

**ORIGINAL ARTICLE****A 2-YEAR REVIEW OF OCULAR TRAUMA IN JIMMA UNIVERSITY SPECIALIZED HOSPITAL**Tsedeke Asaminew<sup>1</sup>, MD, Yeshigeta Gelaw<sup>1</sup>, MD,MMed, Fessehaye Alemseged<sup>2</sup>, MD,MPHE**ABSTRACT**

**BACKGROUND:** Ocular trauma is an important public health hazard with enormous human, social and economical consequences. Worldwide, there are about 1.6 million blind and 19 million with unilateral visual loss people from eye injuries. A study done at a teaching referral hospital in Addis Ababa revealed 15.8% of blindness to be attributed to trauma alone. But there are no researches done on patterns of ocular trauma in the study area. Thus, the objective of this study was to determine the pattern of ocular trauma among patients seen in Jimma University Specialized Hospital, Southwest Ethiopia.

**METHODS:** A 2-year retrospective review of records on 304 patients with ocular trauma seen from July 1<sup>st</sup>, 2006-June 30<sup>th</sup>, 2008 was done using a structured format. Data were analyzed using SPSS for Windows version 16.0. Associations between variables were checked by Chi-Square test and significance considered when  $p < 0.05$ .

**RESULTS:** Ocular trauma accounted for 1452(6.9%) of the 21165 ocular patients seen at the outpatient department in the aforementioned 2 years period. Of the studied 304 cases, 194(63.8%) were below age 30 with mean age 25.5(SD±15.6). Male to female ratio was 3.2:1. One hundred twenty one (39.8%) patients presented to hospital in 2-7days of injury. Duration of presentation had significant association with presence of infection and other complications ( $p$ -value<0.05). The causes of injury were violence related, domestic accidents and occupational in 51(16.8%), 40(13.2%) and 36(11.8%) of cases, respectively. Closed globe injuries accounted for 138 (45.4%), open globe injuries for 69 (22.7%) and adnexal injuries constituted 93 (30.6%). Rupture of the globe was seen in 14 (4.6%) while 15 (4.9%) cases were diagnosed with endophthalmitis.

**CONCLUSIONS:** Ocular trauma is found to be of a significant magnitude in the study area. Closed globe injuries are seen more than open globe injuries. Delay in presentation was associated with infections and other complications. We recommend preventing the injury/mechanisms to reduce occurrence of injury and promote early care seeking behavior.

**KEY WORDS:** ocular trauma, eye injury, Jimma, Ethiopia

**INTRODUCTION**

Ocular trauma, once described as the 'neglected disorder' (1) has recently been highlighted as a major cause of visual morbidity. Worldwide, there are approximately 1.6 million people blinded from eye injuries, 2.3 million bilaterally visually impaired and 19 million with unilateral visual loss this being the commonest cause of unilateral blindness today (2). Incidence for hospitalized ocular injuries varies among different countries (3-10). For instance, incidence is 4.9 in Italy(3), 13 in United States(7), per 100,000 while studies from India and Pakistan showed incidence of 20.53%(9) and 12.9%(10), respectively.

According to estimates by WHO, about 55 million eye injuries restricting activities for more than one day occur each year, 750,000 cases requiring hospitalization which includes 200,000 open globe injuries(2). Although it affects all age groups, the age distribution for

occurrence of serious ocular trauma is bimodal, with maximum incidence in young adults and another peak in the elderly. Different studies worldwide show ed that ocular trauma is more common in males and in those less than 30 years of age (4,5,11-17). The typical male to female ratio is 4:1 worldwide (5,15,16,18-22).

There is significant shift from workplace to home as a place of eye injuries as studies show (5,23-25). But the workplace remains the most important site in the developing countries (26). Street and highway as the site of injury increased from 15% in 1995 to 19% in 2005 in the United States Eye Injury Registry (USEIR) and reason for increase was found to be not road traffic accident but violence (5,20). Assault was the cause in 19% of injuries in the USEIR. Open globe injury is said to be more common worldwide (12,13,15,17,27).

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Study in Ghana showed ocular injuries constituting 6.2% of all admissions in the ophthalmologic unit (13). The same research also showed that ocular trauma is more common in males and in those less than 30 years of age with a mean age of 18.4 years. Most patients presented within 24 to 48 hours after trauma.

However, no studies had been carried out on patterns of ocular trauma in the study area.

The importance of prevention in ocular injuries should be emphasized as depicted by studies in the United Kingdom which showed that the introduction of windscreens and seat belt law changed patterns of ocular trauma (35-38). Also, a study in Singapore has shown low rate of protective goggle use at workplace in patients with ocular injury (6). Another prospective study in Cote d'Ivoire done on pediatric population has shown that most ocular injuries occurred during unsupervised play (27).

The impact of ocular trauma is not limited to the individuals' health only but also has profound socio-economical implications regarding the lost productivity by young men and requirement of caring facilities and rehabilitation for the elderly. The problem in developing countries is compounded by general lack of access to preventive health care at all levels (10). In spite of these facts, ocular trauma seems to be one of the most unrecognized major health problems globally and nationally (2). Effective prevention must be based on data collected and analyzed in a scientifically rigorous manner. Both clinical and population based researches prove essential in this aspect. The objective of this study is to assess the magnitude and pattern of ocular trauma in JUSH. Thus, this study will provide information on magnitude and patterns of ocular injuries at JUSH. It serves as the basis for designing and implementing preventive measures to be undertaken by respective bodies.

## METHODS and MATERIALS

A 2- year retrospective study was conducted on September 2008 in the Jimma University Specialized Hospital Department of Ophthalmology (JUDO). The maximum possible sample size was taken by making the proportion value 0.5 as there was no previous study in the study area showing the prevalence. Three hundred and four records of patients were selected by systematic sampling technique from registry out of a total of 1454 ocular trauma patients seen from July 1st, 2006 - June 30th, 2008. First registry number was selected randomly and then every 5<sup>th</sup> card of patients with ocular trauma in order of registry number was selected for the study.

Data were collected from the clinical records using a structured data collection format. It was edited cleaned, checked for completeness and cross-checked for

Eye injuries are the most common causes of monocular blindness in Ethiopia (28-30). A study on pattern of ocular injuries at Menelik II hospital revealed 15.8% of blindness to be attributed to trauma alone with a mean age of 26.4(31). People of age less than 30 years were predominantly affected with male to female ratio of 3.5:1 (31-34).

accuracy to ensure quality and was analyzed using SPSS for Windows version 16.0. Associations between variables were checked by Chi-Square test and significance was considered when  $p < 0.05$ .

The study was approved by Faculty of Medical Sciences and patients' records were kept confidential.

Operational definitions were according to World Health Organization (WHO) and Bermingham Eye Trauma Terminology System (BETTS) (5).

Blindness: Visual acuity  $< 3/60$ ,

Eye Wall: Cornea and Sclera.

Closed globe injury: No full thickness wound of the eye wall.

- Contusion: no full thickness wound, direct energy delivery (e.g. choroidal rupture) or due to change in shape of the globe (e.g. angle recession)

- Lamellar laceration: partial thickness wound of the eye wall

Open Globe injury: full thickness wound of the eye wall

- Laceration: full thickness wound at the impact site of a sharp object by outside-in mechanism

- Penetrating: entrance wound only

- Perforating: entrance plus exit wound

- Intra-ocular foreign body: technically a penetrating injury but grouped separately because of different clinical implications.

- Rupture: Full thickness wound by blunt object by inside out mechanism due to increased intraocular pressure.

- Adnexal injuries: Eyelid and/or conjunctiva injuries.

## RESULTS

It was found that of the 21165 new patients seen at the outpatient department 1454 were ocular trauma patients accounting for about 6.9%. The study showed that 194(63.8%) patients were below age 30 years with mean age of 25.5(SD±15.6) years. Male to female ratio of 3.2:1.0 (Table 1)

In 249(81.9%) cases the occupation was not documented excluding preschool ages (<6years) who were 18(5.9%). Of those 37 injured cases whom occupation was documented, 16(43.0%) were metal workers. Daily laborers, carpenters, housewives, mechanics, garage workers were other documented occupations.

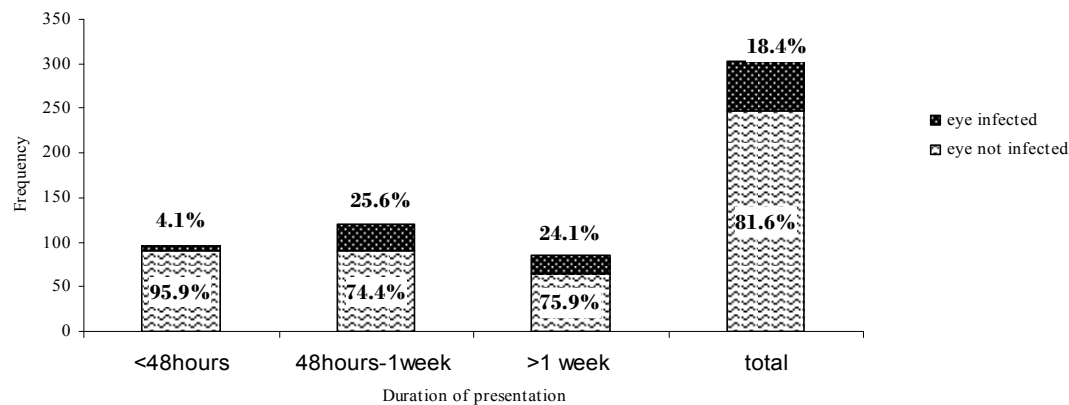
Only 96(31.6%) presented within 2 days, 121(39.8%) presented in 2-7 days, while 87(28.6%) after 7 days of injury. Fifty two (25.0%) of those who presented after 2 days were infected as compared to only 4(4.1%) of those who presented earlier with significant association ( $p = 0.0005$ ) (Fig 1).

Right, and left eyes were affected equally, 151(49.7%) and 151(50.0%), respectively. Only one patient had bilateral injury.

In 167(54.9%) of cases the circumstance or cause of injury was not documented. Among the documented, violence was the cause for 51(37.2%). Domestic accidents including falls 40(29.2%), occupation related 36(26.3%), and others 10(7.3%) like sports, recreational, road traffic accidents were other identified causes. In those 12 children less than 5 years domestic accidents or fall was commonest cause accounting for 10(83.3%) (Table 2).

**Table 1.** Age group and Sex distribution of ocular trauma patients seen at JUDO from July 1st 2006- June 30th 2008

Age group (years)	Sex		Total No. (%)
	Male No. (%)	Female No. (%)	
<5	8 (66.7%)	4 (33.3%)	12 (3.9%)
5-14	45 (71.4%)	18 (28.6%)	63 (20.7%)
15-24	69 (74.2%)	24 (25.8%)	93 (30.6%)
25-34	33 (75.0%)	11 (25.0%)	44 (14.5%)
35-44	37 (78.7%)	10 (21.3%)	47 (15.5%)
45-54	20 (87.0%)	3 (13.0%)	23 (7.6%)
55-64	16 (88.9%)	2 (11.1%)	18 (5.9%)
≥65	4 (100.0%)	0	4 (1.3%)
Mean age	25.7	20.1	25.5
Total	232 (76.3%)	72 (23.7%)	304 (100.0%)



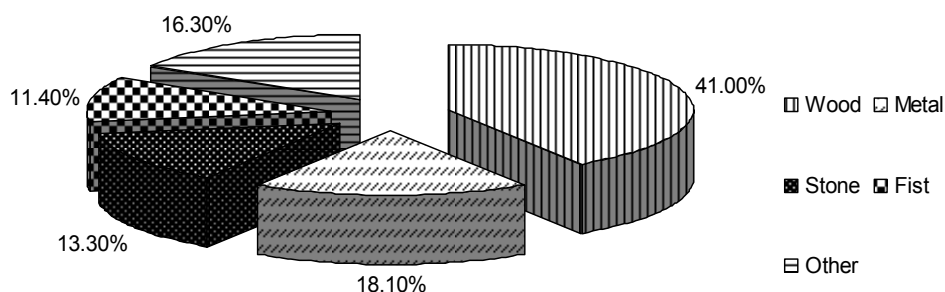
**Fig. 1** Eye infection among ocular trauma patients by duration of presentation, JUDO, July 1st 2006- June 30th 2008

**Table 2.** Cause of injury and sex distribution of ocular trauma patients seen at JUDO from July 1st 2006- June 30th 2008

Cause of injury	Sex		Total No. (%)
	Male No. (%)	Female No. (%)	
Violence related	33 (25.8%)	18 (25.0%)	51 (16.8%)
Occupation related	34 (14.7%)	2 (2.8%)	36 (11.8%)
Domestic accidents (fall,...)	28 (12.1%)	2 (16.7%)	40 (13.2%)
Sports, playing, recreational	4 (1.7%)	0	4 (1.3%)
Road traffic accident	3 (1.3%)	1 (1.4%)	4 (1.3%)
Others	2 (0.9%)	0	2 (0.7%)
Not documented, unknown	128 (55.2%)	39 (54.2%)	167 (54.9%)
Total (%)	232 (76.3%)	72 (23.7%)	304 (100.0%)

Documentation regarding the material of injury was also limited to only 166 (54.6%) cases. Of the documented ones, wood was the commonest material accounting for 68 (40.9%) followed by metal, 30(18.1), stone 22(13.3%), fist 19 (11.4%), others 27 (16.3%) like soap,

bottle, horn of a bull, etc. All metallic workers (welders) had their trauma from small metallic particles causing lamellar lacerations. Those injuries caused by fist (19) mostly 16 (84.2%) resulted in adnexal (conjunctiva and/or lid) injuries (Fig 2).

**Fig. 2:** Material of injury (only the documented/known) among ocular trauma patients seen at JUDO from July 1st 2006- June 30th 2008

Closed globe injuries were more encountered in 138 (45.4%), open globe injuries in 69 (22.7%) and adnexal injuries accounted 93 (30.6%), while 4 cases were difficult to classify due to inadequate and non-standard

documentation. The commonest 105 (34.5%) specific type of injury was lamellar laceration and rupture was seen in 14 (4.7%) cases (Table 3).

**Table 3.** Type of injury and final visual outcome among ocular trauma patients seen at JUDO from July 1st 2006-June 30th 2008

Type of injury	Final visual outcome , VA					Total No. (%)
	6/6-6/18 No. (%)	<6/18- 3/60 No. (%)	<3/60- NPL* No. (%)	Not documented No. (%)	Not cooperative No. (%)	
Closed globe injuries						
Lamellar laceration	8 (7.6%)	0	13 (12.4%)	78 (74.3%)	6 (5.7%)	105 (34.5%)
Contusion	0	3 (9.1%)	10 (30.3%)	20 (60.6%)	0	33 (10.9%)
Open globe injuries						
Penetrating	1 (2.2%)	3 (6.5%)	18 (39.1%)	21 (45.7%)	3 (6.5%)	46 (15.1%)
Perforating	0	0	6 (100.0%)	0	0	6 (2.0%)
Intra-ocular foreign body	1 (33.3%)	0	2 (66.7%)	0	0	3 (1.0%)
Rupture	0	0	14 (100.0%)	0	0	14 (4.6%)
Adnexal injuries	14 (15.1%)	2 (2.2%)	0	65 (69.9%)	12 (12.9%)	93 (30.6%)
Unclassified	0	0	1 (25.0%)	3 (75.0%)	0	4 (1.3%)
<b>Total</b>	<b>24 (7.9%)</b>	<b>8 (2.6%)</b>	<b>64 (21.1%)</b>	<b>187 (61.5%)</b>	<b>21 (6.9%)</b>	<b>304 (100.0%)</b>

Cornea was the most 192 (63.2%) affected part of the eye. In 52 (17.1%) of cases the lens was involved along with the cornea. Cornea-scleral injury in 45(14.8%), cornea with uveal-prolapse or damage in 27 (8.9%), corneo-scleral injury with lens involvement in 20 (6.6%), and corneo-scleral injury with uveal involvement in 16 (5.3%) were the other figures.

Complications at presentation were seen in 59 (19.4%) patients. Endophthalmitis occurring in 15 (4.9%) cases followed by traumatic cataract in 10 (3.3%), corneal opacity 9 (3.0%), hyphema 7 (2.3%), hypopyon 7 (2.3%), and others 11 (4.0%) like synechiae, phthisis bulbi, iridoplegia, glaucoma. Only 6 (6.25%) of the patients who presented earlier than 48 hrs had complications, while 51 (24.4%) of those who presented later than 48 hrs had one complication or another. Presence of complications was found to have significant association with duration of presentation (p value=0.0005) (table 4). Coming to the visual acuity at presentation, 129 (42.4%) had visual acuity of 6/6- 6/18 while 112 (36.8%) were blind at presentation i.e visual acuity of <3/60. One case was blind before the injury. Visual acuity was NPL in 44 (14.5%) cases.

Operative procedures were done for 116 (38.2%) cases. Corneal foreign body removal was the commonest procedure done accounting for 48 (15.8%) of the ocular trauma patients, followed by evisceration, 21 (6.9%), Corneal repair (4.9%), corneo-scleral repair (4.3%), cataract surgery (3.3%). Other procedures 9 (3.0%)

included uveal replacement, lid laceration repair, conjunctival repair, intra-ocular foreign body removal & retrobulbar alcohol injection.

Final visual outcome (at least one week after treatment) was difficult to analyze because of significant lack of documentation 187 (61.5%). But 64 (21.1%) of the ocular injuries were documented to have a blinding outcome i.e. visual acuity of <3/60.

## DISCUSSION

The magnitude of ocular trauma as a problem is depicted by the high figure of 6.9% out of total ocular patients seen in the outpatient department. This figure is significantly higher than that of the developed countries (3-10) and is comparable with a figure found in the research done in Ghana where it is 6.2% (13). It was found in this study that most ocular trauma patients were males (76.3%) and below age 30 (63.8%). Different studies worldwide show that ocular trauma is more common in males and in those less than 30 years of age(4,5,11-17). The same is true in our country (31-34). The mean age is 25.5(±15.6) years in this study which is comparable with a 1994 GC study done on patterns of ocular injuries at Menelik II hospital which showed a mean age of 26.4 (SD not reported)(31). Another recent (2001GC) study at the same hospital but with study population only on perforating injuries showed that 75.5% were below age 30 the mean age being 22.6(±4.2) years (35). A study done on blast injuries in Tigray showed the mean age to be 24 years (SD not reported) (33). The typical male to female ratio is 4:1 worldwide (5,15,16,18-22). But this study revealed the ratio to be 3.22:1 being comparable with the 1994 GC at Menelik II Hospital which was 3.54:1(31). The 2001 GC study on perforating injuries at the same hospital showed a male to female ratio of 3.42:1 (34). The explanation for this could

be the greater risky, occupation and stimulus to aggressiveness given to males in almost all societies or the better access to health services as seen in Ethiopia (34).

**Table 4.** Association of duration of presentation and presence of complications among ocular trauma patients seen at JUDO from July 1st 2006- June 30th 2008.

Duration of presentation	Presence of Complications		Total No (%)	P-value
	Yes No. (%)	No No. (%)		
<24 hrs	3 (5.8%)	49 (94.2%)	52 (17.1%)	0.0005
24-48 hrs	3 (6.8%)	41 (93.2%)	44 (14.5%)	
>48 hrs-1 week	22 (18.2%)	99 (81.8%)	121 (39.8%)	
After 1 week	31 (35.6%)	56 (64.4%)	87 (28.6%)	
Total	59 (19.4%)	245 (80.6%)	304 (100.0%)	

In the Ghana study most patients presented within 48 hours after trauma 57.3%(13). In this study, however, only 31.6% came within 48 hours which is almost the same as the 1994 GC study on patterns of ocular trauma at Menelik II hospital where the figure was 31.4% (31). The same study showed 21.0% of the patients arrived one week or later as compared to 28.6% in this study. In the 2001GC study on perforating injuries 39.2% of patients arrived within 2 days (48 hrs). The same study showed 33.6% of the patients arrived after one week or more (35).

There was no significant tendency towards right or left eye in this study, both being affected almost equally, 49.7% and 50.0% respectively. Also, the studies done in Ethiopia have not found any significant laterality towards either eye (31-34). For instance, the 1994 GC study study at Menelik II Hospital showed the right eye to be affected in 45.1% as compared to 47.7% on the left eye (31). In the 2001 GC study at the same hospital the left eye was injured slightly more (55.9%) of cases, but failed to establish significant laterality (34). The slight predominance of left eye injuries than right was explained by the fact that most people are right-handed and the left eye of the victim is the one which is more vulnerable to an attack from a right-handed person (34).

There is significant shift from workplace to home as a place of eye injuries as studies show worldwide (5,23-25). Assault was the cause in 19% of ocular injuries in the USEIR (5,20). The workplace remains the most important site in the developing countries (26). But in this study commonest causes of injury were violence (assault) related, 37.2% of the documented cases. This was also true in the 1994 GC Menelik II hospital where "assault" was the commonest cause accounting 32.5% (31). But commenting on the comparability of these results is difficult, because in 54.9% of cases the

circumstance or cause of injury was not documented in this study.

Of the documented ones, wood is the commonest material accounting 40.9% followed by metal 18.1%, and stone 13.3%. In the 1994 study at Menelik II hospital the commonest causes were described as "flying objects" (28.2%) which is difficult to compare, where the exact type of the material is not described in the latter study. The order of frequency of material of injury was similar to a study done on perforating eye injuries at Menelik II hospital wood (32.8%), metal (28.4%), stone (14.2%). But comparison is difficult in that there are too many non-documented cases (45.4%) in this study and the latter study has a different study population.

In this study, closed globe injuries (45.4%) were more encountered than open globe injuries (22.7%) in contradiction to the fact that open globe injury is said to be more common worldwide(12,13,15,17,27). This is not, however, a general truth. For instance, a study in Queensland, Australia has shown the closed globe injuries to be more frequent (68.6%)(39). This percentage should not be compared with this study because it excludes adnexal injuries. The 1994 study done at Menelik II hospital which included all types of injury "major and minor" reported only the involved part of the eye rather than using the standard BETT classification system (31). The other studies done in Ethiopia had their study population focused only on one type of injury (33-34).

Cornea was the most affected part of the eye (63.2%) which is also true in the studies done at Menelik II Hospital (33,34). This may be due to the anatomical position of the cornea being most anterior.

Delay of care is found to be a major cause of poor visual outcome in Nepal (23). But studies in Ethiopia didn't demonstrate this association though they agree delay of care is important cause of poor visual outcome (33-34). Although it was difficult to analyze the final visual

outcome due to inadequate documentation, this study has shown a significant association between duration of presentation and presence of infection at presentation (Chi square value=19.425, degree of freedom =3, p value=0.0005) and also with presence of complications (Chi square value=25.400, df=3, p value=0.0005) which may affect final visual outcome.

A study in Cote d'Ivoire (27) showed that open globe injuries resulted in final monocular blindness in 55% of patients which is comparable with this study where about 58% of the open globe injuries ended up in a VA of <3/60 (table 4). In this study 21.1% of the ocular injuries were documented to have a blinding outcome i.e. visual acuity of <3/60 (table 4). This is comparable with the 1994 GC study on patterns of ocular injuries at Menelik II Hospital where 20.86% had blinding outcome (31). The study done at the same hospital in 2001GC revealed 76.6% to be blind as a final outcome of the trauma (32). This figure is higher because the latter study was only on perforating eye injuries which may have a more damaging effect on the eye. Final visual outcome (at least one week after treatment) was difficult to analyze because of significant lack of documentation 187 (61.5%). One contributing factor to this could be patients' default to follow up.

In general, incompleteness of information, due to lack of documentation of occupation, cause, circumstance, and material of injury, final visual acuity in significant number of cases limited the study from testing associations among some variables and from making adequate conclusions. Direct comparison of this study with the data from some of the studies reviewed was difficult, in some aspects, due to the different classification, definition and methods of reporting used in these studies. However, it is possible to conclude from this study that delay in presentation was common. Moreover, a significant association is shown between delay in presentation and presence of infections and complications which may have a detrimental visual outcome. This study also has shown that domestic accidents are the commonest causes of ocular injuries in children. Thus, it is recommended preventive measures advocated by health workers to emphasize the importance of early health seeking behavior and follow up of patients with ocular trauma. Simple safety procedures like wearing seat belts in driving, protective goggles in welding, supervising children while playing, etc. should be advocated using mass media. It is further recommended that JUDO should design an urgent referral system for emergency care services for ocular trauma patients. It should improve its documentation system by designing a structured and standardized format to be used when clerking, treating and following up of ocular trauma patients which will help in doing more researches on the area which in turn are fundamental in planning its emergency care services.

## ACKNOWLEDGEMENTS

We would like to send our gratitude to W/t Mahlet for providing us the necessary data and information about JUDO.

A lot of thanks should go to the record office of JUDO and the SRP office of JU for its financial support of the study.

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