - knowledge, skills and attitude. Attitude had the highest mean score of 3.6. As seen in Table 2, there was no significant difference across year levels.

**Table 2.** Mean scores in specific competencies of all respondents (N=144)

Competence	Mean score	F (p-value)
Knowledge	3.2	3.64 (0.14)
Skills	3.4	0.75 (0.52)
Attitude	3.6	2.66 (0.05)

Race or ethnicity, languages spoken or understood, religion and length of stay in a foreign country were not significantly associated with knowledge in nursing students across year levels (Table 3). Among the demographics characteristics evaluated, race/ethnicity and length of stay in a foreign country were significantly associated with skills ( $p < 0.01$ ) in Level 3 and Level 4 nursing students, respectively, as seen in Table 4. Length of stay in a foreign country was significantly associated with attitude ( $p = 0.02$ ) among freshmen nursing students but the other factors were not (Table 5).

Among the Level 1 students, length of stay in a foreign country was significantly associated with attitude but not with the knowledge and skills domains. None of the selected demographic characteristics was significantly associated with any of the domains in the 2nd year nursing students. Race/ethnicity was significantly associated with the skills domain but not with knowledge and attitude among the 3rd year respondents. Length of stay in a foreign country was significantly associated with skills in the Level 4 respondents but not with the other domains. The other demographic characteristics examined were not associated with the knowledge

**Table 3.** Association between selected demographic characteristics and knowledge of respondents per year level

Demographic Characteristic	Year Level			
	1	2	3	4
Race/Ethnicity	0.89 (0.72)*	0.12 (0.21)	0.04 (0.09)	0.92 (0.99)
Language/s spoken/understood	0.61 (0.79)	0.17 (0.07)	0.63 (0.97)	0.71 (0.71)
Religion	0.33 (0.82)	0.08 (0.29)	0.82 (0.16)	0.99 (0.39)
Length of stay in a foreign country	0.76 (0.58)	0.42 (0.06)	0.20 (0.88)	0.24 (0.09)

\* Chi-square (p-value)

**Table 4.** Association between selected demographic characteristics and skills of respondents per year level

Demographic Characteristic	Year Level			
	1	2	3	4
Race/Ethnicity	0.55 (0.22)*	0.02 (0.81)	0.06 (0.04)	0.62 (0.89)
Language/s spoken/understood	0.34 (0.49)	0.12 (0.69)	0.29 (0.26)	0.09 (0.99)
Religion	0.36 (0.25)	0.04 (0.64)	0.38 (0.58)	1.00 (0.77)
Length of stay in a foreign country	0.37 (0.39)	0.14 (0.04)	0.23 (0.83)	0.20 (<0.01)

\* Chi-square (p-value)

**Table 5.** Association between selected demographic characteristics and attitude of respondents per year level

Demographic characteristic	Year Level			
	1	2	3	4
Race/Ethnicity	0.46 (0.39)*	0.03 (0.76)	0.36 (0.16)	0.11 (0.44)
Language/s spoken/understood	0.28 (0.72)	0.05 (0.76)	0.10 (0.45)	0.41 (0.83)
Religion	0.33 (0.29)	0.16 (0.80)	0.59 (0.93)	0.80 (0.80)
Length of stay in a foreign country	0.70 (0.02)	0.49 (0.14)	0.44 (0.21)	0.54 (0.22)

\* Chi-square (p-value)

and attitude domains in the Level 4 students surveyed.

### Discussion

Present results indicate that student nurses are moderately competent when it comes to skills; however, as future healthcare professionals who will interact with a diverse population of patients, they should be knowledgeable about health disparities and possess considerably higher levels of competence than would be expected of other individuals.<sup>7</sup> The attitude of the students is important in providing care to a culturally diverse population because as they move to the next year level, they become more exposed to different areas and gain more comfort in dealing with future cross-cultural encounters or cultural situations. Previous studies recommend the addition of content related to cultural competency.<sup>8</sup>

Results of the present show that race or ethnicity is not a factor in the cultural skills and attitude of Level 2 student nurses in providing care to culturally diverse patients; it is also not a factor in the cultural knowledge of Level 3 students. The race/ethnicity of Level 3 student nurses shows a significant difference in their skills which can affect their cultural competency in providing care to diverse populations. The changing multicultural demographic suggests that factors such as race, ethnicity, culture, language, and religion may modify how patient-centered care is received and how it ought to be delivered.<sup>9</sup>

Most respondents did not speak any language other than Filipino and English. Attitude domain scores of Level 2 student nurses revealed that spoken/understood language/s does not affect their competency in rendering care. Language ability has been associated with enhanced interpersonal process

of patient-centered care and higher levels of cultural competence.<sup>7,10</sup> The religion of the Level 2 student nurses does not affect their skills in giving culturally competent care. Working with religion in the clinic is a delicate endeavor, but one that will improve recovery outcomes if handled appropriately.

Length of stay in a foreign country among Level 1, 2, and 4 nursing students showed a significant difference in their skills and attitude, consistent with previous studies.<sup>11,12</sup> Another study showed that staying longer in a country was a factor in the adjustment process to build support systems, acquire greater cultural knowledge, and become more efficacious in interacting within the host culture.<sup>13</sup>

There is no significant difference in the overall cultural competence and in the knowledge, skills and attitude in cultural competence of student nurses across year levels. Length of stay in a foreign country was significantly associated with skills among 4th year students, and with attitude in 1st year students. The investigators recommend reviewing the cultural competency related-learning experiences to improve cultural competency of the student nurses and make them more globally competitive.

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# The effectiveness of *Ocimum basilicum* (basil) tea as an adjunct to medications in decreasing the blood pressure of hypertensive individuals

Ileana Anika Domondon, Samantha Alexis Dueñas, Hazel Joy Dungo, Rafael Luis Encarnacion, Kimberly Esteban, Ma. Presentacion Estrada, Alan Evangelista, Izach Evangelista, Michael Jason Fadul, Kenneth Martin Falloria, Reyna Marie Federo, Jose Ronilo Juangco, MD, MPH (Faculty Adviser)

## Abstract

**Introduction** This study aimed to determine the effectiveness of basil tea as an adjunct to anti-hypertensive medications in decreasing the blood pressure of hypertensive subjects.

**Methods** Hypertensive patients were randomly allocated into either experimental (anti-hypertensive medications + basil tea) or control (antihypertensive medications alone) group. Experimental subjects drank basil tea twice daily for 28 days, with blood pressure readings done at baseline and on a weekly basis for four weeks.

**Results** A significant difference in systolic blood pressure was elicited for both treatment ( $p=0.005$ ) and control ( $p=0.034$ ) groups. There is a significant difference in the mean systolic ( $p=0.021$ ) and diastolic blood pressure  $P$  ( $p=0.023$ ) between the two groups at the fourth week in the basil tea group. There was a significant difference ( $p=0.046$ ) in the mean difference in diastolic blood pressure from baseline to Week 4 in the basil tea group. There was a statistically significant decrease in systolic blood pressure between baseline and Week 4 ( $p=0.05$ ).

**Conclusion** Basil tea, used as an adjunct to anti-hypertensive medications, elicited a statistically significant reduction in systolic blood pressure and a statistically significant difference in change of diastolic blood pressure after four weeks of treatment.

**Key words:** Basil, hypertension

Worldwide, hypertension is estimated to cause 7.5 million deaths, about 12.8% of the total of all deaths. This accounts for 57 million disability

adjusted life years (DALYS) or 3.7% of total DALYS.<sup>1</sup> However, it is alarming that hypertension exists globally in 22% of adults aged 18 and over as of 2014 and it is known that 28% of Filipino adults had high blood pressure as of 2013.<sup>2</sup> The economic burden of hypertension is greater once it is left uncontrolled, which then leads to further complications.<sup>1</sup> Thus, alternative measures have to be explored to help aid in decreasing the financial burden for the patient.

In developing countries like the Philippines, traditional medicine is popular because it is accessible

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## Correspondence:

Ileana Anika A. Domondon, Department of Preventive and Community Medicine, College of Medicine, University of the East Ramon Magsaysay Memorial Medical Center Inc., 64 Aurora Boulevard, Barangay Doña Imelda, Quezon City 1113; E-mail: anikadomondon@gmail.com; Telephone: +639178118739

and affordable. *Ocimum basilicum* (basil tea) is a common plant found in the country that is known as a treatment for numerous ailments in addition to its popular use as a culinary herb. In Algeria and China, *O. basilicum* is a common herbal remedy for hypertension.<sup>3</sup> Studies on rats, but not on humans, have been done to explore the effect of *O. basilicum* on hypertension.<sup>4</sup> In recent years, studies on *O. basilicum* have found promising effects on the cardiovascular system. Preclinical trials on rats report its cardioprotective property against isoproterenol-induced myocardial infarction.<sup>5</sup> Another study noted that it has vasorelaxant and ADP-induced antiplatelet aggregation activity.<sup>6</sup> It can lower blood pressure in hypertensive-induced rats using the aqueous extract along with a reduction in endothelin, a potent vasoconstrictor.<sup>4</sup>

This study aimed to determine the effectiveness of *O. basilicum* tea infusion as an adjunctive treatment for hypertension in producing a statistically significant decrease in the systolic and diastolic blood pressure of hypertensive individuals. This study also aimed to determine the proportion of subjects who developed side effects while taking *O. basilicum* tea as adjunctive treatment.

## Methods

This was a randomized, single-blind, negative-control clinical trial to determine the effect of *O. basilicum* leaf and stalk tea in decreasing the systolic blood pressure (SBP) and diastolic blood pressure (DBP) of hypertensive individuals in five barangays in San Juan City. Eligible subjects who consented were randomly assigned to either the experimental group (basil tea + antihypertensive medication/s) or the control group (antihypertensive medication/s alone), with the assigned intervention taken for 28 days. The investigators measured the blood pressure weekly for four weeks. The study was approved by the Ethics Review Committee of UERMMMCI and coordinated with the City Chief Medical Officer.

Whole plants of *O. basilicum* were authenticated at the National Museum, and its leaves and stalks were then air-dried until brown by a botanist in a clean room with a net surrounding it to prevent contamination. The dried leaves and stalks were ground and placed into tea bags, with each tea bag containing 1.5 grams of dried *O. basilicum*. The dosage of 1.5 grams was arbitrarily set based on the quantity per teabag of commercially-available teas.

The barangays chosen had the highest cases of hypertension in San Juan City as determined by the City Chief Medical Officer. Medical records from the barangay health centers were then reviewed in five barangays: Corazon de Jesus, Salapan, Batis, Kabayanan, and San Perfecto to identify potential adult male and female subjects. The researchers then went house-to-house, identified, oriented and screened the potential subjects. Those who agreed to participate were asked to sign an informed consent form and were thereafter interviewed to gather data for subject profiling.

The inclusion criteria were as follows: 1) stage I/II hypertensive, 2) currently taking anti-hypertensive maintenance medications, 3) 35 to 70 years old and 4) understood the compliance form mechanics. Those with any of the following were excluded: 1) renal conditions such as glomerulonephritis, chronic kidney disease, and end-stage kidney disease; 2) hepatic conditions such as hepatitis and cirrhosis; 3) hematologic conditions such as anemia, bleeding disorders, and platelet disorders; 4) congestive heart failure; 5) terminal illness; 6) hypersensitivity to *O. basilicum*; 7) anticoagulant/antiplatelet medications and 8) pregnancy or lactation.

A sample size of at least nine subjects per group was computed using the formula for the difference between population means and the following parameters:  $Z_{\alpha} = 1.96$ ,  $Z_{\beta} = 0.84$ ;  $S_1 = 10.4$ ,  $S_2 = 13.9$  and  $\mu_1 = 100$ ,  $\mu_2 = 84.4$ . The researchers aimed to recruit at least 15 subjects per group, with 30 subjects total, as allowance for attrition.

The researchers obtained the subjects' height, weight, baseline BP, and usual daily physical activities. The researchers carried each weekly visit-from week 0 to week 4, in pairs. One person interviewed the subjects about side effects, compliance, and for all other concerns related to the study. The other person measured the blood pressure. The interviewer first talked to the subject alone. After obtaining the necessary information, the blinded researcher was then called to measure the BP using an aneroid sphygmomanometer (Baxtel®), and following the JNC 8 guidelines for taking the BP.<sup>7</sup> The blood pressure was measured with the respondent relaxed and in sitting position, with both feet flat on the ground. The arm was supported to be at the level of the heart. The subjects were instructed not to drink any caffeinated beverages such as coffee, not to do strenuous activity, not to smoke 30 minutes prior to

their BP measurement and not talk to the BP assessor. If they were unable to comply with these provisions, a 30-minute resting period was observed before their BP was measured. An average of two BP recordings with an interval of 5 minutes on the same extremity was done throughout the study. A third BP recording on the contralateral arm was added if the BP increased on the second reading. The weight was measured using a bathroom weighing scale. The daily physical activities were measured using the metabolic equivalent task (MET) presented in the 2011 Compendium of Physical Activities.<sup>8</sup> To take into account each subject's sex, age, body mass and height, the corrected METs formula was used.

After obtaining the baseline data, the subjects of the experimental group were given their supply of tea bags and distilled water for 28 days. They were instructed to steep the tea bag in hot water (1 regular cup) for 10 minutes and to take it twice a day - after breakfast and after dinner.<sup>9</sup> They were allowed to drink it cold by adding ice after the tea bag was steeped in hot water for the said duration. They were also allowed to add a teaspoon of brown sugar that was provided to them for better taste. They were also given hard copies of the instructions in Filipino.

Each subject was given a compliance sheet and was asked to fill it out every time he/she drank the infusion. They were also asked to keep their used tea bags for the week in a plastic bag, and this was checked weekly by the researchers to ensure compliance. They were also asked to take note of any side effects associated with drinking the infusion.

The researchers visited every subject once weekly to check the BP, compliance sheets and used tea bags. The researchers also asked at every visit if the subjects felt any side effects brought about by drinking the tea. This was repeated until the treatment period was over. The weight and daily physical activities were again recorded on the last week of visit. Over the course of the study period, both the experimental and control group subjects were asked to follow their doctors' recommendations regarding diet and physical activity.

The data were analyzed using a paired-samples t-test, independent samples t-test, and repeated measures analysis of variance (rANOVA) to compare the change in SBP and DBP for each treatment arm throughout the course of the study. Intention-to-treat (ITT) rather than a per-protocol analysis was done.

For each dropout in the basil leaves tea and control arms, the last observation was carried forward and used for each subsequent time point, mimicking a non-effective medication scenario. An alpha of 0.05 was used in a 2-tailed normal distribution for all statistical tests. Microsoft Excel 2016 was used to encode the data, while IBM SPSS 24 was used to perform the specific statistical tests.

The demographic variables considered for initial comparison between treatment and control groups included sex, age, baseline SBP, baseline DBP, body mass index (BMI), MET scores, alcohol consumption, smoking, and therapy regimen (monotherapy or dual therapy, and drug type). Homogeneity of these variables at the beginning of the study was then established using the following: Levene's test was used for homogeneity of variance of blood pressure; independent t-test was used to check the homogeneity of age, BMI, and MET; and chi-square test was done for homogeneity of sex, those smoking and drinking alcohol, drug type, and if the subjects were on mono- or dual-therapy. Change in SBP and DBP between week 0 (baseline) and week 4 (end of study) was analyzed with a paired-samples t-test. Independent samples t-test was then done to determine whether the decrease in blood pressure was due to either the basil or the antihypertensive maintenance medications the subjects were taking. Lastly, repeated measures ANOVA (rANOVA) was used to analyze the significance of the changes in SBP and DBP weekly, and Mauchly's Sphericity test was used to validate the results of the rANOVA.

Treatment success was defined by a subject's ability to meet his/her target blood pressure as prescribed by the JNC 8 guidelines: <140/90 for subjects aged younger than 60 years and <150/90 for subjects aged 60 years or older.<sup>7</sup> Relative risk for treatment success was then calculated to determine which group - basil leaves tea or control was more likely to experience treatment success.

## Results

The researchers were able to recruit 12 subjects per group with 4 dropouts (basil tea 3, control 1). The reasons for dropping out were unavailability of the subject, dislike of the taste of tea, and surgery within the duration of the study. The control group was older than the basil tea group and had a higher baseline systolic blood pressure but the differences were not significant. There were more women in the

study. The basil tea and control groups were comparable and this was confirmed by Levene's test for homogeneity, allowing the researchers to proceed with the analysis of change in blood pressure. The demographic characteristics of the two groups are seen in Table 1.

Change in blood pressure was determined as the difference between the baseline and Week 4 systolic and diastolic blood pressures. There was a significant decrease in the SBP in both groups but not in the DBP, as seen in Table 2. The mean difference in the SBP between the basil tea and control groups was significant, as seen in Table 3. The individual difference in SBP and DBP from baseline to week 4 were also calculated for each participant and revealed that the difference was significant for DBP, as seen in Table 4.

Although the paired-samples t-test produced statistically significant results, it was limited to an examination of the difference in SBP and DBP only between the baseline and Week 4 measurements. A rANOVA of the weekly changes in SBP and DBP for each group showed a statistically significant difference in SBP for the basil tea group only between the baseline and Week 4, as seen in Table 5. In contrast, there was no statistically significant reduction in SBP in the control group (overall rANOVA  $p = 0.265$ ) at any point. Likewise, no statistically significant reduction in DBP was seen for both basil tea (overall rANOVA  $p = 0.225$ ) and control (overall rANOVA  $p = 0.665$ ) groups. Figure 1 shows the trend in blood pressure changes over the four-week period with their corresponding p-values generated by rANOVA.

**Table 1.** Baseline demographic characteristics of basil tea and control groups

Variable	Basil tea (n = 12)	Control (n = 12)	p-value
Age (yr)	53.7 ± 9.90	59.9 ± 6.73	0.084**
Sex			1.000***
Male	3	3	
Female	9	9	
SBP (baseline)	149.7 ± 13.80	159.6 ± 19.28	0.191*
DBP (baseline)	88.2 ± 8.09	88.2 ± 9.57	0.965*
Smoker	3	3	1.000***
Alcohol	4	3	0.653***
BMI	26.5 ± 4.00	26.3 ± 5.07	0.930**
MET	79.8 ± 21.48	87.2 ± 20.07	0.397**
Therapy			0.682***
Monotherapy	7	6	
Dual Therapy	5	6	
Drug Type			0.223***
ARB <sup>a</sup>	7	9	
ACEi <sup>b</sup>	1	2	
CCB <sup>c</sup>	8	4	
BB <sup>d</sup>	1	3	

\*Levene's Test for homogeneity of variance;

\*\*Independent t-test

\*\*\*Chi-square test;

<sup>a</sup> ARB: Angiotensin II receptor blocker;

<sup>b</sup> ACEi: Angiotensin converting enzyme inhibitor;

<sup>c</sup> CCB: Calcium channel blocker;

<sup>d</sup> BB: Beta blocker

Effectiveness of Ocimum basilicum as an adjunct to medications in decreasing the blood pressure

**Table 2.** Blood pressure changes in basil tea and control groups from baseline to week 4

		Baseline	Week 4	Mean difference (95% CI)	p-value*
SBP	Basil tea	149.7 ± 13.80	137.1 ± 7.97	12.6 (4.66, 20.52)	0.005
	Control	159.6 ± 19.28	151.6 ± 17.84	8.0 (0.71, 15.29)	0.034
DBP	Basil tea	88.2 ± 8.09	83.2 ± 7.58	5.0 (-0.89, 10.89)	0.089
	Control	88.2 ± 9.57	90.9 ± 7.94	-2.7 (-7.86, 2.53)	0.282

\* Paired-samples t-test

**Table 3.** Comparison of change in mean blood pressure between basil tea and control groups

	Basel tea	Control	Mean difference (95% CI)	p-value*
SBP				
Baseline	149.7 ± 13.8	159.6 ± 19.28	9.9 (-4.28, 24.11)	0.161
Week 4	137.1 ± 7.97	151.6 ± 17.83	14.5 (2.49, 26.51)	0.021
DBP				
Baseline	88.2 ± 8.09	88.2 ± 9.57	0.1 (-7.42, 7.59)	0.982
Week 4	83.2 ± 7.58	90.9 ± 7.94	7.8 (1.18, 14.32)	0.023

\* Independent samples t-test

**Table 4.** Comparison of mean difference in blood pressure between basil tea and control groups

	Basel tea	Control	Difference of means (95% CI)	p-value*
SBP (week 0 - week 4)	12.4 ± 12.33	7.9 ± 11.77	4.5 (-14.71, 5.69)	0.369
DBP (week 0 - week 4)	4.9 ± 9.26	2.6 ± 8.04	7.5 (-14.85, -0.15)	0.046

\* Independent samples t-test

**Table 5.** Systolic blood pressure changes in basil tea group per week from baseline

	Mean SBP	Mean difference (95% CI)	P-value*
Baseline	149.7 ± 13.79	--	--
Week 1	141.7 ± 12.59	8 (-5.57, 21.57)	0.637
Week 2	138.2 ± 11.61	11.5 (-1.89, 24.89)	0.120
Week 3	137.2 ± 10.19	12.5 (-0.33, 25.25)	0.059
Week 4	137.1 ± 7.97	12.6 (0.002, 25.16)	0.050

\* rANOVA

Treatment success for both groups with the last observation carried forward is tabulated in Table 6 and shows that the basil tea group is more likely to reach their blood pressure goals as prescribed by the

JNC-8 guidelines (definition of treatment success for this study). However, the frequency of treatment successes and failures shows no statistically significant difference (p=0.414) between the

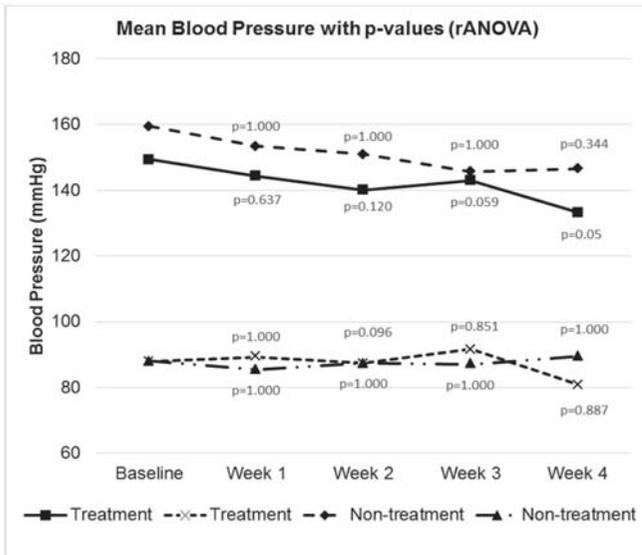


Figure 1. Trend in blood pressure change from baseline to Week 4

treatment and control groups. Treatment success in the worst-case scenario is also tabulated in Table 7, showing results that yield the same implications as those in Table 6.

The side effects listed by the subjects are flatulence and increased appetite. In the basil tea group, one participant experienced flatulence, while three participants experienced increased appetite. No

participant in the control group experienced any such side effect. Using Fisher's Exact Test, both flatulence ( $p = 1.000$ ) and increased appetite ( $p = 0.217$ ) did not demonstrate statistical significance. The number needed to harm was calculated to be 12 for flatulence and four for increased appetite.

**Discussion**

The general objective of this study was to determine the effectiveness of *O. basilicum* (basil) tea as an adjunctive treatment with antihypertensive medications in decreasing the blood pressure of hypertensive individuals. *O. Basilicum* has been used to lower hypertension throughout history, and has been a part of traditional medicine practices in Algeria and China.<sup>3,4</sup>

The results show a statistically significant decrease in systolic but not in the diastolic blood pressure from baseline to Week 4. The results of the paired samples t-test showed statistically significant decreases in systolic blood pressure for both treatment and control groups after the four-week study period. However, since this test only measured change in blood pressure within each group, it did not reveal whether this effect was due to basil tea consumption or the antihypertensive medications that the participants were taking. Using an independent samples t-test comparing the baseline and Week 4 SBP measurements for the two groups,

Table 6. Treatment success: Last observation carried forward

	Treatment Success	Treatment Fail	RR for Treatment Success	p-value*
Basil tea	7	5	1.40	0.414
Control	5	7		

\*Chi-square test with Yate's correction

Table 7. Treatment success: Worst case scenario

	Treatment Success	Treatment Fail	RR for Treatment Success	p-value*
Basil tea	7	5	1.17	0.683
Control	6	6		

\*Chi-square test with Yate's correction

the authors could confirm that a statistically significant difference in the mean change of blood pressure between the two groups - indicating that the significant reduction in systolic blood pressure seen in the paired samples t-test was, in fact, due to the basil tea treatment.

An interesting finding, however, with the independent t-test, is the statistically significant difference that was also seen in the DBP in week 4 ( $p=0.023$ ). At first glance, this may seem inconsistent with the results of the paired samples t-test, which indicated no significant reduction in DBP for either group in the four-week study period. The difference is that the paired sample t-test looked at the differences in blood pressure within each group from baseline to week 4, while the independent samples t-test compared the measurements between the basil tea and control groups at baseline and week 4 rather than within each group.

The differences in SBP and DBP from baseline to week 4 were also calculated for each participant. The differences were then compared using an independent t-test. There was no statistical difference in the change in SBP between the two groups, but a statistically significant difference was seen in the change in DBP. This shows that the difference in the change in DBP between the treatment and control groups from baseline to week 4 was statistically significant. The result showing this comparison was not statistically significant for SBP means that the change in SBP was not different between the two groups.

The rANOVA showed that there was no statistically significant reduction in SBP from baseline to week 4 for the control group, though the paired samples t-test did show that there was significant difference from baseline to week 4. Both the paired samples t-test and rANOVA assumed that the conditions at each time point were dependent and the means were compared within each group, but the paired samples t-test only compared two time points and may therefore be more prone to a type 1 error than the rANOVA that compared data from five time points in the study, and thus may explain this apparent discrepancy.

Two side effects were mentioned for the basil tea regimen - flatulence and increased appetite. The odds ratio for each is undefined, as the control group did not experience such side effects. Using Fisher's Exact Test, both side effects were not shown to be

statistically significant, though they were both included in the analysis precisely because no previous studies have shown any side effect profile for human consumption of basil tea.

The calculation of relative risk for treatment success showed that the basil treatment was effective ( $RR = 1.40$ ), though the difference in successes between the treatment and control groups were not significant ( $p = 0.414$ ). This may be explained by the fact that there were three dropouts in the treatment group after the baseline subject data were obtained. Per intent to treat analysis procedures, the subjects' initial data were analyzed as part of treatment group and since they did not agree to further visits, their last observed BP was used for each subsequent time point (last observation carried forward). Thus, these subjects were noted as 'treatment failures' from the start of the study, and may have contributed to the lack of significance when treatment successes were calculated. Computations for the worst case scenario were also performed, which likewise indicated that the treatment was effective ( $RR=1.167$ ), though the difference in successes between the two groups was not significant ( $p=0.683$ ).

There have been no human trials and very few animal studies that have explored the exact mechanism of action of *O. basilicum's* effects on hypertension. These studies have shown that several pathways may be involved in the mechanisms of action for *O. basilicum*.

A study by Aftab demonstrated that crude extract of basil and pure eugenol extract, which was determined to be a major phytochemical compound of *O. basilicum*, caused a fall in systolic, diastolic and mean blood pressure in anesthetized rats. Comparing multiple drug effects, the study deduced that eugenol acting as a calcium channel blocker was the most likely pathway through which *O. basilicum* effected the fall in BP.<sup>10</sup>

Another study by Umar explored the effect of the *O. basilicum* aqueous extract on hypertensive-induced Wistar rats and showed that this caused a decrease in their SBP and DBP, and a decrease in hypertension-induced hypertrophy of the heart of rats. There was also a variable decrease in angiotensin-II and a considerable decrease in serum endothelin concentrations. Endothelin is a potent vasoconstrictor and is involved in cardiac remodeling. This study suggests that the decrease in

blood pressure and cardiac hypertrophy caused by *O. basilicum* extract may be partly due to similar actions to endothelin converting enzyme inhibitors leading to decreased serum endothelin levels.<sup>4</sup>

Another study by Fathiazad on Wistar rats demonstrated a suppression in isoproterenol-induced ST-segment elevation.<sup>5</sup> The sharp reduction in left ventricular contractility and a marked increase in left ventricular end-diastolic pressure were also significantly improved with the aqueous extract of *O. basilicum*. The results were related to the potent antioxidant activities of its phenolic compounds, with rosmarinic acid as the principal phenolic compound, and presence of flavonoids that were found during phytochemical screening. The study suggested that *O. basilicum* has cardioprotective effects related to its antioxidant properties.

These animal studies support the findings of the present study, which shows a statistically significant drop in systolic BP in the basil treatment group. The multiple mechanisms of action described by the animal studies may all contribute to the decrease in SBP seen in this study. However, more studies are needed to determine the different effects of the multitude of phytochemicals found in *O. basilicum*.

Basil tea, when used as an adjunct to antihypertensive medications, elicits a statistically significant reduction in systolic blood pressure and a statistically significant difference in the change of diastolic blood pressure after four weeks of treatment for this specific population of respondents. Its long-term effects were not assessed and not part of the scope of the study. The limited results of this study showing that *O. basilicum* has antihypertensive effects as an adjunct should encourage researchers to explore and determine its antihypertensive properties. Further studies employing a larger sample size and assessing its long-term effects may be carried out.

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# Project Hawkeye: A cross-sectional study on the prevalence of undetected refractive errors in school-age children

Gabrielle Delos H. Reyes, Jan Erik B. Detran, Maria Immanuelle C. Devela, Khia Cates N. Devoma, Miguel Enrico D. Dial, Jurish Candice E. Diaz, Rafael Jose A. Dimaculangan, Alejandro S. Dizon Jr., Dean Marco R. Dizon, Patricia Mae F. Domingo, Banette Lysa F. Estacio, Remigio Jay-Ar Z. Butacan IV, MD<sup>1</sup> (Supervising Investigator), Fay Charmaine S. Cruz, MD, FPBO<sup>2</sup> (Supervising Investigator)

<sup>1</sup>Department of Preventive and Community Medicine, College of Medicine, University of the East Ramon Magsaysay Memorial Medical Center Inc.

<sup>2</sup>Department of Ophthalmology, College of Medicine, University of the East Ramon Magsaysay Memorial Medical Center Inc.

## Abstract

**Introduction** In the Philippines, essential eye care services are not easily accessible especially for those in lower income groups, putting public elementary school students at risk for under-diagnosis of problems in visual acuity. The objective of this investigation was to determine prevalence of undetected refractive errors among public elementary students using the Welch Allyn Spot™ Vision Screener.

**Methods** A cross-sectional design was used in this investigation to estimate the prevalence of uncorrected refractive errors in the first grade students in San Perfecto Elementary School using Welch Allyn Spot™ Vision Screener (Photoscreener). Eligible students who gave informed consent and assent answered a questionnaire and underwent an eye examination. The prevalence of undetected errors of refraction were computed for the sample population and for selected demographic variables.

**Results** Approximately one out of four students (24.53%) had errors of refraction, with the most common type being astigmatism (22.64%), followed by myopia (3.77%) and hyperopia (2.83%).

**Conclusion** This study revealed a high prevalence of undetected refractive errors among school-age children, higher than current published data (5%) in the Philippines.

**Key words:** Undetected refractive errors, Welch Allyn Spot™ Vision Screener, school-age children

The World Health Organization defined refraction error as "a very common eye disorder that could

occur when the eye would not clearly focus the images from the outside world."<sup>1</sup> The most common refractive errors are myopia, hyperopia, astigmatism, and presbyopia. These vision problems can be easily addressed with the use of eyeglasses.<sup>2</sup> In addition, the WHO also emphasized that "school-age children constituted a particularly vulnerable group, where uncorrected refractive error might have a dramatic impact on learning capability and educational potential."<sup>2</sup> It also mentioned that uncorrected

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### Correspondence:

Maria Immanuelle C. Devela, Department of Preventive and Community Medicine, College of Medicine, University of the East Ramon Magsaysay Memorial Medical Center Inc., 64 Aurora Boulevard, Barangay Doña Imelda, Quezon City 1113; E-mail: yel.devela@gmail.com; Telephone: +639985524029

refractive error "could have a potential negative impact on career choice, ocular health, and sometimes, even self-esteem."<sup>3</sup>

In the Philippines, however, essential eye care services (e.g., vision testing and screening) have not been easily accessible, especially to those in the lower income group, including public elementary school students, making them at risk for under-diagnosis of these vision problems. While there is a legislative bill in the Philippine senate establishing a national vision screening program for kindergarten pupils, this would cater only to children entering the public school system. Students past the kindergarten level might have undetected eye problems, as well.<sup>4</sup> Thus, from a public health perspective, addressing this concern is relevant and requires urgent attention.

The general objective of this investigation was to determine prevalence of undetected refractive errors among first grade students in a public elementary school. Through this vision screening, the students who needed comprehensive examination by a pediatric ophthalmologist were identified. In addition, it also identified among those who tested positive what specific type of refractive errors the students suffered from.

## Methods

A cross-sectional design was used in this investigation to estimate the prevalence of uncorrected refractive errors in the first grade students in San Perfecto Elementary School using the Welch Allyn Spot™ Vision Screener (Photoscreener). Eligible students who gave informed consent and assent answered a questionnaire and underwent an eye examination. The prevalence of undetected errors of refraction were computed for the sample population and for selected demographic variables. This study was approved by the Ethics Review Committee of UERMMMCI Research Institute for Health Sciences and coordinated with school authorities.

Subjects were chosen from the list of Grade 1 students enrolled in San Perfecto Elementary School. Sample size was estimated using an online application Open Epi to achieve a 95% level of confidence, precision of 5%, given an estimated prevalence of refractive errors of 5.04%.<sup>5</sup> The sample size obtained was adjusted for the anticipated non-participation rate; the final sample size was 82 subjects.

San Perfecto Elementary School was randomly selected based on the list of public elementary schools

of the Department of Education in San Juan City. A list of first grade students was obtained, and those aged 6 years or older were recruited, as per 2014 recommendations of the Philippine Eye Research Institute (PERI) to perform vision screening in children every 1 to 2 years, after attaining 5 years old.<sup>4</sup> The study was explained to the students and their parents. Written informed consent was obtained from their parents and assent, from the children. Students who did not sign the assent were eventually excluded from the study.

Prior to the vision screening, a simple questionnaire was administered to the students. The questionnaire was constructed by the researchers, based on previous studies that described the population of interest, and was duly pilot-tested. This data collection tool was used to describe the characteristics of the participants. It was administered to the students, with selected members of the research team assisting them. All students who agreed to participate in the research and answered the questionnaire were then examined using Welch Allyn Spot™ Vision Screener, which had been reported to have an 87.7% sensitivity and 75.9% specificity in detecting amblyopia.<sup>6</sup> Those found to have refractive errors were subsequently referred to the Department of Ophthalmology of the UERM Memorial Hospital PO Domingo Out-Patient Services for further evaluation and definitive management.

To ensure data integrity and minimize observer bias, only one person operated the equipment to screen all study participants. A Philippine board-certified pediatric ophthalmologist was also present during the study to supervise the examination procedure. In addition, there were only two assigned persons for data management (i.e., data coding, entry, cleaning, and statistical analysis). Frequencies were first encoded in Microsoft Office Excel 2013 and were then analyzed using Epi Info 7. The prevalence of undetected refractive errors was computed for the whole study population and according to age, sex, occupational status of parents, awareness of having errors of refraction, and access to ophthalmological health care.

## Results

There were 125 students who met the inclusion criteria, all of whom were invited and eventually recruited for the study. A total of 106 pupils participated in the study and their sociodemographic

profile is summarized in Tables 1 and 2. Majority of them (64.15%) were six years old, with equal proportions of male and female subjects. None of the study participants were wearing corrective eyeglasses during the data collection.

**Table 1.** Characteristics of respondents according to age, sex, and responses to survey (N=106)

Characteristic	Frequency	Percentage (%)
Age (yr)		
5	15	14.15
6	68	64.15
7	16	15.09
8 to 10	7	6.60
Mean ± SD = 6.17 ± 0.834		
Sex		
Male	53	50.00
Female	53	50.00
Primary caregiver at home		
Both parents	24	22.64
One parent	61	57.55
Others	21	19.81
Employment of parents		
Both parents not employed	6	5.66
Mother only employed	22	20.75
Father only employed	52	49.06
Both parents employed	26	24.53

The Welch Allyn Spot™ Vision Screener detected cases of refractive errors in 26 subjects, for an overall prevalence of 24.53%. As seen in Table 3, astigmatism was the most common bilateral (14.15%) or unilateral (8.49%) eye pathology. A few students had myopia (3.75%), hyperopia (2.83%), and anisometropia (2.83%), but there was no documentation of presbyopia.

The prevalence of refractive errors was also noted to be more common among the following subject profile: those who were five-year olds (26.67%), followed by six-year and seven-year olds, females (26.42%) versus males (Table 4); those whose primary caregiver was only one parent or someone else aside from their parents (2.00%), those whose parents were both unemployed (33.33%), those who admitted having poor vision (25.00%), those who consulted any physician to have their eyes examined in the

**Table 2.** Summary of responses to questionnaire

	n=106	%
Answer to "Malabo ba ang mata mo?"		
Yes	12	11.32
No	94	88.68
Did a doctor check respondent's eyes in the past year?		
Yes	20	18.87
No	86	81.13
"Does anyone in the family wear eyeglasses?"		
Yes	52	49.06
No	54	50.94
"Do you inform parents/teachers when you feel pain/itching in your eyes?"		
Yes	53	50.00
No	53	50.00
"Do you do homework at home before coming to school?"		
Yes	84	79.25
No	22	20.75
"Do you read books, aside from those assigned in school?"		
Yes	54	50.94
No	52	49.06
"Do you watch television?"		
Every day	69	65.09
A few times a week	31	29.25
Not at all	6	5.66
"Do you play video games?"		
Every day	44	41.51
A few times a week	29	27.36
Not at all	33	31.13
"Do you use the computer aside from playing video games?"		
Every day	23	21.7
A few times a week	16	15.09
Not at all	67	63.21
"Do you play outdoors or play sports?"		
Every day	57	53.77
A few times a week	19	17.92
Not at all	30	28.3

previous year (35.00%), those who did not have any relatives with corrective eyeglasses (25.93%), those who did not report to their teachers whenever their eyes were painful or felt itchy (26.42%), those who did their homework at home before going to school

(26.19%), those who did not read books aside from those assigned by the school (25.00%), those who never watched television (33.33%), those who played video games a few times per week (27.59%), those who never used the computer aside from playing video games, and those who never played sports or did outdoor activities (30.00%) (Please refer to Table 5).

### Discussion

The prevalence of refractive errors among Grade 1 students in San Perfecto Elementary School (24.53%) in San Juan City was higher than those shown in most literature in other countries. For instance, a study in Ethiopia found the prevalence of refractive

**Table 3.** Prevalence of type of refractive errors detected in the respondents based on visual screening

Type of refractive error	Frequency	Prevalence (%)
<b>Astigmatism</b>		
Right eye only	9	8.49
Left eye only	0	0
Both	15	14.15
<b>Myopia</b>		
Right eye only	2	1.89
Left eye only	0	0
Both	2	1.89
<b>Hyperopia</b>		
Right eye only	0	0
Left eye only	1	0.94
Both	2	1.89
<b>Anisometropia</b>		
	3	2.83

**Table 4.** Prevalence of refractive errors according to respondents' age and sex

	Prevalence (%)
<b>Age (yr)</b>	
5	26.67
6	25.00
7	25.00
8	20.00
<b>Sex</b>	
Male	22.65
Female	26.42

**Table 5.** Prevalence of refractive errors according to the respondents' answers to questionnaire

	Prevalence (%)
<b>Primary caregiver at home</b>	
Both parents	21.43
One parent	25.00
Others	25.00
<b>Employment of parents</b>	
Both unemployed	33.33
Mother only employed	18.18
Father only employed	26.92
Both employed	23.08
<b>"Malabo ba ang iyong mga mata?"</b>	
Yes	25.00
No	24.47
<b>Had their eyes checked by the physician in the last one year.</b>	
Yes	35.00
No	22.09
<b>Does another family member use eyeglasses?</b>	
Yes	23.08
No	25.93
<b>Report to their teachers whenever their eyes are painful or itchy</b>	
Yes	22.64
No	26.42
<b>Accomplishes their homework at home before going to school</b>	
Yes	26.19
No	18.18
<b>Reads books aside from those required by school</b>	
Yes	24.07
No	25.00
<b>Television use</b>	
Daily	26.09
A few times a week	19.35
Not at all	33.33
<b>Video game use</b>	
Daily	25.00
A few times a week	27.59
Not at all	21.21
<b>Computer use</b>	
Daily	26.09
A few times a week	18.75
Not at all	25.37
<b>Playing outdoors/playing sports</b>	
Daily	21.05
A few times a week	26.32
Not at all	30.00

errors among schoolchildren aged 7 to 15 to be 6.3%.<sup>7</sup> Another study in India reported that the prevalence of refractive error among schoolchildren of the same age bracket was 7.03%.<sup>8</sup> However, compared to the present study, these foreign studies used eye charts (e.g., Snellen and Jaeger) instead of the photo screener. Furthermore, refractive errors among the participants were more prevalent in the five-year olds than the older schoolchildren - a finding consistent with previous investigations that suggested the hyperopic shift might have taken place (i.e., myopia had been documented to be more prevalent in younger population and eventually diminishing with advanced age).<sup>9</sup> Thus, the prevalence of errors of refraction had been reported to be actually less among children more than 5 to 10 years of age.

More female schoolchildren had refractive errors than males. Some experts theorized that the eye of a female appeared to have a shorter axial length and shallower anterior chamber depth than that of a male; hence, the higher probability of being hyperopic among females.<sup>10</sup> However, this observation had been challenged by other investigations, and another viewpoint suggested that the prevalence of refractive errors among school-children did not significantly differ between biological sexes.<sup>11</sup> Nonetheless, more studies supported the female preponderance of refractive errors.

The prevalence of refractive errors was higher among those who admitted having poor vision and those who consulted the physician in the last one year with complaints of abnormal eyesight (i.e., painless blurring of vision). For schoolchildren with refractive errors who did not tell their teachers whenever their eyes felt painful or itchy, they could have resorted to excessive tearing, covering, blinking, closing, or rubbing their eyes instead to relieve their symptoms and to address the issue of blurring of vision.

It was striking that refractive errors were more common among those who did not have any known relatives wearing eyeglasses. Refractive errors, like most medical conditions, had been shown to have some form of genetic bases; they might have probable heritable traits. This finding suggests that the interaction of genetic and environmental factors could better predict the occurrence of refractive errors among children.

However, asking the schoolchildren for any relatives with eyeglasses entailed possible risk of

missing those who regularly used contact lenses, which the schoolchildren might be unaware of. In fact, in a study regarding awareness and attitude towards refractive error correction methods, 80.3% were unaware of contact lens usage, and a significant correlation between educational level and knowledge of contact lens usage was established. Some individuals, although suffering from visual impairment, might prefer not to wear eyeglasses at all, since some might argue that eyeglasses could have limiting effects on their activities of daily living, or they simply lacked access to affordable refractive services and corrective lenses.<sup>12</sup>

Nonetheless, disease of the eye might be undetected or under-diagnosed. For instance, in a study among Latin patients, 53% had various eye diseases, of which 63% were previously undetected.<sup>13</sup> Thus, further probe on the eye diseases of the schoolchildren's family and their corresponding knowledge might possibly reveal the current burden of refractive errors among the general population. However, this was beyond the scope of this study.

Majority of schoolchildren who never or minimally spent time doing outdoor and sports activities also had refractive errors. Recent pertinent studies had established among children who engaged more time doing outdoor activities had less chances of becoming myopic.<sup>14</sup> Some experts theorized that children might develop refractive errors from spending too much time indoors, or from reading or playing video games excessively, thereby exhausting their eyes, especially if they did so in poorly illuminated rooms, which could precipitate eyestrain.

On the other hand, refractive errors might cause these schoolchildren not to enjoy doing outdoor activities due to difficulty in seeing their surroundings, especially at a distance. Since the children were very much familiar with their homes, other experts suggested that children with undetected refractive errors might prefer to stay indoors because they found it more difficult to adapt outdoors, where more variable visual stimuli demanded more physiologic compensatory mechanisms in the eyes. These schoolchildren might also be discouraged to stay outdoors, perhaps because they were not at par with the play performance of their peers. Indeed, even before reaching schoolage, some children with visual impairments already exhibited some forms of clinical developmental delays, including inability to

appropriately participate in pretend play.<sup>13</sup> Moreover, others who had difficulty in symbolic play might also suffer deficits in language and social-emotional development.<sup>15</sup>

Another study linked unemployment of biological parents to uncorrected refractive errors among children and adult relatives.<sup>13</sup> Intuitively, these pictured a cycle of poverty, with possible concomitant malnutrition, leading to the public health burden of undetected refractive errors not only in pediatric populations, but also in adults and older age groups, across generations.

Using the Welch Allyn Spot™ Vision Screener, the prevalence of undetected refractive errors among school-age children in the first grade was 24.53% - a finding much higher as documented by other previous studies done in the Philippines. Refractive errors were more common in schoolchildren who were females, who belonged to the lower socioeconomic stratum, who did not regularly engage in outdoors activities, and peculiarly had no known relatives wearing corrective eyeglasses. The findings of this investigation suggested a more complex interplay of genetic and environmental factors, possibly affecting the prevalence of refractive errors in young pediatric populations.

This cross-sectional study described the burden of undetected refractive errors in a small pediatric population in San Juan City, using a novel screening tool - the Welch Allyn Spot™ Vision Screener. The said tool appeared to be a convenient method in screening for visual impairment in a resource-limited locality. However, there was no attempt to determine the accuracy of the said tool, nor was there any intention to establish causal factors for refractive errors in school-age children.

Future studies might explore the usefulness of the Welch Allyn Spot™ Vision Screener in generating a wider or even a national database on visual acuity disorders, in monitoring the progression of refractive errors in a cohort of study subjects, both pediatric and adult age groups, as well as in formulating health policies and future programs on eye and vision care. Probing for risk factors for eye diseases and visual impairment in children and their families, as well as their corresponding knowledge levels on proper eye care, might produce a more accurate picture of the true burden of errors of refraction among Filipino families and communities.

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Nyland LJ, Grimmer KA. Is undergraduate physiotherapy study a risk factor for low back pain? A prevalence study of LBP in physiotherapy students. Retrieved from: <http://www.Biomed-central.com/1471-2474/4/22>. 2003. [Accessed August 27, 2011].

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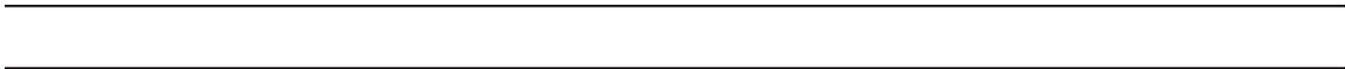
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## Discussion



Research Institute for Health Sciences  
2/F Jose M. Cuyegkeng Building  
University of the East Ramon Magsaysay Memorial Medical Center  
Aurora Boulevard, Brgy. Doña Imelda, Quezon City 1113  
Telefax (02) 716-1843; Trunk Line (02) 715-0861 loc. 358  
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