A STUDY OF KNOWLEDGE AND PERCEPTION ON BIODIVERSITY AMONG THE UNDERGRADUATE STUDENTS OF ALLIED HEALTHCARE SCIENCES, MRU, HYDERABAD

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ABSTRACT

The present study was carried out to assess the knowledge and perception of biodiversity and its protection and conservation amongst first-year undergraduate students at the School of Allied Healthcare Sciences, Malla Reddy University, Hyderabad, India. An institutional-based cross-sectional study was conducted from July 3 to 25, 2023. A self-administered questionnaire was used to collect data on socio-demographics, knowledge, and perception of biodiversity. Data were consolidated, coded, transferred, and analyzed with SPSS version 25. Three hundred forty-one students have participated, with a 100% response rate. More than 50% (N=179) of students had low knowledge scores on biodiversity, and 11.1% (N=38) showed negativity. Most students (86.2%) were aware that biodiversity loss leads to floods and global warming, and 89.7% of students believed they could do something to protect the world's biodiversity. Chi^2 test of the independent analysis showed that the Branch of study (BOS) and Family Income (FI) have a relationship with knowledge score, and the girls had a better perception (7.4; p=0.05) over boys. Pearson's correlation analysis between knowledge and perception scores showed a weak correlation (r=0.154 at p=0.01).

The present study revealed that the respondents had a moderate level of knowledge about biodiversity, and most of the students have a moderately positive attitude towards biodiversity and find themselves engaging in topics related to environmental behavior.

Keywords: Attitude, Biodiversity, Correlation, Ecosystem, Socio-demographic.

1. INTRODUCTION

Biodiversity is the variability among living organisms and the ecological complexes showing diversity within species, between species, and within ecosystems (UN Summit, 1992). Species diversity, genetic diversity, and ecological diversity make up biological diversity (Swift et al., 2004). Biological diversity encompasses all levels of biological organization, including species, genes, and ecosystems (Gaston and Spicer, 2004). Biodiversity provides numerous benefits to humans and is involved in ecological functions (MEA, 2005). India is one of the world's megadiverse nations, with approximately 10 percent of the world's species and an ancient cultural heritage. According to the International Union for Conservation of Nature (IUCN), India is a diverse country with 2.4% of the world's land area accounting for 7-8% of all documented species, including species of flora and fauna including about 91,000 species of animals (6.5% of the world's fauna) and 45,500 species of plants (7% of the world's total), which have been documented in its ten bio-geographic regions.

The accelerating decline in biodiversity due to human activities (Beckrich, 2011) and changes in the climate are currently adding effects to the collective burdens (Williamson and Bodle, 2016). As the diversity of flora and animals across the globe continues to decline, it is essential to raise public awareness about the need to conserve biodiversity (Kenneth and Ernest, 2011). There are a number of national, regional, and international policy mechanisms designed for biodiversity conservation, and the imperative to reduce human impact on biodiversity is widely acknowledged by governments in a variety of nations (Rands et al., 2010). Knowledge (Kelkar, 2007) and perspective (Boland and Tenkasi, 1995) are necessary to design and implement management measures for conserving and protecting natural resources. Education is a means of knowledge acquisition (Rwanamiza, 2009), and conservation and management projects cannot proceed smoothly without education, information, and awareness (Morar and Peterlicean, 2005; Howe, 2009).

In contrast, the perspective of a person's viewpoint can be used to predict his behavior or response to something (Kruglanski et al., 2018). The current generation, particularly children and youth, are the two most important actors in preventing the loss of all biodiversity and natural resources (Morar and Peterlicean, 2005). Educating them at a young age can help them gain a broader perspective and become champions for biodiversity by actively participating in conserving and protecting natural resources (Šorytė and Pakalniškienė, 2019).

The present study aimed to gather information on the level of knowledge and perceptions on biodiversity, its protection and conservation, recognize the probable relationship between students' profiles and their knowledge and perspective on biodiversity and determine the correlation between knowledge on biodiversity and their perspective on its conservation and protection among the first-year undergraduate students.

2. METHODOLOGY

2.1. Study area, subjects, design, and period

The study was conducted at the School of Allied and Healthcare Sciences, Malla Reddy University, Hyderabad, India. An institutional-based cross-sectional study design was conducted from the 3rd to the 25th of July 2023, and the data was collected from all undergraduate students enrolled in different allied health science programs.

2.2. Sample Size Calculation -

The sample size for a finite population equation was used. The following online software was used to determine the sample size (https://www.surveysystem.com/sscalc.htm). The confidence level was 95%, the confidence interval was 4.5, the population size was 1200, and the sample required was 341.

2.3. Data collection tool and procedure -

A self-administered close-ended questionnaire along with an observational checklist was designed. The questionnaire was classified into three parts; the first was socio-demographic data with five questions from (Table 1), which contained gender, age, Branch, religion, and percentage of marks obtained. The knowledge part had nine questions (Table 3), and the perception part had ten questions (Table 5).

2.4. Data quality management

Before starting the actual survey, the questionnaire was pretested on about 2% of the total sample at the School of Allied Health Sciences. After pretesting, the questionnaire was checked and structured by the principal investigator. Before data collection, proper measures and corrections were taken on time for data completeness and accuracy.

2.5. Data processing and analysis

The collected data were edited, coded, and cleaned up in Excel and transferred into SPSS version 25 for analysis. Knowledge, defined as an understanding of the fundamentals of biodiversity, was analyzed by inquiring nine questions regarding basic fundamental biodiversity concepts. All the inquired questions had five responses, and correct answers to each knowledge statement were given a score of 1 and wrong answers as 0. Hence, the overall knowledge score for each student was obtained by adding the correct answers to the nine knowledge statements. Perception, with means of immediate awareness to perceive something based on the knowledge, was assessed by inquiring ten questions regarding student's perception of biodiversity. For perception questions, a favorable response (yes) was given a score of 1, whereas an unfavorable response (no) was given a score of 0; by adding coded responses for each perception question, overall perception scores were obtained for the ten inquired questions for each student. Knowledge assessment scores taken were in the range of 0-3 (low), 4-6 (moderate) and 7-9 (high). Perception assessment scores taken were in the range of 0-4 (negative), 5-7 (moderately positive) and 8-10 (positive).

Descriptive statistics were used to summarize the results. The chi^2 test of independence was used to understand the impact of independent variables on knowledge and perception. Pearson's correlation was done to study the association of knowledge and perception scores; all tests considered statistical significance at $p \leq 0.05$ level.

2.5. Ethical considerations - The present study does not need an ethical clearance.

3. RESULTS

3.1. Socio-demographic profile of respondents

A total of 341 students participated, with a 100% response rate. The mean age (±SD) of respondents was 19.09 ± 1.92 years. Of this, 73.6% were female students (N = 251), with higher female preponderance over male students.

Among the Branch of study (BOS), 101 (29.6%) students were from MBT (Medical Biotechnology) and 23 (6.7%) students from other (other six courses). The majority of the participants belonged to Hinduism (91.8%, N = 313). From Telangana state, 36.4% of students' family average income was below 30 thousand Indian Rupees, and fifty percent of the students (N=171, 50.1%) were from urban backgrounds.

3.2. Students' knowledge of biodiversity -

Based on students' responses to the knowledge assessment questions, the knowledge assessment test yielded scores ranging from 0 to 8 on a scale of 9. Only 5% of students were found to have high knowledge assessment scores, and more than fifty percent of the students (52.5%) who participated in the survey were found to have low knowledge assessment scores (0-3) (Table 2). Moreover, eight students scored 0 (2.3%) and were unaware of biodiversity.

The student's level of knowledge about biodiversity was calculated using nine questions rating how many the students thought they knew about each inquired question, and responses were summarized in Table 3. Among the inquired questions, students responded to a great extent (86.2%) to the question "Are loss of biodiversity cause flooding, shortage of food, airpollution and global warming?" with a high knowledge assessment score (0.86 ± 0.34). Likewise, 52.8% and 57.2% of students responded to a reasonable extent for the inquired questions "Wildlife is destroyed mostly by" and "Which is the major cause of extinction of different species?" respectively. On the other hand, students who participated in the survey had modest to low knowledge assessment scores for the other inquired questions.

3.3. Students' Perception of Biodiversity -

Students' scores on the perspective assessment test ranged from 0 to 10 out of 10 items (Table 4). Nearly 50 percent of students (N=167, 49%) had a moderately positive perception, and 39.9% (N=136) possessed a positive perception of biodiversity protection and maintenance. On the other hand, 1.8% (N=6) of students did not perceive biodiversity and its fortification.

The students' perception of biodiversity was analyzed using ten biodiversity-related statements. Table 5 presents the Mean and SD of knowledge and perception assessment scores. Most (89.7%) students believe that they can do something to protect the world's biodiversity. As well, 81.8% of students are aware that today's activities will have a greatimpact on tomorrow's biodiversity. It is greatly appreciable that 81.5% of students want to plant at least one appropriate tree every year to maintain biodiversity. Similarly, 82.7% of students acknowledge the importance of reuse, reduce, and recycle in conserving biodiversity. Most of the students who participated in the survey have a positive perception of conserving water and avoid stepping on flowers and crops to maintain high biodiversity.

3.4. Relationship among Students' socio-demographics, knowledge, and perspective on biodiversity

To determine the impact of various socio-demographic characteristics such as course (BOS), place of birth (POB), gender, age, and Family Income (FI) on biodiversity knowledge and perception, a Chi^2 test of independence was used (Table 6). The findings of the Chi^2 independence test revealed the association between respondents' demographic and knowledge levels, as well as students' perspectives on biodiversity. The independent variables, BOS and FI had a great impact on knowledge scores at p=0.01 statistically significant level. Alternatively, gender and POB had an impact on perception scores at a p=0.05 statistically significant level. The association between biodiversity knowledge and perspective was also investigated. The correlation between these two variables was low, r (341) = 0.154, p=0.01. The scatter diagram revealed a weak linear trend describing the association between students' knowledge and perspectives (Figure 1).

Pearson's correlation was calculated to measure the strength of the linear relationship between two variables, knowledge and perception scores. Spearman's bivariate correlation analysis between knowledge and perception at p=0.01 indicated a weak significance of correlation with a Pearson's value of r = 0.154 (Table-7).

4. DISCUSSION

An essential requirement for the successful protection and conservation of biodiversity is that the public comprehend the complexity of the interrelationships between the physical environment and human activity (Chan, 1996). The current study demonstrated that students were acutely aware of the pervasiveness of biodiversity. In addition, they felt that biodiversity only encompassed the variety of life forms in terrestrial habitats. Students ' knowledge of biodiversity and its conservation is generally appreciable, with moderate assessment scores. The perception of students toward biodiversity was proven to be beneficial for the protection and preservation of biodiversity. The majority of students' responses regarding biodiversity and its preservation align with the findings of other academics (Purvis and Hector, 2000; Mooney, 2002).

In the present study, scatter plot analysis exposed that with the increase in students' knowledge of biodiversity, the students' perception improved a little with a weak correlation. Most of the students had positive perceptions towards biodiversity protection and admitted the importance of reuse, reduce, and recycle in conserving biodiversity. Nisiforou and Charalambides (2012) found significant differences with regard to the level of knowledge about biodiversity between first- and second-year university students. Conversely, no significant differences were found in attitudes and behavior towards biodiversity.

Concerning gender differences, several studies have shown that gender differences are present between an individual's level of knowledge, attitudes, and behavior (Arcury, 1990). In the present study, as the female students' preponderance is high in the survey, the female gender alone is a positive association with the perception scores of students. Mohai (1992) observed that women are more concerned about environmental issues than men. Riechard and Peterson (1998) on college students found that female students had a significantly higher perception of environmental risk scores than male students did. Boca and Saracli (2019) observed a positive correlation between the

perception, attitude, and behavior variables among the university students enrolled in different specializations. Hui-Ju Huang and Yu-Teh Kirk Lin (2014) investigated American and Taiwanese undergraduate students' attitudes toward biodiversity and found significant differences between different groups.

Regarding their perspective on biodiversity, 81.8% of students are willing to reuse, reduce, and recycle. Furthermore, the majority of students agreed that their activities can aid in preserving and protecting biodiversity. It was consistent with the findings of Nisiforou and Charalambides (2012), who indicated that 90% of students felt positive about their ability to maintain biodiversity. However, 90% of students favored the use of invasive species. According to Gallardo et al. in 2019, invasive species are the leading cause of extinction and environmental degradation.

Biodiversity is really vital, and these findings suggest the curriculums of all degree programs will be re-evaluated. The administration must ensure that every level of education program should provide students with an environmental education that emphasizes biodiversity. Consequently, each curriculum must include at least one subject, viz., Environmental Science, Environmental Management, People and Ecosystems, to assist students to become environmentally literate and ecologically conscientious.

5. CONCLUSION

The findings in the present study have shown that the first-year undergraduate students had a moderate level of perceived knowledge about biodiversity and its preservation. It is highly appreciable that, overall, students have a positive attitude towards biodiversity and motivate themselves to engage in environmental behavior studies. There is a need to stress the significance of biodiversity in educational institutions with the aim of benefiting both student's knowledge and the future welfare of the upcoming generations.

6. Acknowledgement

7. Conflict of Interest -We declare no conflict of interest among the authors.

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Table 1: Socio-demographics of study participants

Demographics inquired		N=341	Percentage (%)
Gender	Male	90	26.4
	Female	251	73.6
*Age	18 to 19	274	80.4
	20 to 21	48	14.1
	>21 Years	19	5.6
BOS	AOTT	72	20.6
	BMB	68	19.9
	CVT	43	12.6
	EMCCT	21	6.2
	MBT	101	29.6
	MLT	13	3.8

	Others	23	6.7
Religion	Hinduism	313	91.8
	Christianity	20	5.9
	Islam	8	2.3
Marks (%)	>80	220	64.5
	66-79	86	25.2
	<66	35	10.3

*Mean age: 19.09 (± 1.922 SD)

Table 2: Frequency table of knowledge assessment score

Assessment Score	Ranged values	N=341	Percent (%)
Knowledge assessment score	0-3 (Low)	179	52.5
	4-6 (Moderate)	145	42.5
	7-9 (High)	17	5.0

Table 3: Mean and SD of knowledge and perception assessment scores

	Knowledge Questions inquired	N	%	Mean	SD
1	Hot spots are regions of highs of what?	97	28.4	0.28	0.452
2	Which of the following is true about biodiversity?	132	38.7	0.39	0.488
3	Which of the following regions has the maximum diversity?	26	7.6	0.08	0.266
4	The loss of biodiversity causes flooding, food shortage, airpollution, and global warming.	294	86.2	0.86	0.345
5	What is the most important reason for a decrease in biodiversity?	70	20.5	0.21	0.404
6	Wildlife is destroyed mostly by	180	52.8	0.53	0.500
7	Which is the major cause of the extinction of different species	195	57.2	0.57	0.496
8	Identify the species that has the maximum genetic diversity India.	150	44.0	0.44	0.497
9	Which of the following is an example of an ex-situ conservation?	64	18.8	0.19	0.391

Table 4: Frequency table of perception assessment score

Assessment Score	Ranged values	N=341	Percent (%)
Perception assessment score	0-4 (Negative)	38	11.1
	5-7 (Moderately positive)	167	49.0
	8-10 (Positive)	136	39.9

Table 5: Mean and SD of knowledge and perception assessment scores

|	Perception Questions inquired	N	%	Mean	SD
1	I believe I can do something to protect the world's biodiversity.	306	89.7	0.90	0.304
2	I think it is best to plant invasive species like Mahogany (*Swieteniamacrophylla*) and Ipil-ipil (*Leucaena luecocephala*) in an ecosystem.	219	64.2	0.64	0.480
3	I acknowledge the importance of 3Rs (reuse, reduce, and recycle) inconserving biodiversity.	282	82.7	0.83	0.379
4	It is acceptable to utilize abundant plant species without replacing them because they are still numerous in count.	224	65.7	0.66	0.475
5	I know that shortening my shower time can conserve water.	266	78.0	0.78	0.415
6	I would not mind throwing plastics in the bodies of water. It will notdecrease biodiversity.	161	47.2	0.47	0.500
7	I know that avoidance of stepping on flowers and crops can maintainhigh biodiversity.	239	70.1	0.70	0.459
8	It is okay for me to convert forestland to have malls and otherestablishments.	159	46.6	0.47	0.500
9	I would like to plant at least one appropriate tree species every year tomaintain biodiversity.	278	81.5	0.82	0.389
10	Have you ever thought your today's activities will have a great impact on our tomorrow's biodiversity?	279	81.8	0.82	0.386

Table 6: Chi-square test' p-values for respondents and relationship with knowledge and perspective scores

	Independent variable	Knowledge score		Perspective score	
		Chi^2 value	p-value	Chi2 value	p-value
	BOS	29.1*	0.004	4.485	0.973
	POB	0.269	0.992	11.75	0.019
	FI	24.508*	0.002	7.396	0.495
	Gender	0.222	0.895	7.4*	0.025
	Age	10.32	0.035	6.48	0.166
	Percent (%)	5.197	0.268	7.676	0.104

* Statistically significant at p=0.01 level

Table 7: Correlation of knowledge and perspective scores (N=341, p=0.01)

Scores	Mean	SD	Pearson's r value
Knowledge score	3.54	1.69	
			0.154
Perception score	7.08	2.24	
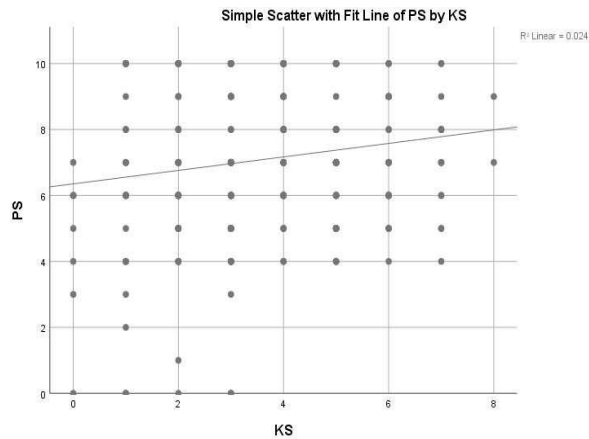
Figure 1: Scatter plot of the relationship between knowledge and perception of students towards biodiversity