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Original Research Article

Intimate Partner Violence and a New Screening Score – A Prospective Observation Study Over Eight Years

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Abstract: Over the past 40 years, intimate partner violence (IPV) has evolved from an emerging social problem to a socially unacceptable crime. It is defined as any act of sex-based violence that results in physical, sexual, or psychological harm or suffering between partners. Although men do experience intimate partner violence, it is considerably more prevalent among women. 1.366 consecutive patients with diagnosed IPV were included in our study over a period of eight years (91.1% female). Mean age was 34 years (range 9 to 93). 56 (4.5%) reported pregnancy and 892 (65.2%) patients had a migration background. Data collection was performed prospectively and statistical evaluation was performed retrospectively. Correlation between IPV numbers and migration background was significant (MB 892 (65.3%) vs NMB 474 (34.7%) compared to the Viennese population (20.4%)($p<0.005$). Association between IPV cases and lunar phases was significant for absent moon 166 cases (weighted 29%) ($p<0.005$) compared to crescent (weighted 23.8%) or decrescent (weighted 22.4%) moon. Coherence between socioeconomic status and IPV could not be proofed. A total of 1.051 (76%) accepted inclusion in the victim protection program, and in 484 (35.4%) cases photographic documentation was performed. Those findings in our study population with 1.366 patients over a period of eight years have proven a significant correlation between migration background and lunar phases in IPV. Those data signal a need for policy and service design targeted at reducing IPV in patients. Our RIPV score might help to detect IPV victims more easier and precisely.

Keywords: intimate partner violence**,** migration background**,** lunar phases, trauma patients.

INTRODUCTION

Over the past 40 years, intimate partner violence (IPV) has evolved from an emerging social problem to a socially unacceptable crime [1]. IPV is also a major public health issue, with serious social, economic and health consequences [1]. It is defined as any act of sex-based violence that results in physical, sexual, or psychological harm or suffering between partners. Although men do experience intimate partner violence, it is considerably more prevalent among women [2].

IPV is common in the UK and USA, and around 30% of women and 16% of men have experienced some form of domestic abuse since the age of 16 years [3]. Women are 60% more likely to be murdered and more than twice as likely to be injured by an intimate partner compared with men [1]. It is also a fact that in the US IPV against women disproportionately affects ethnic minorities [1]. In Austria, 15% of victims of forcible assaults reported domestic violence as cause of injury - 75% of them were women [4]. A comparable study from Germany detected 70% women in an IPV collective within a period of three years [5].

When it comes to factors possibly influencing IPV in women, the literature has to be seen divided in some aspects. The influence of aggressive behaviour, alcohol and drug abuse, pregnancy and previous IPV cases in the personal history of the victim"s surrounding are agreed on by most authors [6-9]. When it comes to the possible influence of migration background and socioeconomic status of the victims, the literature is divided [6-12]. Even more suspicion exists when the possible influence of lunar phases in association with IPV is discussed [13-19].

It also has to be mentioned that even the detection or screening of possible IPV victims is a topic of hot discussion in the current literature [2,20-23]. Numerous assessment tools for IPV victims exist, but in

our opinion mostly reflecting only parts of the complex field of IPV and its multiple influencing factors [23].

Among the health care settings, the highest prevalence rates of IPV are found in the emergency departments (EDs) [24]. The incidence of acute IPV ranges from 2% to 14%, and cumulative lifetime prevalence of IPV has been reported as high as 54% in the ED setting [24]. Despite the high prevalence of IPV and the serious associated health consequences, screening and detection of victims remain low in the ED [24].

Up to now, little is known about IPV in Austrian patients treated at a Level I Trauma Surgery Department. The purpose of our study was to address the main questions related to IPV: (1) Screening, acceptance of the victim protection program and photographic documentation, (2) is migration background associated with increased IPV occurrence, (3) is there a relationship between the occurrence of IPV and moon´s phase, and (4) is there a significant linkage between poverty and IPV.

Based on our results and existing findings in the literature we present the RIPV (reversed intimate partner violence) score to better detect victims of domestic violence in the future.

METHODS

Data sources

A total of around 351.500 consecutive patients admitted to Dep. of Trauma Surgery, Medical University Vienna, from 01/2008 to 12/2015 have been considered eligible for inclusion. Out of this patient population a total of 1.406 cases associated with IPV have been consecutively and prospectively included in our in-house screening service for IPV cases, as required by Austrian law (§15 Wr. KAG, Victim protection program). Data collection was performed prospectively and statistical evaluation was performed retrospectively, approved by local IRB 1453/2016, as a registered trial NCT02937493.

Inclusion criteria

All cases with association to IPV during study period were eligible for inclusion. 40 individuals had to be excluded due to missing data resulting in 1.366 individuals that were included in our analysis. (Table 1) (Figure 1) Patients were identified from hospital in-patient enquiry system and in-house screening service for IPV. The IPV in-house screening service was established in 2008, and our Department represents a leading figure in detection and servicing victims of domestic violence. Our IPV in-house screening service is a routine procedure established 24/7 at clinics for all admitted patients.

If the slightest suspicion rose up, patients were asked by the attending physician or nurse, in a private and respectful manner, if a certainty of IPV exists, related to the actual presentation. If the patient admits the fact of IPV, this is noted in the hospital in-patient enquiry system, and a notification is sent to the local police station – as required by Austrian law. Part of our IPV in-house screening service, is the admission to the victim protection program and photographic documentation for legal utilization on behalf of the victim in an upcoming lawsuit, both services can be joined voluntarily by the victims.

Classification of migration background

Patients´ clinical and demographic data were retrieved from our database. Migration background was defined according to current law (MighEV §6, Sozialgesetzbuch) [25]. In detail this means that migration background is fulfilled, if (1) the person does not possesses the national citizenship, or (2) the origin of birth is outside the borders of the national country, and emigration to the national territory was after 1949, or (3) origin of birth of one of the two parents is outside the current borders of the national territory plus emigration of one of the two parents occurred after 1949.

The reason for using German law in an Austrian study is justified by a more practical and veridical approach of the German law in this particular matter. The corresponding Austrian law for defining migration background is almost identical, except for (3), where compared to Germany both parents have to be affected instead of one. The reason for explaining this matter in such a detail is to avoid any misleading conclusions, based on false assumptions.

Study population was divided into the following sub-groups: patients with migration background (MB), and patients without migration background (NMB), according to data retrieved from patient's medical records and inclusion criteria.

Classification of lunar phases

Adjustment of our dataset according to lunar phases was performed in collaboration with Central Institute for Meteorology and Geodynamics (Zentralanstalt für Meteorologie und Geodynamik, ZAMG), Vienna, Austria [46].

Classification of socioeconomic status

Socioeconomic status of the victim was assumed according to their zip code in correlation with a data adjustment with Statistics Austria, Vienna, Austria. The 23 districts of Vienna were subdivided in three groups: rich, middle class, and poor, according to data from Statistics Austria and government reports. Rich was defined as > 110% of average income; middle class 90-110% of average income; and poor <90% of average income; Districts for "rich" were considered: 1., 4., 7., 13., 18., 19., 23.; Middle class: 2., 3., 6., 9., 11., 14., 17., 21., 22.; Poor: 5., 10., 12., 15., 16., 20.;

Outcome measurement

The primary outcome measured was the association between migration background and IPV. Acceptance of the victim protection program and photographic documentation, relationship between the occurrence of IPV and moon´s phase, significant linkage between poverty and IPV, and other epidemiological facts were also observed.

RIPV score implementation

Based on our hypothesis for possible influencing factors and existing findings in the literature, we generated the RIPV score to detect possible IPV victims in the ED [2,4,6,21]. The score is characterised by 8 simple questions and covers the most prominent factors associated with IPV in women. Therefore the 8 questions are: 1. Is there any history of IPV? 2. Is there a substance abuse in your environment? 3. Is there a migration background? 4. Is there a poor socioeconomic status? 5. Absent moon? 6. Are you pregnant? 7. Female gender? 8. Age below 35 years? This score was retrospectively utilized in our study population to proof its possible effectiveness. (Table 2)

Statistical analysis

For statistical analyses we used the SPSS 16.0 software package (SPSS, Chicago, Ill., USA). Mean value and standard error of the mean were given unless otherwise indicated for continuous variables. Discrete data are presented as counts and percentages. A two-tailed p-value < 0.05 was considered statistically significant.

RESULTS

A total of 1.051 (76%) accepted inclusion in the victim protection program, and in 484 (35.4%) cases photographic documentation was performed.

Correlation between IPV numbers and migration background was significant (MB 892 (65.2%) vs NMB 474 (34.8%) ($p<0.005$). (Table 1) Gender distribution in both groups was equal. In 1057 (77.7%) cases the IPV was caused by males, in 78 (5.7%) cases by females, and in 231 (16.9%) cases the gender was unknown. In 360 (26.4%) cases battering was caused by the husband, 28 (2%) wife, 44 (3.2%) ex-husband, 4 (0.3%) ex-wife, 397 (29.1%) male part time lover, 20 (1.5%) female part time lover, 30 (2.2%) son, 7 (0.5%) daughter, former male partner 158 (11.6%), former female partner 7 (0.5%), 68 (5.0%) other male relatives, 12 (0.9%) other female relatives, 231 (16.9%) unknown, and others.

Association between IPV cases and lunar phases was significant with absent moon in 166 cases (weighted 29%) ($p<0.005$) compared to crescent (weighted 23.8%) or decrescent (weighted 22.4%) moon. (Table 3)

At the time of injury 579 (43.7%) patients were employed, versus 230 (16.9%) unemployed, 539 (39.4%) others. Coherence between socioeconomic status and IPV could not be detected. Distribution according to the districts of Vienna were as following: 1. 19 (1.4%) , 2. 68 (5.0%), 3. 55 (4.0%), 4. 31 (2.3%), 5. 52 (3.8%), 6. 45 (3.3%), 7. 28 (2.0%), 8. 31 (2.3%), 9. 59 (4.3%), 10. 114 (8.3%), 11. 47 (3.4%), 12. 75 (5.5%), 13. 7 (0.5%), 14. 39 (2.9%), 15. 82 (6.0%), 16. 93 (6.8%), 17. 64 (4.7%), 18. 69 (5.1%), 19. 81 (5.9%), 20. 98 (7.2%), 21. 92 (6.7%), 22. 25 (1.8%), 23. 24 (1.8%), and other not from Vienna 68 (5.0%).

In 745 (55%) cases patients were admitted by ambulance, 621 (45%) case were walk-in patients. Allocation according to the anatomical localization was as follows: Head 963 (70.5%), thorax 138 (10.1%), abdomen 24 (1.8%), upper extremity 163 (11.9%), lower extremity 56 (4.1%), other 22 (1.6%).

47 (3.4%) patients were injured by stabbing, 1.195 (87.5%) were punched, 48 (3.5%) were hit by leg, 36 (2.6%) strangulated, and 40 (2.9%) other.

48 (3.5%) patients were pregnant at the time of injury, range of pregnancy weeks from 5 to 38. In 98 (7.2%) cases the victim was under the influence of alcohol.

We retrospectively tested the RIPV score in our study population and found that > 3 out of 8 questions answered with “yes” predict a relatively high risk for IPV. (Table 4)

Table 1: Illustrates the general patient characteristics, including gender distribution, migration background, lunar phases and socioeconomic status

	n	**%**
Total patients	1.366	100
Gender		
Male	122	8.9
Female	1.244	91.1
Age		
Total mean in years 34 (range 9 to 93)		
<18	66	4.8
≥18	1.300	95.2
Admission		
Clinics	1149	84.2
In-patient	217	15.8
Patient distribution		
Walk-in	621	45
Ambulance	745	55
Location of IPV		
Domestic	837	61.2
Outside	529	38.8
Pregnant	56	4.5
Rape cases	21	1.6
Repeated IPV incidence	27	2.0
1st readmission	18	1.3
2nd readmission	6	0.4
3rd readmission	3	0.2
Employment		
Employed/professional	579	42.4
Unemployed	499	36.5
Other	270	21.1
Migration background		
MB	892	65.2
NMB	474	34.8
Lunar phases		
Absent moon	166	(weighted 29%)
Crescent moon	544	(weighted 23.8%)
Decrescent moon	514	(weighted 22.4%)
Full moon	142	(weighted 24.8%)
Socioeconomic status*		
Rich	259	20.4
Middelclass	494	39.0
Poor	514	40.6
Victim protection program	1.051	76
Picture documentation	484	35.4
Police known	746	54.6
Victim UI**	98	7.2

*Rich >110% of average income; Middel class 90-110%; Poor <90%; ** UI=under influence of alcohol
MB=migration background; NMB=non migration background

Table 2: Describes the revised intimate partner violence score (RIPV) containing 8 questions

RIPV - Revised Intimate Partner Violence Score	
Question	Points
1. Is there any history of IPV?	1
2. Is there a substantive abuse in your environment?	1
3. Is there a migration background?	1
4. Is there a poor socioeconomic status?	1
5. Absent moon?	1
6. Are you pregnant?	1
7.Female Gender	2
8.Age below 35 years	2
Yes =1 point; No= 0 points; (Q 7. & 8. Yes=2 points);	
>3 points represents a relatively high risk for IPV	

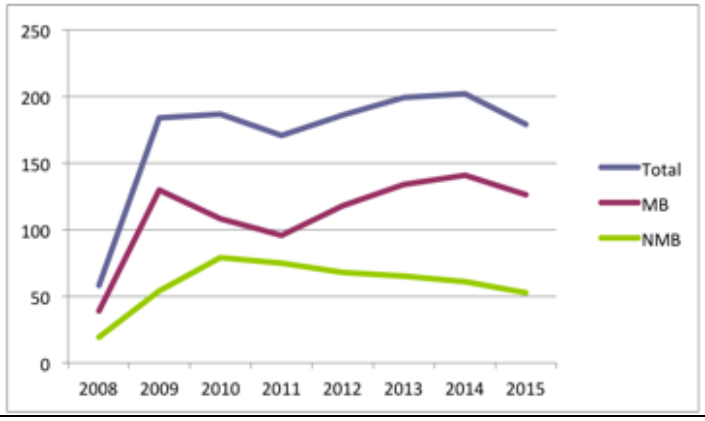
Table 3: Describes the association between lunar phases and the total study population, the MB and NMB subgroups

Lunar phases	Total		MB		NMB	
	n	%	n	%	n	%
Absent moon	166	12.2	100	11.2	66	13.9
Crescent moon	544	39.8	357	40	187	39.5
Decrescent moon	514	37.6	341	38.2	173	36.5
Full moon	142	10.4	94	10.5	48	10.1
P*	<0.001		0.2		<0.001	
MB=migration background; NMB=non migration background; *p-value weighted for period						

Table 4: Describes the findings in our study population in relation to the RIPV score.

Question	n	%
1. Is there any history of IPV?	36	2.7%
2. Is there a substantive abuse in your environment?	92	7.2%
3. Is there a migration background?	892	65.3%
4. Residence in a district with lower income?	514	37.6%
5. Absent moon?	166	12.2%
6. Are you pregnant?	48	3.9%
7. Age below 35 (2 Points)	806	59,00%
8. Female gender (2 points)	1245	91.1%

Yes =1 point; No= 0 points; >3 points represents a relatively high risk for IPV (96%)



Deviation according to years								
	2008	2009	2010	2011	2012	2013	2014	2015
Total	58	184	187	171	186	199	202	179
MB	39	130	108	96	118	134	141	126
NMB	19	54	79	75	68	65	61	53
MB=migration background; NMB=non migration background;								

Fig-1: Describes the total number of patients per year including the subgroups MB and NMB

DISCUSSION

To the best of our knowledge, our study is the first of this kind conducted in Austria. The total number of cases and the inclusion 24/7 over an 8 years period is outstanding in the existing literature in relation to this topic. Therefore we discuss in detail our main questions associated with IPV.

Screening, acceptance of the victim protection program and photographic documentation

Based on our results and experience over eight years in detecting IPV victims in the ED and in walk-in clinics, we think that personal questioning if suspicion arises has two major advantages compared to other screening tools – the approach is more personal for the victim and the procedure is more target oriented for the treating personal. Those assumptions are in line with the current literature [2,6,21].

In our study population 76% of positive screened victims were included in the victim protection program. When we looked in the literature to compare our results with others, two striking findings made a comparison almost impossible: (1) the restricted inclusion period compared to our 24/7 approach; (2) the relatively low number of patients [6,21]. IPV screening was performed from 09:00 to 17:00 in the study by Warren-Gash, missing 16 hours of possible screening, compared to the study by Burkert *et al.* [4] and our results. Other papers do not give specific information related to this matter [7,22,24,27].

Photographic documentation was performed in 484 cases representing 35.4% of the total study population. The relatively low number compared to 76% included in the victim protection program can be interpreted as a sign of distrust in the public system related to data misuse or as an inhibition threshold to being confronted with the own injuries and misery forthright.

Warren-Gash reported 7.1% IPV victims with a total period of 9 months (total study cohort 10.158), whereas Mutschler *et al*. detected 1.4% IPV cases in a period of 24 months (total cohort of 13.880) [5,20]. This is in contrast to our findings with only 0.4% patients associated with IPV. Due to our catchment area, inclusion criteria and the 24/7 approach we therefore think that our data might be a more reliable source for further investigations in this direction, compared to others [5,20].

Migration background associated with increased IPV occurrence

Racial composition in IPV is another interesting aspect, seldom discussed due to its ambivalent affection [13,26-29]. Our study population showed a significant association (65.2% MB, $p<0.005$) between migration background and IPV. This is very interesting when comparing our IPV collective with the total population of Vienna (20.4% MB) [30]. Our results are comparable to the study by Mutschler *at al.*, describing a total of 45% female and 36% male IPV victims with migration background [5]. When interpreting those data one should have in mind the different definitions in Austria and Germany, possibly resulting in a false low prevalence of MB in officially Austrian data sources for Vienna.

Our findings are in contrary to a finding by Sugg et al. stating no differences in women's race when it comes to IPV [29]. Masho *et al.* could detect in a study with 108.220 women significant ethnic differences in the association between IPV and unintended pregnancy [13]. Additionally, the association differed by marital status [13]. According to the 2010 National Intimate Partner and Sexual Violence Survey, non-Hispanic Black and Native American/Alaska Native women reported higher prevalence rates of lifetime IPV (43.7% and 46% respectively) compared to non-Hispanic White women (34.6%); the rate for Hispanic women was slightly higher (37.1%) [1,31]. These disproportionate rates have also been consistently documented in multiple US studies [31,32]. This goes also hand in hand with the influence of migration. Marginalized populations such as women who are foreign born, are also more likely to experience IPV than those born in the U.S. [31]. Physically abused Latinas residing in the US but born in Mexico, Central America, South America, and the Caribbean are more likely to experience sexual IPV compared to their counterparts born in the US [31-33]. Moreover, 48% of Latinas in another study reported that their partners' violence had increased after they immigrated to the U.S. [31,34,35]. Asian immigrant women also experienced high rates of IPV, with community-based studies based on non-representative samples documenting rates between 24% and 60% [31,36-38].

In a study investigating IPV in a total of 804 Thai women residing in Sweden, 22.1% reported lifetime exposure to IPV and 9.2% had been exposed to IPV since they had moved to Sweden. It should be noted that IPV by a current partner was rather low (6.7%) compared to previous experiences of abuse (20.5%) [10].

Many immigrant women experienced IPV in the context of language difficulties, confusion over their legal rights, and overall stress of adaption to new cultural and social structures [31]. Immigrant women are especially vulnerable because of poverty, social isolation, disparities in economic and social resources and immigration status [31]. Pregnant, disabled and ethnic minority women are the groups most often mentioned in relation to IPV [9]. Teng *et al.* stated that poor social integration is a key risk factor, and social services aimed to reduce IPV and integrate migrants in their new communities [11]. This is also in line with the

finding by O`Connoer *et al*. that the exacerbation of domestic violence by migration is a salient social determinant proof of mental health [12].

Relationship between the occurrence of IPV and moon´s phase

Our results proved a significant association between lunar phases and IPV. The belief that the moon exerts an influence on human affairs has survived rather obstinately through history [39]. According to the existing literature, the assumption that lunar phases exert an influence on human behaviour remains a controversial one [16-19,39,40]. Lieber´s book "How the moon affects you" became a best-seller and is still in print, although his results have not been replicated [39,40].

There is a certain amount of modern literature reporting that different lunar cycles are associated with an increase in aggressive behaviours [14,15], the incidence of certain diseases [41], and the number of spontaneous births [42].

A study by Biermann *et al*., investigating the relationship between lunar phases and serious crimes of battering, showed no significant association between lunar phases and observed crimes [16]. Despite that fact, the authors observed an increase in violent crimes committed during full moon and in outdoor locations during the waning moon, especially among male offenders [16]. This is in accordance with another study, stating that a significant association between crime and full moon exists in India [14]. Two other studies also proved findings in this direction in association with moon´s phases [43,44].

Other authors conclude, that no significant relationship between violence or trauma and any phase of moon exists [20]. Nevertheless, it remains questionable whether the moon exerts an immediate or delayed influence on human behaviour by affecting hormonal and neurotransmitter systems or perceived sleep quality [16]. Owen et al. concluded, that a perceived lunar influence might exist, although it is not detectable by statistical methods [20].

The mentioned findings of higher criminality during full and crescent moon have to be seen also under the possible influence of improved visibility during nights of full moon, as well as possible perceptions of offenders themselves [16,17].

As a possible limitation to our findings we have to admit that we detected a significant association between lunar phases and IPV, but we are unable to explain why we succeeded and others failed before.

Linkage between socioeconomic status and IPV

Another aspect influencing IPV cases is the household income. As stated under results, we could not detect a significant association between IPV and socioeconomic status. In our study population the distribution of IPV cases was almost equal between middle class and poor people, leading to the conclusion that IPV is not a phenomenon of the underprivileged. This is in sharp contrast to other findings in the literature [6,8,45].

A study by Fanslow *et al.* conducted in New Zealand found out, that increased household income and both the respondent and her partner being employed, were associated with reduced likelihood that women would experience current as opposed to prior IPV [45]. This is also confirmed by a study from Iran, showing that women with lower education and living in low income households reported more intimate partner violence during pregnancy than well educated and affluent women [8].

While interpreting those data one has to keep in mind two main influencing factors leading to possible bias: (1) the estimated number of missed reports, almost impossible to reflect in a study, (2) the possible lower number of reported IPV cases in the rich group due to the existing social stigma and the less likely attendance of public hospitals by this group.

Reasoning for implementing the RIPV score

One has to face the question: do we really need another score to detect possible IPV victims? According to the CDC report about the existing scores to screen or detect possible IPV victims, more than 30 scores already exist [46]. When you go into the detail of those scores you can find the following characteristics: 18 out of 33 retrieve the possible influence of aggressive behaviour and previous history of IPV; 4 out of 33 retrieve the possible influence of pregnancy; 3 out of 33 retrieve the possible influence of substance abuse; 2 out of 33 retrieve the possible influence of poor socioeconomic status, and only one reflects the possibility of migration background as a risk factor.

Those findings, according to our results, support the strong desire to improve the existing scoring systems in a practical and reasonable manner. Therefore we implemented the RIPV score as described in the Methods section. We retrospectively tested our score in our study population concluding that >3 "yes" out of 8 questions represents a relatively high risk for IPV.

We think that this is a promising path to make screening IPV victims easier for the physician and therefore improve the victims' chances to be detected and supported with their burden. The usefulness of our score has to be proven in further trials.

CONCLUSION

Our findings in a study population of 1.366 patients over a period of eight years have proven a significant correlation of migration background and

lunar phases with IPV. These data signal a need for research, policy and service design targeted at reducing IPV. Our newly implemented RIPV score might help to detect IPV victims more easily.

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