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Original Article

Ophthalmology Section

Knowledge and Attitude about Eye Donation among First and Second versus Final Year MBBS Students: A Cross-sectional Study

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ABSTRACT

Introduction: The cure of corneal blindness requires manifold increase in the rate of eye donation. The present study was undertaken to assess the knowledge and attitude about eye donation among medical students. A secondary objective of the study was to assess the impact of knowledge of eye donation after studying ophthalmology among the final year students of the MBBS (Bachelor of Medicine Bachelor of Surgery) graduation course.

Aim: To assess knowledge and attitude about eye donation among first, second and final year medical students. Also, to assess the impact of studying 'Ophthalmology' on their knowledge.

Materials and Methods: A cross-sectional study was conducted by collecting information on a predesigned, structured questionnaire on 'Google forms' and sending a soft copy to 601 students of two medical colleges i.e, GGS Medical College, Faridkot and Dayanand Medical College, Ludhiana, Punjab, India, by email, from March 2019 to April 2019. There were questions about awareness and source of information about eye donation in medical students, knowledge of criteria, and willingness to donate eyes. Responses were accepted till a period of seven days. Students were divided into two groups; group A (n=320 students) with 165 students in first professional year and 155 in second professional year, who had not studied Ophthalmology. Group B (n=281 students) with 142 students in final (part I) professional year and 139 in final (part II) professional year, who had/were studying Ophthalmology. Results were analysed and compared using Chi-square test.

Results: Out of 601 students, 527 responded (272 of group A and 255 of group B). The results on knowledge and willingness to donate eyes were quite encouraging. Most of the questions were answered by more than 400 students. Majority of students cited teachers/friends as their source of knowledge. However, there was a significant gap in knowledge in the students, specially before reading Ophthalmology (p-value <0.05).

Conclusion: More efforts in the form of counselling techniques, short trainings, videos, need to be put into medical curriculum, ophthalmology teaching and short in-job trainings to make the MBBS students an important link in increasing cornea retrieval.

Keywords: Bachelor of medicine, Bachelor of surgery curriculum, Cornea transplantation, Eye banks

INTRODUCTION

A large proportion of the huge burden of blindness in India is avoidable [1]. Global prevalence of blindness was 3.38% in 2015 [2]. According to the National Blindness and Visually Impaired Survey, the major cause of blindness in the population aged 0-49 years was corneal opacity contributing 37.5% [3]. Urgent preventive and therapeutic measures are needed to decrease this increasing burden. It has been reported that nearly 90% of the global cases of ocular trauma and corneal ulceration leading to corneal blindness occur in developing countries [4]. It is treatable by keratoplasty in most cases. However, a major obstacle for a corneal transplant is a lack of awareness about eye donation and a negative attitude in the general population [5].

The current corneal procurement rate stands at 49,000 per year [6]. It is estimated that 277,000 donor tissues are needed every year, and the shortage of transplantable tissue deserves much attention [6]. Hospital Cornea Retrieval Program (HRCP) has proven to be an effective technique for eye donation [7]. To further increase the procurement of corneas, medical professionals can enhance the eye donation rates by educating and motivating the relatives in case of a patient's death. Hence, the present study was undertaken to assess the knowledge and attitude about eye donation among medical students of Punjab. In India, Ophthalmology subject is taught in 'final (part I) professional year (phase 3)' of MBBS course; and no study has yet assessed its impact on student knowledge on eye banking and donation. So, secondary objective of the study was to assess the impact of knowledge of eye donation after studying ophthalmology among the final year students of the MBBS (Bachelor of Medicine Bachelor of Surgery) graduation course.

MATERIALS AND METHODS

A cross-sectional study was conducted among medical students of two medical colleges i.e, GGS Medical College, Faridkot and Dayanand Medical College, Ludhiana, Punjab, India, from March 2019 to April 2019. This study was approved by Institutional Review Board and complied with by the Declaration of Helinski. All the required information was collected on the self-designed, structured questionnaire on 'Google forms' (attached as [Table/Fig-1], and as supplemental file) sent to students as email link to elicit responses. Responses were accepted till a period of seven days. The validity of the research tool was checked by an intramural pilot study (n=12) from passed out MBBS students.

Inclusion and Exclusion criteria: All first, second and final year students of GGS Medical College and Dayanand Medical College were included in the study. Those students who did not respond within the seven days period were automatically excluded from the study.

Questionnaire

The questionnaire was divided into four parts

- True/false option questions,
- Multiple-choice questions,
- Yes/no option questions, and
- Personal information.

It consisted of 16 questions pertaining to finding the knowledge and source of information about eye donation in medical students, knowledge of criteria, and willingness to donate eyes.

Total 601 MBBS students studying in the two medical colleges were included and the questionnaire was emailed to them.

A. True/False Questions

1. One eye donor can provide vision to two blind persons?
   True/False
2. The whole eyeball is removed during donation?
   True/False
3. Only the cornea (the anterior transparent part of the eye) is used for transplantation?
   True/False
4. Only corneal blindness can be cured by corneal transplant?
   True/False
5. The ideal time interval between death and enucleation (removal of the eye) is preferably within 6 hours?
   True/False
6. The eye removal takes only 10-15 minutes.?
   True/False
7. The eye donation from a living person is not accepted.
   True/False
8. There occurs no disfigurement of face after eye donation.
   True/False

B. Multiple Correct Answers

1. What is your source of knowledge about eye donation?
   a. Teachers/Friends
   b. Books
   c. Hospital advertisements
   d. Television/Radio
   e. Newspapers/Magazines
   f. Internet
2. According to you, who all can donate their eyes?
   a. People using Spectacles
   b. Eyes operated for cataract
   c. After any eye surgery
   d. At any age
   e. Person with AIDS (HIV)/Cancer/Any communicable disease
   f. Persons with Diabetes/Hypertension (High blood pressure)

C. Yes/No Response

1. Do you know that the consent of relatives is required for eye donation after death?
   Yes/No
2. Do you know whom to contact for eye donation after the death of any relative?
   Yes/No
3. Do you know that the eye bank team removes the eyes at the home of the deceased? or at the hospital (if death occurs in the hospital)?
   Yes/No
4. Do you think that there is a lack of awareness among people for eye donation?
   Yes/No
5. Are you willing to donate your eyes?
   Yes/No
6. Have you registered for an eye donation?
   Yes/No

D. Personal Information

1. College
2. Professional year
3. Age (in years)

[Table/Fig-1]: The questionnaire: It comprised of four parts- true/false type questions, yes/no type questions, multiple choice questions and personal information.
HIV: Human immunodeficiency virus; AIDS: Acquired immune deficiency syndrome

Group A (n=320): Students studying preclinical and paraclinical subjects who had not studied Ophthalmology.

First professional year n=165

Second professional year n=155

Group B (n=281): Students after studying the subject.

Final-I professional year n=142

Final-II professional year n=139

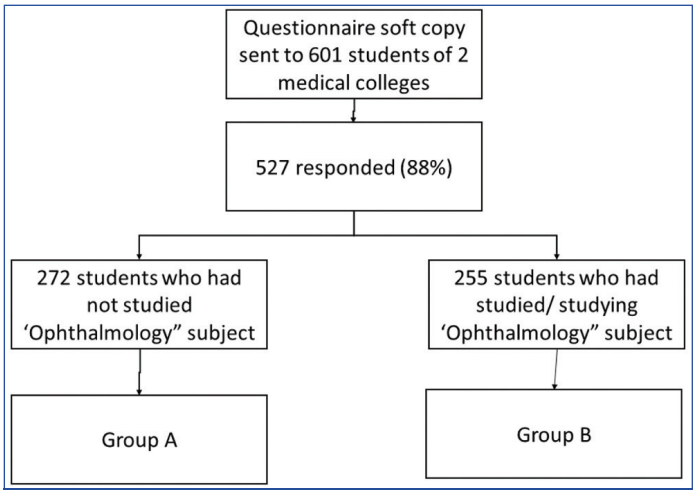
With an implied consent, the students were directed to answer the questionnaire by themselves, without help from other information sources (individual/books/internet). Knowledge gap was defined as the gap between knowledge of medical students before and after studying ophthalmology. Data collected was nominal data thus no scoring system was used.

STATISTICAL ANALYSIS

The information attained from the students' responses to the questions were analysed using the Chi-square test. The comparison was done between group A and group B and significant difference between their knowledge was labelled as 'impact of studying Ophthalmology/knowledge gap between groups'. A p-values less than 0.05 were taken as statistically significant. All statistical calculations were done using Statistical Package for the Social Science version 21.0 (SPSS Inc., Chicago, IL, United States of America) statistical program for Microsoft Windows. Knowledge and attitude were assessed for difference between groups by calculating p-value using Chi-square test.

RESULTS

The questionnaire was sent to 601 students (320 and 281 who had not and were studying/studied 'Ophthalmology' subject, respectively) of two medical colleges. Out of them, 527 students participated and provided responses. Out of these, 272 in the first and second professional year who had not studied Ophthalmology were labelled as group A, and the remaining 255 in the final professional year who were studying/had studied Ophthalmology were labelled as group B. The study flow diagram is provided as [Table/Fig-2]. The groups were uniform with regards parent institution and constituent number of students. The age of the students ranged from 18-24 years with a mean of 20.25±1.52 years. The demographic details are provided in [Table/Fig-3].



[Table/Fig-2]: Line diagram showing study flow.

The answers provided by the medical students to 'true/false questions are aggregated in [Table/Fig-4]. In response to MCQ on 'source of knowledge' about eye donation, the responses are aggregated in [Table/Fig-5]. Most common answer was from friends/teachers. In answers to MCQ on 'eligibility to donate' are summarised in [Table/Fig-6]. The answers to 'yes/no style questions are aggregated in [Table/Fig-7].

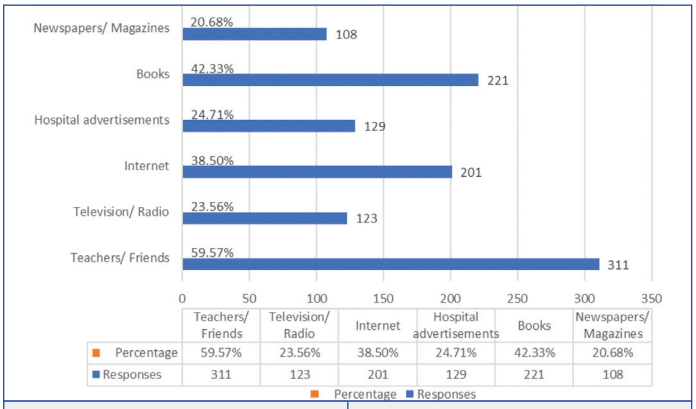
Most of the questions were answered by >50 % of students in both groups except two questions. One was from 'true/false' category

Variables	Group A				Group B				Total
No. of students	272				255				527
Age (years)	19.42				21.29				20.35
College	GGS Medical College		Dayanand Medical College		GGS Medical College		Dayanand Medical College		
Professional year	First professional	Second professional	First professional	Second professional	New final (part 1) professional	Old final (part 2) professional	New final (part 1) professional	Old final (part 2) professional	
	83	97	47	45	85	88	40	42	

[Table/Fig-3]: Demographic details of students of group A (1st and 2nd professional year MBBS) and group B (3rd and Final professional year MBBS).

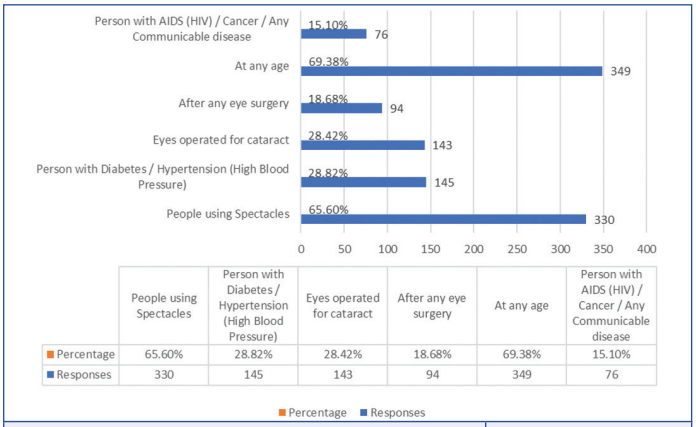
S. No.	Questions	Correct answers			p-value
		Total (n=527) (n, %)	Group A (n=272) (n, %)	Group B (n=255) (n, %)	
1	One eye donor can provide vision to two blind persons?	484/523 (92.5%)	244/270 (90.4%)	240/253 (94.9%)	0.05
2	Only cornea (the anterior transparent part of eye) is used for corneal transplantation?	456/519 (87.9%)	230/268 (85.8%)	226/251 (90.0%)	0.14
3	Only corneal blindness can be cured by corneal transplant?	343/520 (66.0%)	170/268 (63.4%)	173/252 (68.7%)	0.20
4	The ideal time interval between death and enucleation (removal of eye) is preferably within 6 hours?	459/515 (89.1%)	221/265 (83.4%)	238/250 (95.2%)	0.01
5	The eye removal takes only 10-15 minutes?	422/507 (83.2%)	204/261 (78.2%)	218/246 (88.6%)	0.01
6	The eye donation from a living person is not accepted?	303/519 (58.4%)	135/266 (50.8%)	168/253 (66.4%)	0.01
7	There occurs no disfigurement of face after eye donation?	403/517 (78.0%)	225/266 (84.6%)	178/251 (70.9%)	0.01

[Table/Fig-4]: Answers provided to 'true/false' type questions.
(Difference between groups calculated using Chi-square test)
*The numbers provided are correct answers followed by number of students who answered the question. Percentage is provided in parenthesis



Sources of knowledge	Responses (n,%) (n=522)
Teachers/Friends	311 (59.57%)
Television/Radio	123 (23.56%)
Internet	201 (38.50%)
Hospital advertisements	129 (24.71%)
Books	221 (42.33%)
Newspapers/Magazines	108 (20.68%)

[Table/Fig-5]: Responses of students on source of knowledge about eye donation (n=522).



According to you who all can donate their eyes?	Responses (%) (n=503)
People using spectacles	330 (65.6%)
Person with Diabetes/Hypertension (High blood pressure)	145 (28.82%)
Eyes operated for cataract	143 (28.42%)
After any eye surgery	94 (18.68%)
At any age	349 (69.38%)
Person with AIDS (HIV)/Cancer/Any communicable disease	76 (15.10%)

[Table/Fig-6]: Responses of students' on "who can donate eyes". (n=503).

i.e. 'The whole eyeball is removed during donation' (23.7% response rate, p-value=0.35) and other was from 'yes/no' category i.e. 'Have you registered for eye donation' (0.03% response rate, p-value=0.89). The response rate of both these was quite less. The first question

S. No.	Questions	Answered as yes			p-value
		Total	Group A	Group B	
1	Do you know that the consent of relatives is required for eye donation after death?	395/524 (75.4%)	232/270 (85.9%)	163/254 (64.2%)	0.01
2	Do you know whom to contact for eye donation after the death of any relative?	308/524 (58.8%)	149/270 (55.2%)	159/254 (62.6%)	0.08
3	Do you know that the eye bank team removes the eyes at the home of the deceased or at the hospital (if death occurs in hospital)?	371/520 (71.4%)	172/268 (64.2%)	199/252 (79.0%)	0.01
4	Do you think that there is a lack of awareness among people for eye donation?	503/524 (96.0%)	259/270 (95.9%)	244/254 (96.1%)	0.94
5	Are you willing to donate your eyes?	369/519 (71.1%)	180/268 (67.2%)	189/251 (75.3%)	0.04

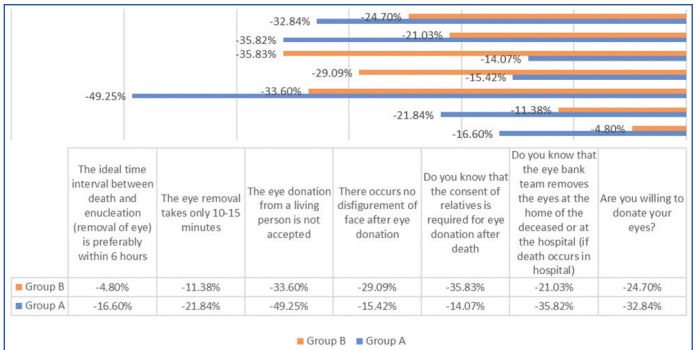
[Table/Fig-7]: Answers to 'yes/no' questions.
(Chi-square test used to calculate difference between the groups)
*The numbers provided are 'yes' answers followed by number of students who answered the question. Percentage is provided in parenthesis

was of a dubious response (correct response could be both true and false) as we all know that the whole eyeball is often removed from the donor for the purpose of corneal transplantation. Yet only donor corneal button harvest is also practical, successful, and is being practiced in some centres. The advantage of the removal of the whole eyeball is that other parts like the sclera can also be used for surgical and research purposes. The second question with poor response rate was of a personally directed nature. The dubious and personal nature of these questions had remained undetected even after the pilot study. Thus, to decrease bias, both of these were removed from the final analysis.

Significant differences in responses were obtained from both the groups implying the impact of studying 'Ophthalmology subject'. These differences were in response to questions like the ideal time interval between death and enucleation {83.4% of the Group A students gave correct response versus 95.2% of Group B students (p-value=0.01)}, time taken for eye removal {78.2% of the Group A students gave correct response versus 88.6% of Group B students (p-value=0.01)}. The differences are summarised in [Table/Fig-8] in the form of gaps in knowledge. Students were more knowledgeable and sensitised to the issue after studying 'Ophthalmology' subject in most aspects.

DISCUSSION

The level of knowledge and attitude of medical students are important determinants in promoting eye donation as they are future potential motivators and donors. The present study showed that 92.5% of the students were aware of the aspect of one donor providing vision for two eyes. This fact was known by 74.1% of college students and 87.5% of the general population in different studies [8,9]. The current study population knew better perhaps



	The ideal time interval between death and enucleation (removal of eye) is preferably within 6 hours	The eye removal takes only 10-15 minutes	The eye donation from a living person is not accepted	There occurs no disfigurement of face after eye donation	Do you know that the consent of relatives is required for eye donation after death	Do you know that the eye bank team removes the eyes at the home of the deceased or at the hospital (if death occurs in hospital)	Are you willing to donate your eyes?
Group B	-4.80%	-11.38%	-33.60%	-29.09%	-35.83%	-21.03%	-24.70%
Group A	-16.60%	-21.84%	-49.25%	-15.42%	-14.07%	-35.82%	-32.84%

[Table/Fig-8]: Bar graph showing percentage of students with knowledge gap in groups A and B. Group B shows less knowledge gap in all aspects (after studying Ophthalmology). It suggests a definite positive impact on knowledge.
Note: Gap knowledge was calculated as: False responses divided by grand total of responses in group A or group B multiply by 100 (negative values)

because MBBS students are more knowledgeable specially in biological sciences.

The timing of eye donation is important, it may not be ideal to utilise eyes that are donated later than six hours after death for optical purposes due to endothelial cell loss. In the present study, a large number of students (89.1%) knew that the ideal time for donation is within six hours of death unlike the study conducted by Dhaliwal U, who observed that 79.6% of medical students knew that eyes can be donated after death and 63.3% knew that it should be done within six hours [10]. The low proportion of people who are aware of the optimal time to donate eyes despite awareness of eye donations suggests that a large proportion of donated eyes may not become available at the optimal time.

Only 58.38% of students knew that eyes could be donated only after death. This is a disturbing fact in comparison to a study conducted by Gupta A et al., where 96.8% of the nursing students were aware that eyes can be donated only after death [11]. Other organs like kidneys or liver may be donated by a live person, however not eyeball/cornea. Also, there were three questions-pertaining to disfigurement of face, relative consent and only ophthalmic part cornea being used for transplantation-to which answers of group A were more accurate. This highlights the inconsistency and shallow depth of knowledge of students even after studying the subject. The curriculum for the medical students should thus be altered to add some videos, roleplays, and other teaching-learning methods so that students can envision the eye donation process.

Coming to next category of Multiple-Choice Question (MCQ), teachers/friends followed by books, was the most important source for awareness about eye donation among the student population. Bhandary S et al., (n=400), Krishnaiah S et al., (n=7775) and Dandona R et al., (n=2522) also did questionnaire or interview-based studies on general population; they found mass media to be major source of knowledge on eye donation in 55.7%, 79.2% and 83.3% of study population, respectively [5,12,13]. However, in a community outreach questionnaire survey on 527 adults by Priyadarshini B et al., among the adult population of South India, the major source of knowledge was publicity campaigns (105, 19,9%) [14].

The other MCQ was about who could donate eyes. There is no age bar for an eye donor. All deceased people can be considered as suitable donors except with blood-borne viral illnesses like Hepatitis B Virus (HBV) and Hepatitis C Virus (HCV), Human Immunodeficiency Virus (HIV) infection, and systemic malignancies which are absolute contraindications as they may affect the recipient. But a great number of students in the present study had misconceptions about the contraindications of eye donation. About two-thirds thought that previous eye surgery and chronic diseases like hypertension or diabetes were contraindications to eye donation. In a study conducted by Dhaliwal U, medical students labelled corneal diseases (85.7%), HIV (38.8%), and HBV (22.4%) as contraindications for eye donation [10]. In the present study 63.4% students knew that corneal donation could not cure all types of blindness. In a study by Dhanushia G et al., three-fourths of medical and half the non medical students knew that corneal donation could not cure all types of blindness. The knowledge that first-degree relatives have the right to give consent for eye donation was 88.2% and 49.5% among medical and nonmedical students respectively (p<0.01). In our study 85.9% of group A and 64.2% of group B students knew that relatives have the right to give consent for the dead [15].

The last category of questions in the questionnaire was the 'yes/no' category. Donors' consent before death should form the basis for eye donation according to the Human Organ Transplantation Act 1995 [16]. However, consent from adult family members of the deceased needs to be obtained. Tandon R et al., did a study on the responses of relatives of post-mortem cases; identified 159 potential donors, but only 44.3% of potential donors gave consent for donation after intensive counseling [17]. The wrong perception of disfigurement of the face is one of the major reasons which restrict relatives of the deceased from eye donation. 78 % of participants in the present study knew that there occurs no disfigurement of the face after eye donation. Likewise, other studies by Dandona R et al., (n=2522), Priyadarshini B et al., (n=527) and Tandon R et al., (n=159) quoted objection by family members, disfiguring the body, donation being a time-consuming process delaying religious rites, and religious restrictions as reasons for not agreeing to donate eyes [13,14,17]. Authors feel that medicos with their knowledge and empathetic behaviour are a powerful medium to help overcome these inhibitions and superstitions.

It was interesting to note that 71% of students were willing to pledge their eyes. Also, we saw that group B students after studying Ophthalmology showed more readiness for eye donation. Thus, studying the subject did have an impact on their knowledge and attitude. Still, just three-fourths of the students were willing for the same, showing area that could be worked upon.

The present study's results on knowledge and willingness to donate eyes resembled similar studies done on students from various backgrounds that varied from 64-87% [9-11,14]. Not surprisingly, these showed quite encouraging results. Contrarily, a study on the general population, both rural and urban was not very reassuring. In the urban population, 73.8% were aware of eye donations and only 44.9% were willing to pledge their eyes [17]. This showed that literate and young students were more sensitised to the noble cause.

The strength of the present study was its large sample size. Approximately 600 students were sent the questionnaire and 527 responded. Authors removed two questions from in-depth analysis as they felt them to be unclear and of personal nature in order to decrease bias; although these remained undetected even after the pilot study. It was the first study of comparison among medical students before and after reading 'Ophthalmology'.

Limitation(s)

The study did not take the picture of the whole population and thus cannot mimic the real situation. Also, the total number of responses for many questions was less than total respondents, maybe indicating that those who did not know, did not answer. Also, authors assumed that the difference between the groups was solely due to 'studying Ophthalmology' subject which may not be true. Besides, reasons for not being donors and the religion of the responder were not asked as we thought it was a personal question and could make the responder uncomfortable.

CONCLUSION(S)

The present study underscores that most of the students have good knowledge of eye donation procedure and practice and studying

'Ophthalmology' has a significant impact on the student knowledge. By means of this study, we wish to give future recommendations that as students of medical fraternity are quite well sensitised to the issue of blindness and eye donation and major chunk get employed in private and public sectors after completing graduation, after a short training, they can be mobilised to promote the cause or even perform eye donation as they have an extensive outreach in rural and urban areas (much more than ophthalmologists). Thus, a highly potential 'cornea retrieval chain' can be formed that increases the cornea donation manifold. This can decrease the root problem of avoidable corneal blindness. Moreover, there is a social stigma attached to eye donation; MBBS students because of the nature of their knowledge can convince others to overcome it.

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- Manual Googling: Nov 19, 2022
- iThenticate Software: Nov 24, 2022 (18%)

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